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NSA MID SOUTH
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STATEMENT OF BASIS SOLID WASTE MANAGEMENT UNIT 9 SEWAGE LAGOONS
MILLINGTON SUPPACT TN
12/1/2005
STATE OF TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

**STATEMENT OF BASIS**

***SWMU 9 — Sewage Lagoons***
***Naval Support Activity Mid-South***
***Millington, Tennessee***

## Purpose of the Statement of Basis

This Statement of Basis (SB) has been prepared to inform the public and provide an opportunity to comment on the proposed remedy at solid waste management unit (SWMU) 9 — Sewage Lagoons at Naval Support Activity (NSA) Mid-South, Millington, Tennessee. NSA Mid-South is responsible for corrective action at SWMU 9 as a result of its Resource Conservation and Recovery Act (RCRA) permit. The Tennessee Department of Environment and Conservation (TDEC) has determined that the proposed remedy for SWMU 9, instituting land-use controls (LUCs) banning fishing and prohibiting the use of site's groundwater as a drinking water source, is protective of human health and the environment.

Before the remedy is finalized, TDEC would like to give the public an opportunity to comment on the proposed remedy. At any time during the public comment period, the public may comment as described in the following section "How Can You Participate?" Upon closure of the public comment period, TDEC will evaluate all comments and determine if there is a need to modify the proposed remedy.

### Site Description

SWMU 9, located on NSA Mid-South's Southside (Figure 1), consists of a western (400,000-square-foot) and an eastern (141,000-square-foot) sewage lagoon. From 1969 to 1978, the lagoons were used as part of NSA Mid-South's wastewater treatment system, receiving domestic and industrial wastewater from NSA Mid-South aircraft maintenance operations. To determine whether these former activities posed a risk to human health and/or the environment, the lagoons underwent characterization under the Resource Conservation and Recovery Act (RCRA) program.

## How Can You Participate?

TDEC solicits public review and comments on this SB prior to implementation of the proposed remedy as the final one. The final remedy for SWMU 9 will be incorporated into the Hazardous and Solid Waste Amendments Permit TNHW-094 for NSA Mid-South, scheduled to be updated in 2006.


Figure 1 SWMU 9 at NSA Mid-South, Millington, Tennessee

Public comment on this SB and the proposed remedy will begin on the date that a notice of the SB's availability is published in *The Millington Star* and *The Commercial Appeal*, local daily newspapers. Since community input could affect selection of a final remedy for SWMU 9, a public comment period has been established for 45 days from ***(insert date)***. If requested during the comment period, TDEC will hold a public meeting to respond to any comments or questions regarding the proposed remedy. To request a hearing or to provide comments, contact the following person in writing within the 45-day comment period:

**Mr. Roger Donovan**
**TDEC — Division of Solid Waste Management**
**5th Floor, L&C Annex**
**401 Church Street**
**Nashville, TN 37243-1538**
**Telephone: (615) 532-0864**
**Email: roger.donovan@state.tn.us**

Investigative reports and documents related to SWMU 9 are referenced at the end of this SB and are included in the Administrative Record, which can be reviewed in the Information Repository that was established to provide public access to documents pertaining to the Navy's environmental program. The Information Repository is maintained at:

**Millington Civic Center**
**8077 Wilkinsville Road**
**Millington, Tennessee 38053**
**(901) 873-5770**

## Background Summary

Past operations at the former Naval Air Station (NAS) Memphis included metal plating, manufacturing, and other operations that involved the use of toxic and hazardous materials. Land use changed as a result of the 1990 Base Closure and Realignment (BRAC) Act, and the name of the facility was changed from NAS Memphis to NSA Mid-South.

A significant portion of NSA Mid-South's Northside was transferred to the city of Millington, and the remaining property, including SWMU 9, was realigned (i.e., an operation was reassigned from NSA Mid-South to another facility, and/or an operation from another facility was reassigned to NSA Mid-South). Three facility operations changed: (1) Navy airfield operations ceased in October 1995, (2) training operations were realigned to NAS Pensacola in 1996, and (3) administrative operations for the Navy Bureau of Personnel were realigned from Washington, D.C., to NSA Mid-South in 1997. SWMU 9 is part of the remaining NSA Mid-South property.

As part of NSA Mid-South's wastewater treatment system, receiving both industrial and domestic wastewater, the lagoons are identified as SWMU 9.

The lagoons were initially evaluated through a Confirmation Study, Verification Phase (CS/VP) that evaluated metals in lagoon sediments (Geraghty & Miller, 1985). Elevated metals were not detected in sediment; however, given the history of the site and the limited data set, the 1990 *RCRA Facility Assessment Report* (RFA; ERC/EDGe, 1990) recommended the site be further evaluated due to the lack of data, at which point the site was designated a SWMU.

As required by the Navy's RCRA Permit, NSA Mid-South is required to evaluate and assess all SWMUs for potential environmental impacts. Due to the former receipt of domestic and industrial waste at the site, the sewage lagoons were designated as a site warranting further evaluation to determine whether they posed a risk to human health and the environment.

The subsequent RCRA Facility Investigation (RFI; EnSafe, 2000) focused on the nature and extent of contamination in soil along the lagoon perimeters, groundwater adjacent to the lagoons, sediment in the lagoons, sediment and surface water in the adjacent Big Creek Drainage Canal, and fish inhabiting the lagoons. Analytical results from the RFI resulted in the land-use control that prohibits both recreational fishing at the site and use of the site's groundwater. The basis for this remedy is provided under the "Summary of Contaminant Evaluation" and the "Summary of Site Risk" sections of the SB.

## Summary of Contaminant Evaluation

Soil and groundwater sample locations from the RFI are provided in Figures 2 and 3 (Attachment 1), respectively. Sediment and surface water sample locations are provided in Figure 4 (Attachment 1). A summary of the number of samples collected from each media is provided below with a summary of the detected chemicals.

### *Soil*

The soil data set is based on eight surface soil samples collected from locations encircling the two lagoons (009S0001 through 009S0008); 15 subsurface soil samples collected from the perimeter and base of the lagoon (009S0009 through 009S0023); and four surface and 12 subsurface samples collected from the monitoring well soil borings, located at the four corners of the site (009S01DA through 009S04DA). Soil sample locations are provided in Figure 2 (Attachment 1).

Benzo(a)pyrene, a semi-volatile organic compound, is the only contaminant found in soil exceeding a regulatory screening standard. It was detected above the U.S. Environmental Protection Agency's (USEPA) residential risk-based concentration (RBC-Res; 78 ppb) in one sample (180 ppb in sample 009S0007).

### *Groundwater*

The groundwater data set is based on 15 samples collected using direct-push methods (009G0009 through 009G0023) and from four monitoring wells (009G01DA through 009G04DA). Groundwater sample locations are provided in Figure 3 (Attachment 1).

Contaminants found in samples exceeding USEPA RBC screening values and/or regulatory screening standards included the volatile organic compounds (VOCs) trichloroethylene (TCE), chloroform, and tetrachloroethylene (PCE); total petroleum hydrocarbons - diesel range organics (TPH-DRO); and the metal, arsenic. Table 1 lists the maximum chemical concentration in groundwater detected above their respective screening criteria.

**Table 1**
**Groundwater Contaminants Exceeding Risk or Regulatory Based Screening Criteria**
**(maximum detections in ppb) [a]**

| Sample Location | Analyte | Result | RC[b] | MCL[c] | RBC-Tap Water[d] |
|---|---|---|---|---|---|
| 009G0023 | TCE | 11 | NA[e] | 5 | 1.6 |
| 009G01DA | PCE | 1.3 | NA[e] | 5 | 1.1 |
| 009G0014 | Chloroform | 1 | NA[e] | 80 | 0.15 |
| 009G03DA | TPH-DRO | 230 | NA[e] | NA[f] | 100[f] |
| | Arsenic | 12.2 | 4.2 | 50 | 0.045 |

***Notes:***

[a] — ppb = parts per billion
[b] — RC is equal to twice the mean background concentration established for NSA Mid-South (E/A&H, 1996).
[c] — Maximum Contaminant Levels (MCLs) in drinking water are from the *Drinking Water Regulations and Health Advisories* (USEPA, 1996).
[d] — Tap water RBC is from the *Risk-Based Concentration Table*, April 2000 (USEPA, 2000).
[e] — NA denotes comparison is not applicable.
[f] — No Tap Water RBC or MCL exists for this compound, so TDEC's drinking water aquifer standard was used.

The RFI report recommended additional groundwater monitoring to verify the PCE detection in well 009G01DA and TPH in well 009G03DA. Both contaminants were absent in a subsequent monitoring event presented in a revision to the RFI (EnSafe, 2000).

### *Surface Water*

Surface water samples were collected from 10 locations (009W0001 through 009W0010) within the sewage lagoons and the Big Creek Drainage Canal—the discharge body for the lagoons. Sample locations are provided in Figure 4 (Attachment 1). None of the samples was found to contain organic or inorganic constituents at concentrations exceeding regulatory and screening standards for groundwater (EnSafe, 2000).

### Sediment

Twelve sediment samples were collected from the sewage lagoons and Big Creek Drainage canal from locations that are generally submerged throughout the year. Sediment sample locations 009M0001 through 009M0012 are shown on Figure 4 (Attachment 1).

VOCs, SVOCs, TPH, pesticides/polychlorinated biphenyls (PCBs), organophosphorus pesticides, herbicides, and metals were detected in sewage lagoon sediment samples and/or Big Creek Drainage Canal sediment samples. Table 2 lists the chemicals detected above the sediment screening values (SSV) based on the maximum detections from eight samples collected in the sewage lagoons and three samples in Big Creek Drainage Canal.

**Table 2**
**Exceedances in Sediment (ppm[a])**

| Sample Location | Contaminant | Maximum Detected Concentration | SSV[b] |
|---|---|---|---|
| 009M0001 — 009M0008 (0"-6") sewage lagoons | Aroclor-1254 | 0.950 | 0.033 |
| | Arsenic | 8.3 | 7.24 |
| | Copper | 162 | 18.7 |
| | Mercury | 2.1 | 0.13 |
| | Silver | 21 | 2.0 |
| | Lead | 45.7 | 30.2 |
| | Chromium | 57.1 | 52.3 |
| | Zinc | 303 | 124 |
| | Nickel | 24.2 | 15.9 |
| | BEHP | 1.7 | 0.182 |
| 009M0009 — 009M0011 (0"-6") Big Creek Drainage Canal | Cadmium | 4.0 | 1.0 |
| | 4,4'-DDD | 0.140 | 0.003 |
| | Dieldrin | 0.0035 | 0.003 |
| | Arsenic | 32 | 7.24 |
| | Lead | 44.7 | 30.2 |
| | 4,4'-DDT | 0.150 | 0.003 |
| | Nickel | 22.2 | 15.9 |

***Notes:***
[a] — Units in parts per million (ppm)
[b] — Sediment Screening Value (SSV); values obtained from the *Ecological Screening Values – Ecological Risk Assessment Bulletin No. 2* (USEPA, 1999)

### Fish Tissue

Of the three samples of fish tissue collected from the sewage lagoons, all contained exceedances of 4,4'-DDE, a pesticide, and Aroclor-1254 and Aroclor-1260, which are PCBs; one sample contained an exceedance of the metal arsenic. Individual exceedances of the respective RBCs for fish tissue consumption are shown in Table 3.

**Table 3**
**Exceedances in Fish Tissue Samples (ppb[a])**

| Sample Location | Contaminant | Result | RBC — Fish Tissue[a] |
|---|---|---|---|
| 009J010001 (East Lagoon) | 4,4'-DDE | 88 | 9.3 |
| | Aroclor-1254 | 100 | 1.6 |
| | Aroclor-1260 | 100 | 1.6 |
| 009J020001 (West Lagoon) | 4,4'-DDE | 42 | 9.3 |
| | Aroclor-1254 | 280 | 1.6 |
| | Aroclor-1260 | 79 | 1.6 |
| 009J020002 (West Lagoon) | 4,4'-DDE | 27 | 9.3 |
| | Aroclor-1254 | 180 | 1.6 |
| | Aroclor-1260 | 38 | 1.6 |
| | Arsenic [c] | 30 | 2.1 |

***Notes:***
[a] — Units in parts per billion (ppb)
[b] — RBC for fish tissue consumption based on adult exposure; values obtained from the *Risk-Based Concentration Table*, April 2000 (USEPA, 2000).
[c] — Units in parts per million (ppm)

## Summary of Site Risk

As part of the RFI, risks to human health and the environment from the contaminants identified at SWMU 9 were evaluated using human health and ecological risk assessments, which were developed in accordance with existing USEPA and TDEC methods.

### Human Health Risk

Human health risk at SWMU 9 was assessed using four scenarios: site worker, child trespasser, construction worker, and future site resident. Ecological risks were evaluated using terrestrial and aquatic endpoints. Table 4 summarizes the populations and exposure media and indicates those that were further evaluated in the risk assessment. A discussion of each media, the chemicals of concern associated with that media, and populations that could be at risk are discussed below.

**Table 4**
**Potentially Exposed**
**Populations and Exposure Media**

| Population | Soil & Surface Water | Sediment | Groundwater | Fish Tissue Ingestion | Air (from Groundwater) |
|---|---|---|---|---|---|
| Site Worker | a | a,b | X | NA | X |
| Trespasser | a | a,b | NA | X | NA |
| Construction Worker | a | a,b | NA | NA | c |
| Resident | a | a,b | X | X | X |
| Ecological Receptor | X | X | NA | NA | NA |

***Notes:***

**a** — No chemicals of potential concern were identified during initial screening; therefore, these exposure media were not evaluated further for the indicated populations

**b** — Sediment excluded from human health risk assessment based on USEPA Region 4 *Supplemental Guidance to RAGS*, which assumes exposure to submerged sediment would be insignificant

**c** — Addressed by site worker scenario based on a longer exposure duration and frequency

**NA** — Not applicable

**X** — Evaluated in SWMU 9 RFI risk assessment

- ***Soil, Sediment, and Surface Water***
  No chemicals of concern were identified for any of the scenarios evaluated for soil, sediment, or surface water.

- ***Groundwater***
  Arsenic, chloroform, and TCE were identified as chemicals of concern under a hypothetical site worker and residential scenario. It should be noted that there are no potable water wells that access the aquifer where these contaminants reside.

- ***Fish Tissue Ingestion***
  Fish tissue ingestion was evaluated for the resident and trespasser scenarios. Chemicals of concern were identified for both of these scenarios based on the following chemicals of concern in fish tissue: 4,4'-DDE, arsenic, Aroclor-1254, and Aroclor-1260.

- ***Air***
  The VOCs TCE, PCE and chloroform were all below their respective UESPA target groundwater thresholds (USEPA, 2002) used to gauge whether the contaminants could pose an indoor air quality/inhalation hazard to future site occupants.

### Ecological Risk

Risks to terrestrial receptors were predicted for the hawk, rabbit, and robin based on initial screening comparisons. Risks were concluded to be minimal for the rabbit and robin, whereas a greater potential risk was concluded for the red-tailed hawk due to the pesticide DDT and its metabolites (DDE/DDD) in fish tissue. However, the ecological risk assessment concluded that given the large forage area (typically more than 500 acres) for predatory species and the abundance of other suitable open-field habitats, it is unlikely that the site would be the preferred feeding grounds for the red-tailed hawk (EnSafe, 2000)

## Selected Remedy

The RFI recommended a land-use control that bans fishing as the remedy to address contaminants found in fish tissue at SWMU 9. Since the VOCs were not detected in subsequent groundwater monitoring and they were limited spatially to two of 15 sample locations, the RFI recommended no further action (EnSafe, 2000). TDEC and USEPA approved the RFI in March and June of 2001, respectively.

The remedy for the site is land-use controls that restrict fishing and use of the site's groundwater as a potable water source. Even though municipal water serves the base and local ordnances prohibit use of the site's groundwater, the groundwater-use restriction will ensure protections remain in place.

A land-use control implementation plan (LUCIP) will be developed to establish the remedy requirements and will be incorporated into the NSA Mid-South's Regional Shore Infrastructure Plan (RSIP). As a minimum, the LUCIP will include the following:

- Location of land subject to LUC
- Explanation of LUC (e.g., signage and fencing requirements, restrictions, etc.)
- Duration of the LUC
- Requirements and frequency of LUC inspections, including documentation requirements.

Since TDEC's goals for human health and ecological risks have been met, no alternative remedies were evaluated. The Navy's proposed remedy is considered protective of human health and the environment. The remedy meets the four general standards of corrective measures, which are:

- Overall protection of human health and the environment
- Attainment of media cleanup standards
- Controlling the sources of release
- Compliance with standards for management

## References

EnSafe Inc. (2000, October 6). *RCRA Facility Investigation Report; Assembly E—SWMUs 2, 9, 14, 38, 59, and 65. NSA Mid-South, Millington, Tennessee.* Revision 2. Memphis, Tennessee.

EnSafe/Allen & Hoshall. (1996, August 27) *Technical Memorandum – Reference Concentrations.* Memphis, Tennessee.

ERC/EDGe. (1990, September). *RCRA Facility Assessment (RFA), NAS Memphis.* Nashville, Tennessee.

Geraghty & Miller. (1985). *NACIP Confirmation Study, Verification Phase, NAS Memphis.* Tampa, Florida.

U.S. Environmental Protection Agency. (1996, October). *Drinking Water Regulations and Health Advisories.* USEPA Office of Water: Washington, D.C.

USEPA. (1999, August). *Supplemental Guidance to RAGS: Region IV Bulletins, Ecological Risk Assessment.* USEPA Region 4 Waste Management Division. Office of Health Assessment.

USEPA. (2000, April). *Risk-Based Concentration Table.* Region 3.

USEPA. (2002). *OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils.*

**Attachment 1**

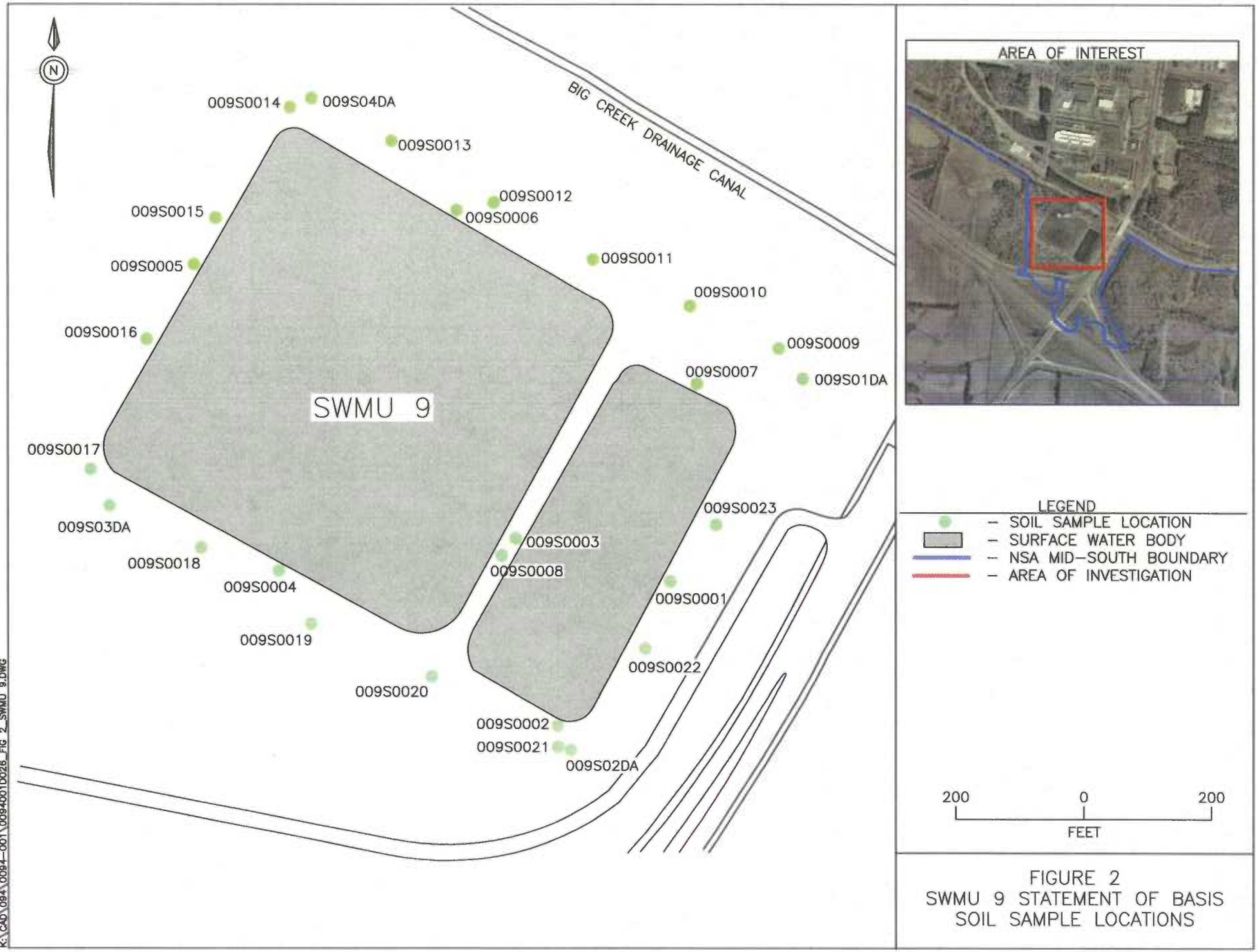


FIGURE 2
SWMU 9 STATEMENT OF BASIS
SOIL SAMPLE LOCATIONS

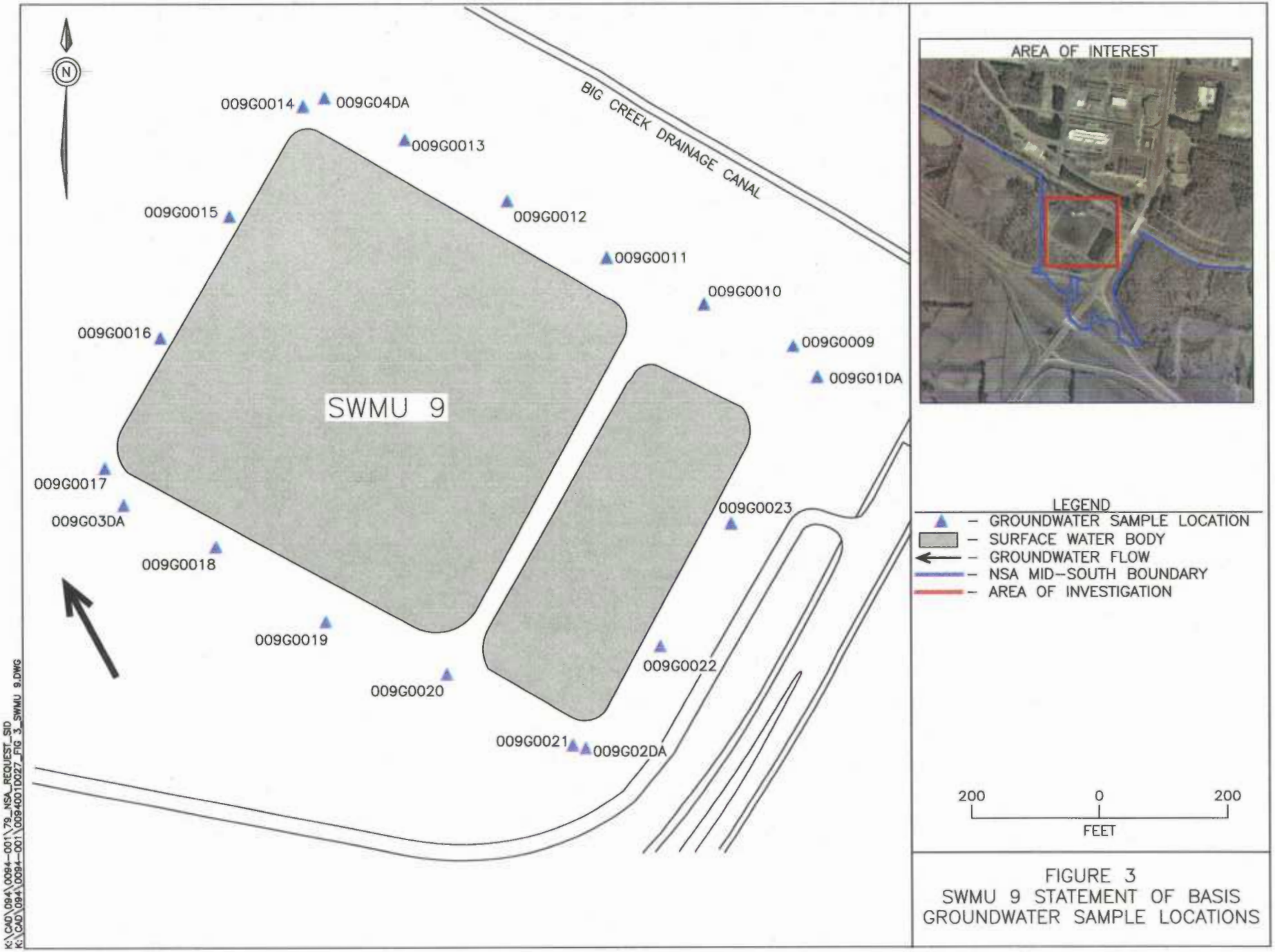


FIGURE 3
SWMU 9 STATEMENT OF BASIS
GROUNDWATER SAMPLE LOCATIONS

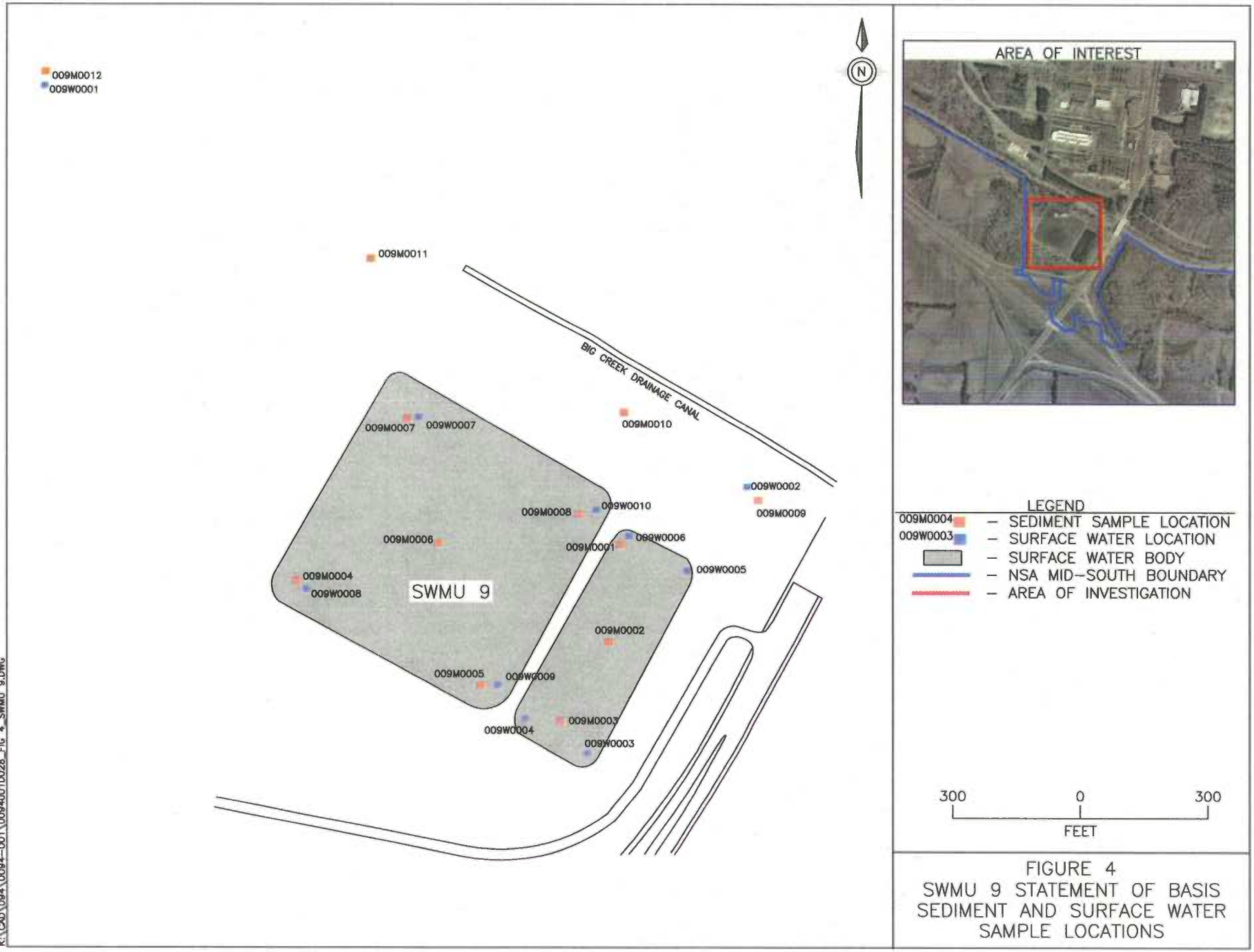


FIGURE 4
SWMU 9 STATEMENT OF BASIS
SEDIMENT AND SURFACE WATER
SAMPLE LOCATIONS

K:\CAD\094\0094-001\79_NSA_REQUEST_SID
K:\CAD\094\0094-001\0094001D028_FIG 4_SWMU 9.DWG

## Williamson, Rob CIV NSA MIDSOUTH

**From:** Silva, Gloria SM2 NSA MIDSOUTH Admin
**Sent:** Thursday, February 09, 2006 4:08 PM
**To:** Kilgore, Rachelle CIV BUPERS IG (PERS-03); 'Christopher Still Army Vet'; Goforth, Rita F CIV CRCB; Gray, Mary C CONT; 'medical'; MILL_NSA_All_Naval_Support_Activity; 'NCIS'; 'NMCRS'; Parker, Kyle S. CTT2 (NSA MIDSOUTH); Stephens, Raybon (MILL)
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Golf Outing 06.doc

Good morning.

The big news this morning is a special deal for active duty military - great prices on a Disney Cruise for your family.

The Home Lawn & Garden Show is coming up this weekend at the Agricenter and we do still have a few tickets left for that event. The Sport & Boat Show is next weekend at the Agricenter and those are also going fast so hurry by ITT for a visit.

The next Memphis Symphony event is Peter & the Wolf narrated by Priscilla Presley at the Cannon Center on Sunday, Marchc 26.

ITT has a trip to The Grand scheduled for Friday, March 3 - enjoy the seafood buffet and leave the driving to ITT.

A day golf trip is planned to Kirkwood National for May 2 - novice or champion golfer alike will enjoy this fun outing.

Memphis Motorsports NASCAR Season Tickets are still available at ITT - get your free cap or T-shirt with purchase.

Have a great day!

**Bonnie McDaniel**
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