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NSA MID SOUTH
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NORTHSIDE RCRA FACILITY INVESTIGATION MONITORING WELL ABANDONMENT AND
LONG TERM MONITORING RECOMMENDATIONS TECHNICAL MEMORANDUM
MILLINGTON SUPPACT TN
5/15/2000
ENSAFE

**NORTHSIDE RFI MONITORING WELL ABANDONMENT
AND LONG-TERM MONITORING RECOMMENDATIONS
TECHNICAL MEMORANDUM**

**NAVAL SUPPORT ACTIVITY MID-SOUTH
MILLINGTON, TENNESSEE**

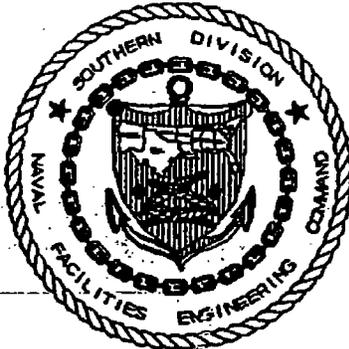


Revision 01

CTO-094

Prepared for:

**Department of the Navy
Southern Division
Naval Facilities Engineering Command
North Charleston, South Carolina**



Prepared by:

**EnSafe Inc.
5724 Summer Trees Drive
Memphis, Tennessee 38134
(901) 372-7962**

May 15, 2000

Response to Comments
RFI Monitoring Well Abandonment and Long-Term Monitoring Recommendations
Naval Support Activity Mid-South - Northside
Millington, Tennessee

USEPA Comments:

Comment 1: More detail is needed describing the rationale/objective for the long-term monitoring. Several wells listed in attachment 1 which will be sampled once per year don't have a basis for recommendations. A basis for the sampling should be provided for each well.

Response: More detail has been added to describe the rationale for the long-term monitoring and a basis for sampling has been added for each well.

Comment 2: At what point will the long-term monitoring end? It should be noted that the long-term monitoring recommendations will likely change after the corrective measures are selected for each area.

Response: A sentence has been added on page 3, 2nd paragraph noting that the recommendations will likely change after the corrective measures for each area are selected.

Comment 3: Figures 2,3,6,7,8,11 and 13 should not be included. These are all from the southside sites which are not covered by this tech memo.

Response: These figures have been removed.

Comment 4: It would be helpful to include the plumes on the figures and some identification of which wells will be closed.

Response: The figures showing the Northside wells have been replaced by a map showing all of the RFI monitoring wells and the TCE plume conceptual model.



ENSAFE INC.

ENVIRONMENTAL AND MANAGEMENT CONSULTANTS

5724 Summer Trees Drive • Memphis, Tennessee 38134 • Telephone 901-372-7962 • Facsimile 901-372-2454 • www.ensafe.com

TECHNICAL MEMORANDUM

TO: Jim Reed, SOUTHDIV
Tonya Barker/Randy Wilson/Rob Williamson, NSA Mid-South
Brian Donaldson, USEPA
Jim Morrison/Clayton Bullington, TDEC
Jack Carmichael, USGS
EnSafe Project Team

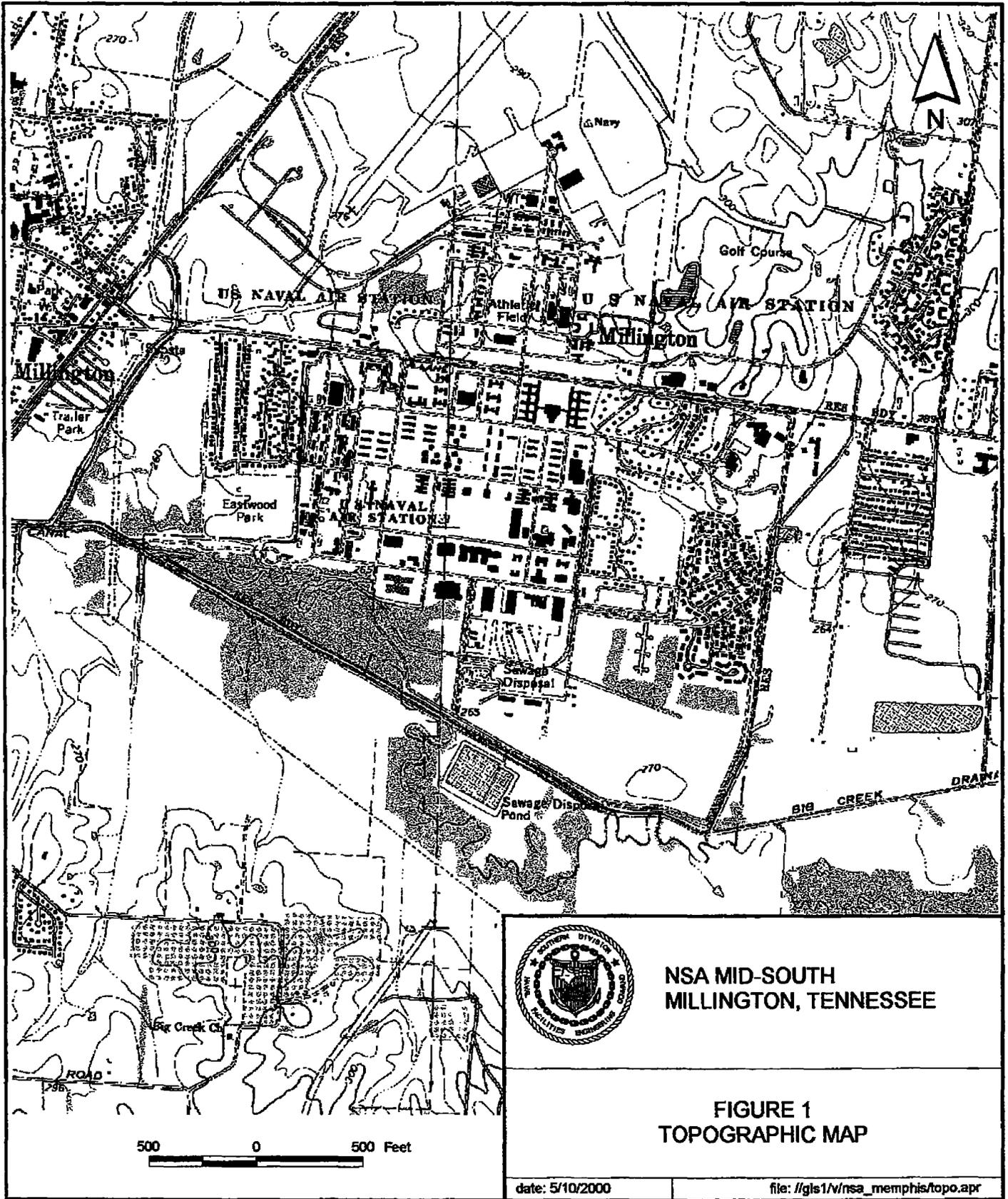
FROM: John Stedman, EnSafe

SUBJECT: Northside RFI Monitoring Well Abandonment and Long-Term Monitoring Recommendations; NSA Mid-South; Millington, Tennessee; CTO-094

DATE: May 15, 2000 (Revision 1)

Introduction

As listed on the table in Attachment 1, 131 RFI monitoring wells are currently located at the Naval Support Activity (NSA) Mid-South Northside and adjacent offsite areas to the northwest. Figure 1, a topographic map of NSA Mid-South and the surrounding area, shows the Northside and Southside base boundaries. The majority of the SWMU-related wells were installed during the investigation of SWMU 7 (N-126 Plating Shop Dry Well/Airfield Apron Area). To reduce NSA Mid-South annual permitting fees and maintenance costs, abandonment of four of the wells is proposed. In addition to these wells, others may be recommended for future abandonment based on long-term monitoring results.



**NSA MID-SOUTH
MILLINGTON, TENNESSEE**

**FIGURE 1
TOPOGRAPHIC MAP**

date: 5/10/2000

file: //gls1v/nsa_memphis/topo.apr

Abandonment procedures will be in accordance with Tennessee Department of Environment and Conservation (TDEC) and Memphis and Shelby County Health Department (MSCHD) regulations. Following chlorination of the well with sufficient quantities of liquid bleach or hypochlorite granules, a high-solids grout will be pumped up from the bottom of the well with a tremie pipe. The well and outer steel casing (if applicable) will be cut off below ground surface. The concrete well pad will be removed.

Attachment 1 lists the RFI wells and either the rationale for abandonment or their intended future use, including recommended long-term monitoring frequencies and analyses. The following briefly summarizes the rationale/recommendations for each site. These long-term monitoring recommendations will likely change after the corrective measures for each area are selected. Attachment 2 contains a monitoring well location and TCE plume figure for all Northside background locations and SWMUs.

Background Wells

The background wells screened in the fluvial deposits and Cockfield Formation are used to measure water levels, particularly the eight wells currently used by the USGS to provide input data for the basewide groundwater flow model. To monitor chlorinated solvent contamination, annual VOC monitoring is proposed for fluvial deposits wells at background locations 5 and 10.

SWMU 3 (Building N-121 Plating Shop Dry Well)

Well 003G04LF will be sampled once per year for VOCs to monitor possible contaminant migration upgradient from the apron area plume. Well 003G06UF is being used by USGS to measure water levels. Abandonment is proposed for the remaining two wells.

SWMU 5 (Aircraft Fire-Fighting Training Facility)

As recommended in the RFI, well 005G01UF will be sampled twice for lead and well 005G02UF will be sampled twice for cadmium. The remaining fluvial deposits and loess wells will be sampled once per year for VOCs and TPH or monitored natural attenuation (MNA) parameters to monitor carbon tetrachloride contamination in the southeast corner of the site, potential downgradient migration of contaminants in the upper part of the fluvial deposits, possible contaminant migration from SWMUs 19 and 49, potential vertical migration of contaminants to the lower part of the fluvial deposits, and Northside perimeter groundwater.

SWMU 7 (N-126 Plating Shop Dry Well/Airfield Apron Area)

Abandonment is proposed for well 007G08LS. Fifty-one of the fluvial deposits wells will be monitored for VOCs and/or MNA parameters once per year as part of the ongoing Northside groundwater investigation. Select wells will also be monitored for hydrogen and carbon dioxide as part of the MNA assessments. The remaining fluvial deposits wells will not be sampled unless additional data from these wells is required. The Cockfield Formation wells are being used by USGS to measure water levels.

SWMU 15 (N-94 Underground Tank Farm)

None of the eight monitoring wells at this site are proposed for abandonment because they will be used for data collection during implementation of corrective measures. All of these wells will be sampled once per year for VOCs and four of them will be sampled once per year for MNA parameters.

SWMU 18 (N-112 Underground Waste Tank)

As recommended in the RFI, the one fluvial deposits well will be sampled once per year to monitor VOCs and MNA parameters.

SWMU 21 (N-10 Underground Waste Tank)

To provide coverage in this area, all four wells at this SWMU have been incorporated into the Northside long-term monitoring program. VOC monitoring once per year is recommended.

SWMU 60 (Northside Landfill)

Both lower fluvial deposits wells will be sampled once per year for VOCs to monitor groundwater under the landfill.

SWMU 66

No further action is required at this site. Therefore, abandonment is proposed for the remaining well.

N-12 (Tank Site)

Chlorinated solvent contamination was identified at this site during an underground storage tank investigation. Subsequently, contamination at this site will be addressed under the RFI program. As part of the Loess CMS recommendation, all six wells will be sampled quarterly for the first year for VOCs while four of them will also be sampled for TPH.

Runway Well

Although this well (RDYG0V81) was not installed as part of the SWMU 7 investigation, it was sampled and found to have chlorinated solvent contamination. Therefore, VOC monitoring once per year is recommended.

Attachment 1
Rationale for RFI Monitoring Well Abandonment — Table

Naval Support Activity Mid-South Northside RFI
Monitoring Well Abandonment and Long-Term Monitoring Recommendations
May 15, 2000

Line No.	Well Id	Site	Abandonment Recommended	Long-term Monitoring Recommendation	Comments and/or Basis for Recommendation
1	0BGG01UF	BG	No	Water level only	Used in USGS flow model
2	0BGG01UF	BG	No	Water level only	Used in USGS flow model
3	0BGG03UC	BG	No	Water level only	Used in USGS flow model
4	0BGG05UF	BG	No	1/yr - VOCs	Contaminated upper fluvial well
5	0BGG05UF	BG	No	1/yr - VOCs	Side gradient of apron area plume
6	0BGG06UC	BG	No	Water level only	Used in USGS flow model
7	0BGG07UC	BG	No	Water level only	Used in USGS flow model
8	0BGG08UF	BG	No	Water level only	Used in USGS flow model
9	0BGG09MF	BG	No	Water level only	Used in USGS flow model
10	0BGG10UF	BG	No	1/yr - VOCs	Used in USGS flow model
11	0BGG13UF	BG	No	Water level only	Used in USGS flow model
12	003G02LF	003	Yes	None	Upgradient of apron area plume
13	003G04UF	003	No	1/yr - VOCs	Upgradient of apron area plume
14	003G05MF	003	Yes	None	Used in USGS flow model
15	003G06UF	003	No	Water level only	Used in USGS flow model
16	005G01UF	005	No	2 times only - Lead	SWMU 5 RFI recommendation
17	005G02UF	005	No	2 times only - Cadmium	SWMU 5 RFI recommendation
18	005G03UF	005	No	None at this time	Sufficient well coverage in area

**Naval Support Activity Mid-South Northside RFI
Monitoring Well Abandonment and Long-Term Monitoring Recommendations
May 15, 2000**

Line No.	Well Id	Site	Abandonment Recommended	Long-term Monitoring Recommendation	Comments and/or Basis for Recommendation
19	005G04UF	005	No	1/yr — VOCs/BIO	RFI recommendation for monitoring CT
20	005G05LF	005	No	None at this time	Sufficient well coverage in area
21	005G05LS	005	No	1/yr — VOCs/TPH	Down gradient of SWMUs 19/49
22	005G08LF	005	No	1/yr — VOCs/BIO	Monitoring fluvial VOC contamination at SWMU 5
23	005G08LS	005	No	1/yr — VOCs/TPH	Monitoring SWMU 5 petroleum contamination
24	005G09LS	005	No	1/yr — VOCs/TPH	Monitoring SWMU 5 petroleum contamination
25	007G01UF	007	No	1/yr — VOCs/BIO	Monitoring apron area plume
26	007G01LF	007	No	1/yr — VOCs/BIO	Monitoring apron area plume
27	007G01UC	007	No	Water level only	Used in USGS flow model
28	007G02UC	007	No	Water level only	Used in USGS flow model
29	007G03UF	007	No	1/yr — VOCs/BIO	Monitoring apron area plume
30	007G03LF	007	No	1/yr — VOCs/BIO	Monitoring apron area plume
31	007G03UC	007	No	Water level only	Used in USGS flow model
32	007G04UF	007	No	1/yr — VOCs/BIO	Monitoring apron area plume
33	007G04LF	007	No	1/yr — VOCs/BIO/H ₂ CO ₂	Monitoring apron area plume
34	007G05UF	007	No	1/yr — VOCs/BIO	Monitoring apron area plume
35	007G05LF	007	No	1/yr — VOCs/BIO	Monitoring apron area plume
36	007G05UC	007	No	Water level only	Used in USGS flow model

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Line No.	Well Id	Site	Abandonment Recommended	Long-term Monitoring Recommendation	Comments and/or Basis for Recommendation
37	007G060F	007	No	None at this time	Sufficient well coverage in area
38	007G06LF	007	No	1/yr - VOCs/BIO	Monitoring apron area plume
39	007G07UF	007	No	None at this time	Sufficient well coverage in area
40	007G07LF	007	No	1/yr - VOCs	Monitoring apron area plume
41	007G08LS	007	No	None	Formerly well 04G-7 which was part of the closed N-94 tank farm
42	007G08UF	007	No	None at this time	Sufficient well coverage in area
43	007G08LF	007	No	None at this time	Sufficient well coverage in area
44	007G09UF	007	No	1/yr - VOCs/BIO	Monitoring apron area plume
45	007G09LF	007	No	1/yr - VOCs/BIO/H2/CO2	Monitoring apron area plume
46	007G09UC	007	No	Water level only	Used in USGS flow model
47	007G10BF	007	No	1/yr - VOCs/BIO	Monitoring apron area plume
48	007G11LF	007	No	1/yr - VOCs/BIO	Monitoring apron area plume
49	007G12LF	007	No	1/yr - VOCs	Monitoring N-6 plume
50	007G13LF	007	No	None at this time	Sufficient well coverage in area
51	007G14LF	007	No	1/yr - VOCs/BIO	Upgradient of N-6 plume
52	007G15UF	007	No	1/yr - VOCs/BIO	Monitoring apron area plume
53	007G15BF	007	No	1/yr - VOCs/BIO	Monitoring apron area plume
54	007G16LF	007	No	1/yr - VOCs/BIO	Monitoring apron area plume

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Line No.	Well Id	Site	Abandonment Recommended	Long-term Monitoring Recommendation	Comments and/or Basis for Recommendation
55	007G17LF	007	No	1/yr — VOCs/BIO/H ₂ CO ₂	Up gradient of apron area plume
56	007G18LF	007	No	1/yr — VOCs/BIO	Monitoring apron area plume
57	007G19LF	007	No	None at this time	Sufficient well coverage in area
58	007G20LF	007	No	1/yr — VOCs/BIO	Monitoring apron area plume
59	007G21LF	007	No	1/yr — VOCs/BIO	Monitoring apron area plume
60	007G22LF	007	No	1/yr — VOCs/BIO	Monitoring apron area plume
61	007G22UC	007	No	Water level only	Used in USGS flow model
62	007G23LF	007	No	1/yr — VOCs	Monitoring apron area plume
63	007G24MB	007	No	1/yr — VOCs/BIO	Monitoring N-6 plume
64	007G25MF	007	No	1/yr — VOCs/BIO/H ₂ , CO ₂	Monitoring N-6 plume
65	007G26MF	007	No	1/yr — VOCs/BIO/H ₂ , CO ₂	Monitoring N-6 plume
66	007G27LF	007	No	1/yr — VOCs	Monitoring apron area plume
67	007G28LF	007	No	None at this time	Sufficient well coverage in area
68	007G29LF	007	No	None at this time	Sufficient well coverage in area
69	007G30LF	007	No	None at this time	Sufficient well coverage in area
70	007G31LF	007	No	1/yr — VOCs/BIO	Monitoring apron area plume
71	007G32LF	007	No	1/yr — VOCs/BIO	Monitoring apron area plume
72	007G33LF	007	No	1/yr — VOCs	Monitoring apron area plume

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Line No.	Well Id	Site	Abandonment Recommended	Long-term Monitoring Recommendation	Comments and/or Basis for Recommendation
73	007G34LF	007	No	None at this time	Sufficient well coverage in area
74	007G35LF*	007	No	1/yr — VOCs/BIO	Monitoring apron area plume
75	007G36LF	007	No	1/yr — VOCs/BIO	Monitoring apron area plume
76	007G37F1*	007	No	None at this time	Sufficient well coverage in area
77	007G37LF	007	No	None at this time	Installed for completed aquifer test
78	007G37L2*	007	No	None at this time	Installed for completed aquifer test
79	007G37LF	007	No	None at this time	Sufficient well coverage in area
80	007G37UC*	007	No	Water level only	Used in USGS flow model
81	007G38LF	007	No	1/yr — VOCs/BIO	Monitoring apron area plume
82	007G39LF*	007	No	None at this time	Sufficient well coverage in area
83	007G40LF	007	No	None at this time	Sufficient well coverage in area
84	007G41LF*	007	No	1/yr — VOCs/BIO	Monitoring apron area plume
85	007G42LF	007	No	1/yr — VOCs/BIO	Monitoring apron area plume
86	007G43LF*	007	No	None at this time	Sufficient well coverage in area
87	007G44LF	007	No	1/yr — VOCs	Monitoring apron area plume at base boundary
88	007G45LF*	007	No	1/yr — VOCs/BIO/H2, CO2	Monitoring apron area plume at base boundary
89	007G46LF	007	No	None at this time	Sufficient well coverage in area
90	007G47LF*	007	No	None at this time	Sufficient well coverage in area

**Naval Support Activity Mid-South Northside RFI
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May 15, 2000**

Line No.	Well Id	Site	Abandonment Recommended	Long-term Monitoring Recommendation	Comments and/or Basis for Recommendation
91	007G48LF	007	No	1/yr - VOCs	Monitoring apron area plume at base boundary
92	007G49LF*	007	No	1/yr - VOCs/BIO	Lower fluvial well downgradient of N-6 plume
93	007G50LF*	007	No	None at this time	Side-gradient of apron area plume
94	007G51LF*	007	No	None at this time	Side-gradient of apron area plume
95	007G52LF*	007	No	1/yr - VOCs/BIO	Contaminated offsite monitoring well
96	007G53LF	007	No	1/yr - VOCs/BIO	Contaminated offsite monitoring well
97	007G54LF	007	No	1/yr - VOCs/BIO	Monitoring apron area plume
98	007G55LF	007	No	1/yr - VOCs	Clean downgradient well
99	007G56LF	007	No	1/yr - VOCs	Clean downgradient well
100	007G57LF	007	No	1/yr - VOCs	Near apron area plume "hot spot"
101	007G58LF	007	No	1/yr - VOCs	Near apron area plume "hot spot"
102	007G59LF	007	No	1/yr - VOCs	Near apron area plume "hot spot"
103	007G60LF	007	No	1/yr - VOCs	Near apron area plume "hot spot"
104	007G61LF	007	No	1/yr - VOCs	Near apron area plume "hot spot"
105	007GPZ01	007	No	None at this time	Sufficient well coverage in area
106	007GPZ02	007	No	None at this time	Sufficient well coverage in area
107	007GPZ03	007	No	1/yr - VOCs	Monitoring apron area plume at base boundary
108	007GPZ04	007	No	None at this time	Sufficient well coverage in area

**Naval Support Activity Mid-South Northside RFI
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May 15, 2000**

Line No.	Well Id	Site	Abandonment Recommended	Long-term Monitoring Recommendation	Comments and/or Basis for Recommendation
109	015G01UF	015	No	1/yr - VOCs/BIO	Monitoring apron area plume and SWMU 15 benzene
110	015G01LF	015	No	1/yr - VOCs/BIO	Monitoring apron area plume and SWMU 15 benzene
111	015G02UF	015	No	1/yr - VOCs/BIO	Monitoring apron area plume and SWMU 15 benzene
112	015G02LF	015	No	1/yr - VOCs/BIO	Monitoring apron area plume and SWMU 15 benzene
113	015G03UF	015	No	1/yr - VOCs	Side-gradient of apron area plume
114	015G03LF	015	No	1/yr - VOCs	Side-gradient of apron area plume
115	015G04UF	015	No	1/yr - VOCs	Monitoring apron area plume
116	015G04LF	015	No	1/yr - VOCs	Monitoring apron area plume
117	018G01LF	018	No	1/yr - VOCs/BIO	Monitoring TCE contamination upgradient of apron area plume
118	021G01LF	021	No	1/yr - VOCs	Monitoring CT contamination at SWMU 21
119	021G02LF	021	No	1/yr - VOCs	Monitoring CT contamination at SWMU 21
120	021G03LF	021	No	1/yr - VOCs	Monitoring CT contamination at SWMU 21
121	021G04LF	021	No	1/yr - VOCs	Monitoring C-15 contamination at SWMU 21
122	060G02LF	060	No	1/yr - VOCs	Long-term fluvial monitoring for SWMUs 10 & 60
123	060G04LF	060	No	1/yr - VOCs	Long-term fluvial monitoring for SWMU 10
124	066G01FL	066	Yes	None	No further action required at this site
125	N12G01LF	N-12	No	Quarterly 1/yr - VOCs	Loess CMS recommendation
126	N12G01LS	N-12	No	Quarterly 1 st yr - VOCs/TPH	Loess CMS recommendation

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Line No.	Well Id	Site	Abandonment Recommended	Long-term Monitoring Recommendation	Comments and/or Basis for Recommendation
127	N12G02DF	N-12	No	Quarterly 1 st yr – VOCs	Loess CMS recommendation
128	N12G02LS	N-12	No	Quarterly 1 st yr – VOCs/TPH	Loess CMS recommendation
129	N12G03LS	N-12	No	Quarterly 1 st yr – VOCs/TPH	Loess CMS recommendation
130	N12G04LS	N-12	No	Quarterly 1 st yr – VOCs/TPH	Loess CMS recommendation
131	RDY-GOV-81	Runways	No	1 st yr – VOCs	Monitoring upon area plume

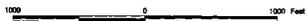
Note:

* — Denotes a monitoring well that is screened throughout the full thickness of the fluvial deposits.

Attachment 2
Monitoring Well Locations and TCE Plume Map



Concentration (ppb)



ATTACHMENT 2
Well Locations and
TCE Plume Map
HRA 800-South Westside