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CNC CHARLESTON  
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LETTER TRANSMITTING MONITORING WELL CONTRACTION AND DEVELOPMENT LOGS  
AT ZONE I AREA OF CONCERN 680 AND SOLID WASTE MANAGEMENT UNIT 177 CNC  
CHARLESTON SC  
6/18/1998  
ENSAFE INC.

935 Houston Northcutt Blvd., Suite 113 • Mt. Pleasant, SC 92464 • Telephone 843-884-0029 • Facsimile 843-856-0107 • www.ensafe.com

June 18, 1998

Paul Bergstrand  
Department of Health and Environmental Control  
Bureau of Solid and Hazardous Waste  
8901 Farrow Road  
Columbia, South Carolina 29203

**RE: Submittal of Monitoring Well Construction and Development Logs at Zone I, Naval Base Charleston, Charleston, SC.**

Dear Mr. Bergstrand:

On behalf of the Southern Division Naval Facility Engineering Command, EnSafe Inc., is submitting copies of the well construction and development logs for two (2) shallow monitoring wells installed at SWMU 177 and three (3) shallow monitoring wells installed at AOC 680 in Zone I. These monitoring wells were installed in accordance with the monitoring well permit approval number HW-98-012.

Although survey data is still being generated in the field for location NBCI680003, a well construction log for this location has been included in this package. Once survey data for this location has been received, a revised well construction log for NBCI680003 will be submitted to DHEC at that time.

Please do not hesitate to call if you have any questions, or if we can be of further assistance.

Sincerely,  
EnSafe, Inc.



By: Todd K. Kafka  
Hydrogeologist

Enclosures

cc: Henry R. Sheppard II, P.E., Caretakers Site Office  
Tony Hunt, SOUTHDIV  
Blake Cabit, AEI, Inc. (with well construction logs)  
Project file 2909-08420

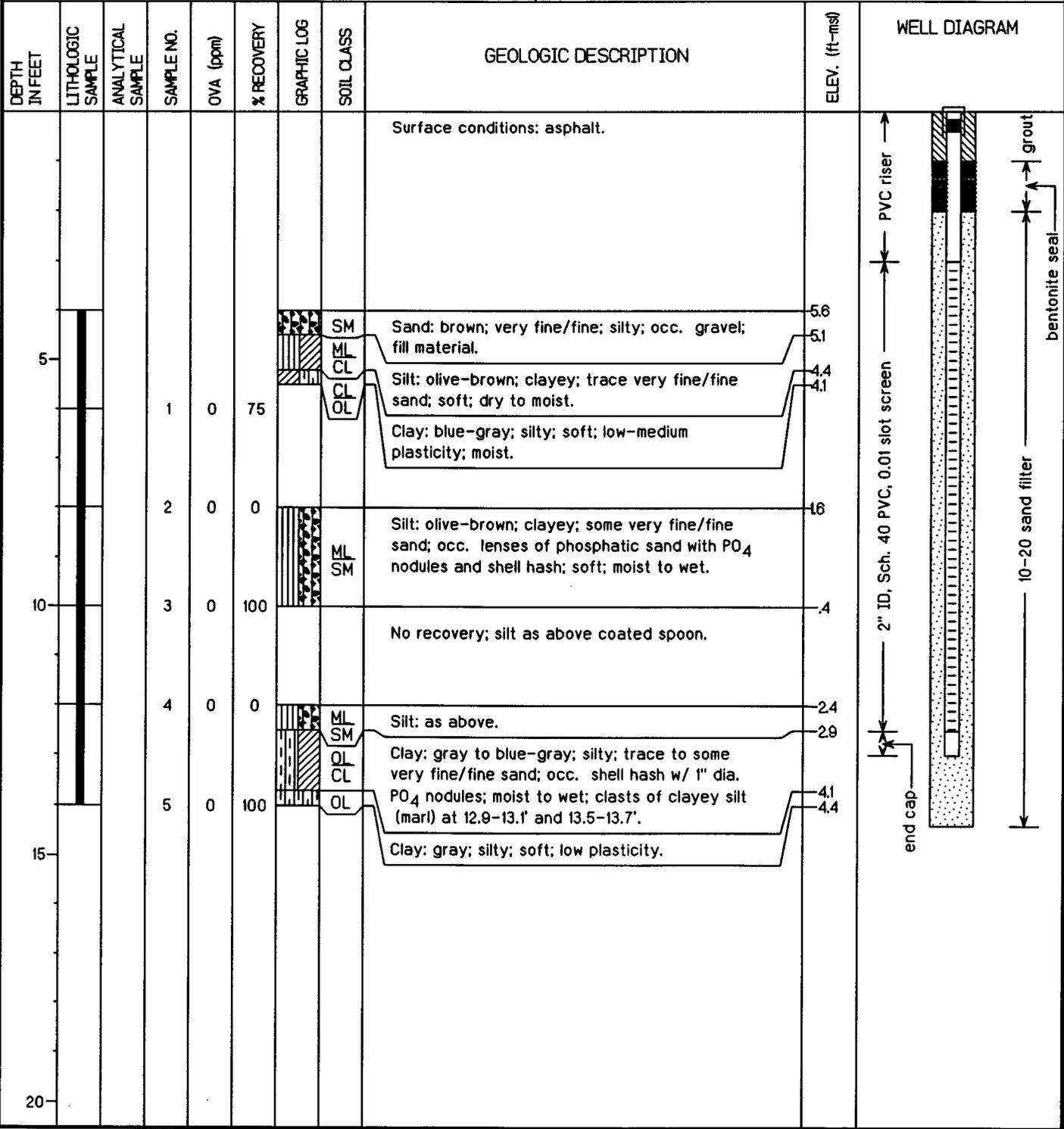
Project: <i>ZONE I - Naval Base Charleston</i>	Coordinates: <i>2324646.4 E, 371613.5 N</i>
Location: <i>Charleston, SC</i>	Surface Elevation: <i>5.9 feet msl</i>
Started at <i>0925 on 3-17-98</i>	TOC Elevation: <i>5.57 feet msl</i>
Completed at <i>1045 on 3-17-98</i>	Depth to Groundwater: <i>2.72 feet TOC</i> Measured: <i>3/24/98</i>
Drilling Method: <i>4.25" ID (7.5" OD) HSA with split spoon</i>	Groundwater Elevation: <i>2.85 feet msl</i>
Drilling Company: <i>Alliance Environmental (SC Cert #1005)</i>	Total Depth: <i>12.5 feet</i>
Geologist: <i>T. Kafka</i>	Well Screen: <i>2.5 to 12.0 feet</i>

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
								Surface conditions: grass.		
5			1	0	75		SM	Sand: brown to gray; very fine to fine; silty; trace-some soft clay in matrix; moist to wet.	1.9	
			2	0	35		SW SM	Sand: dark gray to green-gray; very fine to medium w/ extensive fine to very coarse shell hash; poorly sorted; silty; wet.	1.1 1.8	
			3	0	35		SW SM OL	Sand: dark gray with shell hash as above. Clay: dark gray; low-medium plasticity; soft; sticky; wet.	2.1 2.5 2.8	
10			4	0	30		OL	Clay: as above.	4.1 4.7	
			5	0	0		OL	Clay: as above w/ strong H <sub>2</sub> S odor and extensive peat and grass intermixed.	8.1	
15			6	0	80			No recovery.	9.7	hole collapse

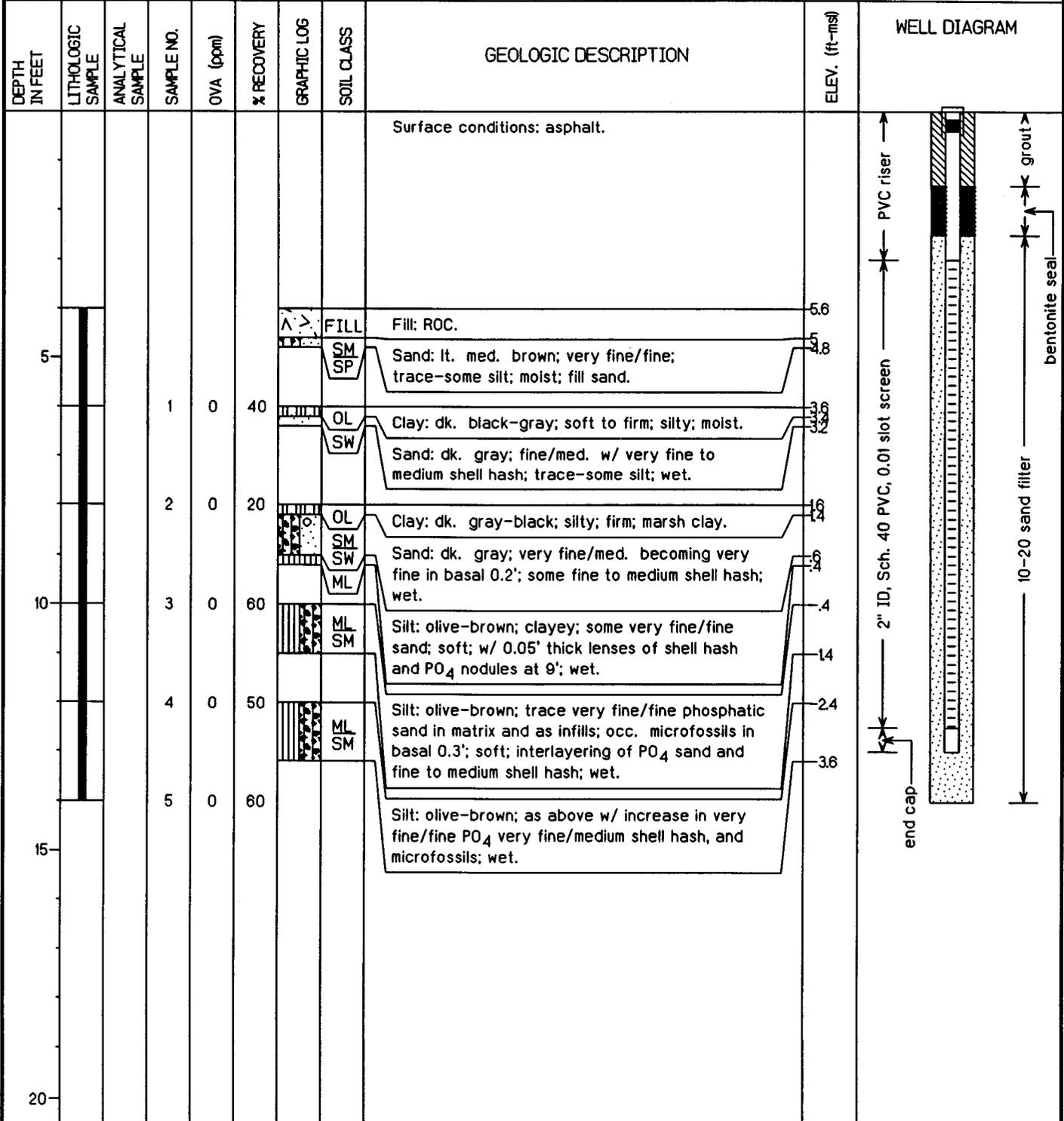
Project: <i>ZONE I - Naval Base Charleston</i>	Coordinates: <i>2324677.1E, 371549.1N</i>
Location: <i>Charleston, SC</i>	Surface Elevation: <i>7.0 feet msl</i>
Started at <i>1145 on 3-17-98</i>	TOC Elevation: <i>6.82 feet msl</i>
Completed at <i>1320 on 3-17-98</i>	Depth to Groundwater: <i>3.00 feet TOC</i> Measured: <i>3/24/98</i>
Drilling Method: <i>4.25" ID (7.5" OD) HSA with split spoon</i>	Groundwater Elevation: <i>3.82 feet msl</i>
Drilling Company: <i>Alliance Environmental (SC Cert #1005)</i>	Total Depth: <i>12.5 feet</i>
Geologist: <i>T. Kafka</i>	Well Screen: <i>2.5 to 12.0 feet</i>

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
								Surface conditions: asphalt.		
5			1	0	55	SM OL SW	Sand: brown; silty; moist.	2 1.7		
							Interbedded sand and clay: Clay: gray, silty, sticky, soft to firm, plastic marsh clay intermixed Sand: very fine/med. w/ shell hash; moist.	9 0		
			2	0	50	SW SP	Sand: gray; med./coarse w/ medium to coarse shell hash; trace silt; dk. gray, soft, sticky marsh clay lens @ 7.5-7.6'; wet.	7 1		
10						SW	Sand: gray; fine/med.; trace to some silt and shell hash; wet.	2 3		
			3	0	50	SW	Sand: gray; very fine/med. w/ extensive very fine to coarse shell hash; lens of soft, sticky marsh clay at 9.8-9.8'; wet.	4 4.5		
15			4	0	25		Sand: gray; medium to coarse w/ fine/coarse shell hash and PO <sub>4</sub> nodules of 1-3 cm dia.; wet.			
20										

Project: ZONE I - Naval Base Charleston	Coordinates: 2326375.4 E, 3708510 N
Location: Charleston, SC	Surface Elevation: 9.6 feet msl
Started at 1440 on 3-16-98	TOC Elevation: 9.47 feet msl
Completed at 1600 on 3-16-98	Depth to Groundwater: 4.10 feet TOC Measured: 3/24/98
Drilling Method: 4.25" ID (7.5" OD) HSA with split spoon	Groundwater Elevation: 5.37 feet msl
Drilling Company: Alliance Environmental (SC Cert #1005)	Total Depth: 13.0 feet
Geologist: T. Kafka	Well Screen: 3.0 to 12.5 feet



Project: <i>ZONE I - Naval Base Charleston</i>	Coordinates: <i>2326415.2 E, 371002.1 N</i>
Location: <i>Charleston, SC</i>	Surface Elevation: <i>9.6 feet msl</i>
Started at <i>1525 on 3-17-98</i>	TOC Elevation: <i>9.32 feet msl</i>
Completed at <i>1725 on 3-17-98</i>	Depth to Groundwater: <i>4.82 feet TOC</i> Measured: <i>3/24/98</i>
Drilling Method: <i>4.25" ID (7.5" OD) HSA with split spoon</i>	Groundwater Elevation: <i>4.50 feet msl</i>
Drilling Company: <i>Alliance Environmental (SC Cert #1005)</i>	Total Depth: <i>13.0 feet</i>
Geologist: <i>T. Kafka</i>	Well Screen: <i>3.0 to 12.5 feet</i>



Project: <i>ZONE I - Naval Base Charleston</i>	Coordinates: <i>E, N</i>
Location: <i>Charleston, SC</i>	Surface Elevation: <i>feet msl</i>
Started at <i>1640 on 3-16-98</i>	TOC Elevation: <i>feet msl</i>
Completed at <i>1800 on 3-16-98</i>	Depth to Groundwater: <i>4.35 feet TOC</i> Measured: <i>3/24/98</i>
Drilling Method: <i>4.25" ID (7.5" OD) HSA with split spoon</i>	Groundwater Elevation: <i>feet msl</i>
Drilling Company: <i>Alliance Environmental (SC Cert #1005)</i>	Total Depth: <i>12.5 feet</i>
Geologist: <i>T. Kafka</i>	Well Screen: <i>2.5 to 12.0 feet</i>

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
								Surface conditions: asphalt.		
5			1	0	70	FILL ML CL	Fill: rocks and sandy gravel. Silt: olive-brown; clayey; trace-some very fine to fine sand; firm.			
			2	0	60	ML SM	Silt: olive-brown; dark black, very fine to fine, phosphatic sand present as lenses; shell hash and PO <sub>4</sub> nodules; moist to wet.			
10			3	0	25	ML SM	Silt: as above w/ dark black silty laminae; sticky; saturated.			
			4	0	100	OL ML SM	Clay: medium gray; silty; trace very fine to fine sand; soft; low to medium plasticity; moist. Silt: olive-brown; very fine to fine, black, phosphatic sand as lenses throughout; firm; wet; at 11.8-11.9', coarse to very coarse shell hash.			
15										
20										

**ENSAFE, Inc.**  
**NAVAL BASE CHARLESTON**  
**WELL DEVELOPMENT STATUS REPORT**  
**ZONE I**

WELL DEVELOPMENT SUMMARY

Well:NBCI\177001

Summary Log of well development progress.  
 Readings are final readings for each visit.  
 Volume data are cumulative from start of development.

DATE	VOLUME Gallons	pH	Turb NTU	Cond mS/cm	Temp Celsius	Sal %	Log VOL. PG#
3/24/98	20	6.96	142	1.83	17.8	.08	II 29
3/24/98	25	7.18	102	1.84	17.6	.08	II 29
3/24/98	29	7.18	22	1.80	17.4	.08	II 29

Well Development Completed on: 3/24/98

COMMENTS:

**ENSAFE, Inc.**  
**NAVAL BASE CHARLESTON**  
**WELL DEVELOPMENT STATUS REPORT**  
**ZONE I**

WELL DEVELOPMENT SUMMARY

Well:NBCI\177002

Summary Log of well development progress.  
 Readings are final readings for each visit.  
 Volume data are cumulative from start of development.

DATE	VOLUME Gallons	pH	Turb NTU	Cond mS/cm	Temp Celsius	Sal %	Log VOL. PG#
3/24/98	15	7.69	999	.780	18.6	.03	II 30
3/24/98	18	7.73	999	.948	19.0	.04	II 30
3/24/98	21	7.73	129	1.08	19.1	.04	II 30
3/24/97	24	7.75	55	1.11	19.2	.04	II 30
3/24/97	27	7.77	30	1.12	19.3	.05	II 30

Well Development Completed on: 3/24/98

COMMENTS:

**ENSAFE / ALLEN & HOSHALL  
 NAVAL BASE CHARLESTON  
 WELL DEVELOPMENT STATUS REPORT  
 ZONE I**

**WELL DEVELOPMENT SUMMARY**

Well:NBCI\680001

Summary Log of well development progress.  
 Readings are final readings for each visit.  
 Volume data are cumulative from start of development.

DATE	VOLUME Gallons	pH	Turb NTU	Cond mS/cm	Temp Celsius	Sal %	Log VOL. PG#
3/24/98	20	7.43	25	2.79	20.3	.13	II 33
3/24/98	27	7.36	59	2.95	20.9	.14	II 33
3/24/98	29	7.34	28	2.83	21.0	.14	II 33

Well Development Completed on: 3/24/98

COMMENTS:

**ENSAFE, Inc.**  
**NAVAL BASE CHARLESTON**  
**WELL DEVELOPMENT STATUS REPORT**  
**ZONE I**

WELL DEVELOPMENT SUMMARY

Well:NBCI\680002

Summary Log of well development progress.  
 Readings are final readings for each visit.  
 Volume data are cumulative from start of development.

DATE	VOLUME Gallons	pH	Turb NTU	Cond mS/cm	Temp Celsius	Sal %	Log VOL. PG#
3/24/98	7	6.98	999	3.85	19.3	.19	II 31
3/24/98	15	7.08	212	3.02	19.1	.14	II 31
3/24/98	20	7.00	28	3.06	19.0	.15	II 31
3/24/98	25	7.00	23	3.08	18.9	.15	II 31

Well Development Completed on: 3/24/98

COMMENTS:

**ENSAFE / ALLEN & HOSHALL**  
**NAVAL BASE CHARLESTON**  
**WELL DEVELOPMENT STATUS REPORT**  
**ZONE I**

WELL DEVELOPMENT SUMMARY

Well: NBCI\680003

Summary Log of well development progress.  
 Readings are final readings for each visit.  
 Volume data are cumulative from start of development.

DATE	VOLUME Gallons	pH	Turb NTU	Cond mS/cm	Temp Celsius	Sal %	Log VOL. PG#
3/24/98	10	7.19	868	2.55	18.6	.12	II 32
3/24/98	15	7.20	544	2.36	19.3	.11	II 32
3/24/98	20	7.23	736	2.20	19.4	.10	II 32
3/24/98	23	7.14	414	2.66	19.8	.13	II 32
3/24/98	30	7.12	149	2.87	19.7	.14	II 32
3/24/98	50	7.35	120	2.74	20.3	.13	II 32
3/24/98	60	7.11	52	3.22	20.3	.16	II 32

Well Development Completed on: 3/24/98

COMMENTS: Well development completed due to no visible turbidity.  
 Elevated Turbidity values due to precipitates relating to heavy H<sub>2</sub>S  
 odor noted during development.