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FINAL REPORT REDLINE/STRIKEOUT VERSION REMEDIAL INVESTIGATION VOL 2 OF 2
FIREFIGHTER TRAINING AREA, LIGHTER AMPHIBIOUS RESUPPLY CARGO (LARC) 60
MAINTENANCE AREA, AND AUTO CRAFT AREA FORT STORY VA
9/1/2002
MALCOLM PIRNIE

FINAL REPORT (REDLINE/STRIKEOUT VERSION)
REMEDIAL INVESTIGATION

VOLUME II OF II (APPENDICES)

FIREFIGHTER TRAINING AREA (FTSTY-04)
LARC 60 MAINTENANCE AREA (FTSTY-06)
AUTO CRAFT BUILDING AREA (FTSTY-07)

FORT STORY, VIRGINIA

PREPARED FOR:

U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND

AND

U.S. ARMY TRANSPORTATION CENTER
FORT EUSTIS, VIRGINIA

CONTRACT DACA31-94-D-0017
DELIVERY ORDER NO. 17, 20 AND 24

SEPTEMBER 2002

MALCOLM PIRNIE, INC.
701 Town Center Drive, Suite 600
Newport News, Virginia 23606

0285-588-330

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References

Remedial Investigation Report
FTA, LARC 60, and Auto Craft Sites
Fort Story, Virginia

APPENDIX A
REFERENCES

EPA, 1988a, *Guidance on Remedial Investigations and Feasibility Studies under CERLCA*, Interim Final. U.S. EPA, OSWER Directive 9335.3-01, EPA/540/G-89/004, October 1988.

EPA, 1989a, *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A)*, EPA/540/1-89/002, December, 1989

EPA, 1989b, *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part B)*, EPA/540/1-89/002, December, 1989

EPA, 1989c, *Exposure Factors Handbook*, Office of Health and Environmental Assessments, EPA/600/8-89/043, July 1989.

EPA, 1989d, *Risk Assessment Guidance for Superfund, Volume II, Environmental Evaluation Manual*, EPA/540/1-89-001, 1989

EPA, 1991a, *Risk Assessment Guidance for Superfund, Volume I: Human Health. Supplemental Guidance. "Standard Default Exposure Factors"*, OSWER Directive 9285.6-03, 1991

EPA, 1991b, *ECO Update - Ecological Assessment of Superfund Sites: An Overview*, EPA, 1991

EPA, 1992a, *Guidance for Data Useability in Risk Assessment, Part 2*, EPA 9285.7-09A, 1992

EPA, 1992b, *Dermal Exposure Assessment: Principles and Applications*, Interim Report, Office of Health and Environmental Assessments, EPA/600/8-91-011B, 1992

EPA, 1993a, *Selecting Exposure Routes and Contaminants of Concern by Risk-based Screening*, EPA Region III, Hazardous Waste Management Division, EPA/903/R-93-001, 1993

EPA, 1993b, *Wildlife Exposure Factors Handbook*, December 1993

EPA, 1994a, *Region III Interim Ecological Risk Assessment Guidelines*, EPA Region III, Hazardous Waste Management Division, July 1994

EPA, 1995a, *Risk-Based Concentration Table*, EPA Region III, Jan - June 1995

Hamilton, P. A. and Larson, J. D., 1988, *Hydrogeology and Analysis of Groundwater Flow System in the Coastal Plain of Southeastern Virginia*. USGS WRI87-4240.

Harsh, J. F., and Laczniak, R. J., 1990, *Conceptualization and Analysis of Groundwater Flow System in the Coastal Plain of Virginia and Adjancent Parts of Maryland and North Carolina*. USGS PP 1404-F.

IT, Corporation, 1994, *Remediation Services Final Report, Volumes I - III, Fire Training Area No. 4 and LARC Area, Fort Story, Virginia*, November 1994.

James M. Montgomery, 1992, *Fort Story Preliminary Assessment/Site Investigation and Fort Story NIKE Preliminary Assessment Site Investigation*, January 1992.

Johnson, G. H., 1972, *Geology of the Yorktown, Poquoson West, and Poquoson East Quadrangles, Virginia*; VDMR Report of Investigations 30.

Johnson, G. H., and Peebles, P. E., 1984, *Stratigraphy of Upper Tertiary and Pleistocene Deposits Between the Pamunkey and James River, Inner Coastal Plain, Virginia*; In: *Stratigraphy and Paleontology of the Outcropping Tertiary Beds in the Pamunkey River Region, Central Virginia Coastal Plain (L. W. Ward and K. Draft, eds.) Atlantic Coastal Plain Geological Association Guidebook*, pp 79-91.

Johnson, G. H., and Ramsey, K. W., 1987, *Geology and Geomorphology of the York-James Peninsula, Virginia; Atlantic Coastal Plain Geological Association Annual Meeting*, College of William and Mary, Williamsburg, Virginia, p. 69.

Johnson, G. H., Ward, L. W., and Peebles, P. C., 1987, *Stratigraphy and Paleontology of Pliocene and Pleistocene Deposits of Southeastern Virginia*; In: *Geological Excursions in Virginia and North Carolina of American Southeastern Section*, Old Dominion University, Norfolk, Virginia, pp 189-218.

Laczniak, R. J., and Meng, A. A., 1988, *Groundwater Resources of the York-James Peninsula of Virginia*; USGS Water Resources Investigations Report 88-4059, pp. 178.

Malcolm Pirnie, 1994a, *Final Field Investigation Plan*, Remedial Investigation for Fort, Story, Virginia, December 1994.

Malcolm Pirnie, 1994b, *Final Chemical Data Acquisition Plan*, Remedial Investigation for Fort, Story, Virginia, December 1994.

Malcolm Pirnie, 1994c, *Final Site Safety and Health Plan*, Remedial Investigation for Fort, Story, Virginia, December 1994.

Meng, A. A. and Harsh, J. F., 1988, *Hydrogeologic Framework of the Virginia Coastal Plain*. USGS PP 1404-C.

Mixon, R. B., Berquist, C. R., Newell, W. L., and Johnson, G. H., 1989, *Geologic Map and Generalized Cross Sections of the Coastal Plain and Adjacent Parts of the Piedmont*, Virginia; USGS Miscellaneous Investigations Series Map I-2033.

Oaks, R. Q, and Coch, N. K., 1973, *Post-Miocene Stratigraphy and Morphology, Southeastern Virginia*: Virginia Division of Mineral Resources Bulletin 82, 135 p.

Onuschak, E. Jr., 1973, *Pleistocene-Holocene Environmental Geology, in Geologic Studies, Coastal Plain of Virginia*: Virginia Division of Mineral Resources Bulletin 83, pt. 3, p. 103 - 153.

Sinnott, Allen, and Tibbitts, G. C., Jr., 1968, *Ground-water Resources of Accomack and Northamp-ton Counties, Virginia*: Virginia Division of Mineral Resources Report 9, 113 p.

Siudyla, E. A., May, A. E. and Hawthorne, D. W., 1981, *Ground Water Resources of the Four Cities area, Virginia*: Virginia State Water Control Board Planning Bulletin 331, 168 p.

Teifke, R. H., 1973, *Stratigraphic units of the Lower Cretaceous through Miocene series, in Geologic Studies, Coastal Plain of Virginia*: Virginia Division of Mineral Resources Bulletin 83, pt. 1, p. 1 - 78.

Teifke, R. H., 1973, *Paleogeology of Early Cretaceous through Miocene Time, in Geologic Studies, Coastal Plain of Virginia*: Virginia Division of Mineral Resources Bulletin 83, pt. 2, p. 79 - 98.

U.S. Army Environmental Hygiene Agency, 1987, *Hazardous Waste Consultation No. 37-26-0173-89, Fort Eustis and Fort Story, Virginia*, June 22 - 25, 1987.

Ward, L. W., and Blackwelder, B. W., 1980, *Stratigraphic Revision of Upper Miocene and Lower Pliocene Beds of the Chesapeake Group, Middle Atlantic Coastal Plain*; USGS Bulletin 1482-D, U.S. Government Printing Office, Washington, DC, p. 61, 4 plates.

Appendix B
Geologic and Well Data

Remedial Investigation Report
FTA, LARC 60, and Auto Craft Sites
Fort Story, Virginia

BORING LOGS

MALCOLM PIRNIE

BORING 4MW-1

PROJECT: FORT STORY - FTA | PROJECT NO: 0285-588

DATE: 3/22/95 | LOCATION: FORT STORY - VIRGINIA BEACH, VA

ELEVATION: | DATUM:

SAMPLE no.	SAMPLE depth	SAMPLE recovery %	SAMPLE blows per 6"	DEPTH	STRATA	SOIL DESCRIPTION M. COMP., TEX., C., 2nd COMP., TEX. C.: 3rd COMP.. ETC., MOIST.. OTHER *	WELL CONST.	REMARKS
S-1	0-2	24	4-5-8-6			TOP 12" 10YR 4/2 BOTTOM 12" 10YR 6/4		
S-2	2-4	17"	5-13-13-15			10YR 6/4 SAND, MEDIUM, LITTLE TO NO FINES, FEW HEAVIES, SORTED, MOIST TO WET		HNU @ 0
S-3	4-6	12	5-6-10-8			10YR 7/3 SAND, MEDIUM TO COARSE, WET, QUARTZ IS SUB ROUNDED TO ROUNDED		
S-4	6-8	16"	3-8-8-8			10YR 6/3 SAND, MEDIUM, A FEW COARSE, WET		HNU @ 0
S-5	8-10	18	3-2-3-2			10YR 5/4 SAND, MEDIUM WITH SOME COARSE,		
S-6	10-12	18"	2-1-1-1			2.5Y 7/2 SAND, MEDIUM, FEW FINE SAND AND HEAVIES, WET		
S-7	12-14	20"	3-2-3-3			TOP 10" 2.5Y 5/4 SAND, MEDIUM, FEW FINE SAND AND HEAVIES, WET BOTTOM 10" 2.5Y 7/2 SAND, MEDIUM, FEW FINE SAND AND HEAVIES, WET		
S-8	14-16	24	4-3-3-3			2.5Y 8/3 SAND, MEDIUM AT TOP BECOMING COARSER AT BOTTOM, SUBROUNDED QUARTZ, WET.		HNU@0

NOTES: HNU IN BREATHING ZONE 0 BORING TERMINATED AT 15' BLS
10' SCREEN SAND UP TO 3' 4-50 LB BAGS SAND
BENTONITE UP TO 2' 1/2-50 LB BAGS BENTONITE

* NOTE: M. COMP. = MAJOR COMPONENT, TEX. = TEXTURE, C. = COLOR, COMP. = COMPONENT, MOIST. = MOISTURE

MALCOLM PIRNIE

BORING 4MW-2D

PROJECT: Ft Story - FTA | PROJECT NO: 0288-588

DATE: 3/21/95 | LOCATION: Fort Story - Virginia Beach, VA

ELEVATION: | DATUM:

SAMPLE no.	SAMPLE depth	SAMPLE recovery %	SAMPLE blows per 6"	DEPTH	STRATA	SOIL DESCRIPTION (M. COMP., TEX., C., 2nd COMP., TEX. C.: 3rd COMP., ETC., MOIST., OTHER *)	WELL CONST.	REMARKS
S-1	0-2	12"	4-5-8-10			10YR 3/3 SAND, FINE TO MEDIUM, SOME BURNT WOOD FRAGMENTS, MOIST		
S-2	2-4	12"	9-10-8-11			10YR 6/3 SAND, MEDIUM, WELL SORTED, MOIST, SOME HEAVIES		
S-3	4-6	12"	6-6-7-7			10YR 6/6 SAND, MEDIUM, WELL SORTED, LITTLE TO NO HEAVIES, WET		
S-4	6-8	18"	6-7-9-12			SAME AS ABOVE, WET		
S-5	8-16	24"	5-5-7-10			TOP 12" 10YR 5/2 SAND, MEDIUM BOTTOM 12" 10YR 7/1 SAND, MEDIUM W/ SMALL ORGANIC LAYER		
S-6	10-12	12"	4-5-7-9			SAME AS ABOVE		
S-7	12-14	18"	4-5-5-10			SAME AS ABOVE		
S-8	14-16	24"	6-3-3-5			SAME AS ABOVE, SOME ~~TREE AND~~ WOOD FRAGMENTS, WET, SOME COARSE SAND AT BOTTOM		
S-9	16-18	24"	7-7-8-11			10YR 7/2 SAND MEDIUM TO COARSE, SOME HEAVIES		
S-16	18-20	20"	16-15-17-23			10YR 7/2 SAND COARSE TO MEDIUM, SOME HEAVES, A FEW ~~RED~~ PIECES OF GRAVEL		
S-11	24-26	0	19-23-24-28			NO RECOVERY		
S-12	29-31	12"	59-80-26			TOP 6" V. COARSE SAND TO GRAVEL, WOOD FRAGMENTS BOTTOM 12" 5Y6/1 SAND, FINE, HEAVIES, LITTLE TO NO SILT		
S-13	34-36	24"	3-5-6-12			5Y 6/1 SAND, FINE, HEAVIES, LITTLE TO NO SILT, NON COHESIVE, WET, 1 INCH COARSE SAND LENSE		WELL SCREEN AT 30-40'
S-14	39-41	14"	7-12-12-16			SAME AS ABOVE, SOME MEDIUM SAND		SLIGHT ODOR PETROLEUM
S-15	44-46	24"	3-5-4-4			5G5/1 SAND, FINE AND SILTY SAND, SOME SHELL FRAGMENTS, SILTY ZONES ARE SLIGHTLY COHESIVE		SLIGHT ODOR

NOTES: BORING TERMINATED AT 44' BGS
SAND UP TO 27' BGS
SCREEN 10'
RISER
6" WELL POINT
4-50LB BAG SAND
1 50LB BAG BENTONITE
BENTONITE UP TO 22'

* NOTE: M. COMP. = MAJOR COMPONENT, TEX. = TEXTURE, C. = COLOR, COMP. = COMPONENT, MOIST. = MOISTURE

MALCOLM PIRNIE

BORING 4MW-2S

PROJECT: Fort Story - FTA | PROJECT NO: 0285-588

DATE: 3/21/95 | LOCATION: Fort Story - Virginia Beach, VA

ELEVATION: | DATUM:

SAMPLE no.	SAMPLE depth	SAMPLE recovery %	SAMPLE blows per 6"	DEPTH	STRATA	SOIL DESCRIPTION M. COMP., TEX., C., 2nd COMP., TEX. C.: 3rd COMP., ETC., MOIST., OTHER *	WELL CONST.	REMARKS
						SEE DESCRIPTION FOR 4MW-2D		WELL SCREEN FROM 14-4' BLS

NOTES: BORING TERMINATED AT 15' BLS

10' SCREEN .01" SLOT
4' RISER
6" WELL TIP

4 - 50 LB BAGS SAND #2 WELL GRADED
1/2 - 50 LB BAG BENTONITE
SAND UP TO 3'
BENTONITE UP TO 2' GROUT UP TO 1'

* NOTE: M. COMP. = MAJOR COMPONENT. TEX. = TEXTURE. C. = COLOR. COMP. = COMPONENT. MOIST. = MOISTURE

MALCOLM PIRNIE

BORING 4MW-3

PROJECT: Ft Story - FTA | PROJECT NO: 0285-588

DATE: 3/22/95 | LOCATION: Fort Story - √ Virginia Beach, VA

ELEVATION: | DATUM:

SAMPLE no.	SAMPLE depth	SAMPLE recovery %	SAMPLE blows per 6"	DEPTH	STRATA	SOIL DESCRIPTION (M. COMP., TEX., C., 2nd COMP., TEX. C.: 3rd COMP.. ETC.. MOIST.. OTHER *)	WELL CONST.	REMARKS
S-1	0-2	16"	4-6-4-5			TOP 6" 10YR 3/4 SAND MEDIUM WITH FINE, ROOTS BOTTOM 10" 10YR 6/4 SAND, MEDIUM WITH FINE		
S-2	2-4	14"	3-4-3-2			SAME AS ABOVE, MOIST		
S-3	4-6	12"	3-5-6-8			10YR 8/1 SAND, MEDIUM, MOIST, NO FINES, WELL SORTED		
S-4	6-8	18"	5-5-6-9			~~TOP~~ 10YR 5/3 SAND, MEDIUM, WET, NO FINES		SAMPLE WET AT 6'
S-5	8-10	14"	8-4-4-4			10YR 6/3 SAME AS ABOVE		
S-6	10-12	20"	2-3-4-4			10YR 6/3 TO 2.5Y 7/3 SAND, MEDIUM NO FINES, WELL SORTED WET		
S-7	12-14	24"	2-1-2-3			SAME AS ABOVE		
S-8	14-16	12"	2-1-2-3			2.5Y 6/3 SAND, MEDIUM WITH A FEW COARSE GRAINS, WET		

NOTES: BORING TERMINATED AT 15' BGS

10' SCREEN .01" SLOT — 4-50 LB BAGS #2 WELL GRAVEL

4' RISER — 3/4-50 LB BENTONITE

6" WELL POINT — SAND UP TO 3'

BENTONITE TO 2' — GROUT UP TO 1'

* NOTE: M. COMP. = MAJOR COMPONENT. TEX. = TEXTURE. C. = COLOR. COMP. = COMPONENT. MOIST. = MOISTURE

MALCOLM PIRNIE

BORING 4MW-4

PROJECT: Ft Story - FTA | PROJECT NO: 0285-588

DATE: 3/27/95 | LOCATION: Fort Story - Virginia Beach, VA

ELEVATION: | DATUM:

SAMPLE no.	SAMPLE depth	SAMPLE recovery %	SAMPLE blows per 6"	DEPTH	STRATA	SOIL DESCRIPTION (M. COMP., TEX., C., 2nd COMP., TEX. C.: 3rd COMP., ETC., MOIST., OTHER *)	WELL CONST.	REMARKS
S-1	0-2	12	0-1-2-3			2.5Y6/4 SAND, MEDIUM, SOME FINES AND HEAVIES, MOIST.		
S-2	2-4	12	3-4-4-4			2.5Y6/4 TO 2.5Y4/4 SAND, MEDIUM WITH SOME HEAVIES AND FINES, MOIST TO SLIGHTLY WET		HNU @ 0
S-3	4-6	14"	2-1-1-1			2.5Y3/2 TO 2.5Y6/4 SAND, MEDIUM, WITH SOME FINES AND HEAVIES, WET		
S-4	6-8	16"	1-1-2-1			TOP 12" SAME AS ABOVE BOTTOM 4" 2.5Y3/3 ORGANIC CLAY, ROOTS, NO SAND		HNU @ 0 BUT SLIGHT PET ODOR
S-5	8-10	16	3-2-1-1			TOP 2" SAME AS ABOVE BOTTOM 14 2.5Y7/4 SAND, MEDIUM, LITTLES FINES, WET		HNU @ 0 SANDS HAVE NO ODOR
S-6	10-12	16"	1-0-1-1			2.5Y8/2 SAND, MEDIUM TO FINE, LITTLE HEAVIES, WET		HNU @ 0
S-7	12-14	18"	1-1-1-1			2.5Y6/4 TO 2.5Y8/2 SAND, MEDIUM WITH SOME FINE SAND, PLANT ROOTS, WET		
S-8	14-16"	16"	2-1-2-2			SAME AS ABOVE.		H.S.U @ 0

NOTES: AUGERS 6¼" ID
SCREEN 10'
RISER 4"
6" WELL TIP

HNU IN BREATHING ZONE 0
4- 50LB BAGS SAND
1- 50LB BAG BENTONITE

BORING TERMINATED @ 16'

* NOTE: M. COMP. = MAJOR COMPONENT, TEX. = TEXTURE, C. = COLOR, COMP. = COMPONENT, MOIST. = MOISTURE

MALCOLM PIRNIE

BORING 4MW-5

PROJECT: FT STORY - FTA | PROJECT NO: 0285-588

DATE: 3/21/95 | LOCATION: FORT STORY - FIRE TRAINING AREA VA BEACH, VA

ELEVATION: | DATUM:

SAMPLE no.	SAMPLE depth	SAMPLE recovery	SAMPLE blows per 6"	DEPTH	STRATA	SOIL DESCRIPTION (M. COMP., TEX., C., 2nd COMP., TEX. C.: 3rd COMP.. ETC., MOIST.. OTHER *)	WELL CONST.	REMARKS
S-1	0-2	18	10-10-8-7			10YR 3/1 TO 10YR 5/6 AT BOTTOM SAND FINE, ORGANIC, SOME MEDIUM SAND COARSE AT BOTTOM, MOIST		
S-2	2-4	18	8-5-8-10			10YR6/6 SAND, MEDIUM, LITTLE FINES 10YR 4/1 BAND OF MEDIUM SAND, WELL SORTED		
S-3	4-6	16	6-6-9-11			10YR 6/8 SAND, MEDIUM TO COARSE, SORTED, LITTLE TO NO FINES OR HEAVIES		WATER AT 6' BG
S-4	6-8	16	6-6-6-10			10YR 4/4 TO 10YR 7/4 SAND, MEDIUM WET		
S-5	8-10	18	6-5-4-4			10YR 4/3 TO 10YR 7/2 SAND, MEDIUM WET,		
S-6	10-12	24	2-3-4-5			SAME AS ABOVE		
S-7	12-14	24"	3-6-7-5			10Y 7/2 SAND, MEDIUM, WELL SORTED, WET, SAND IS ROUNDED		
S-8	14-16	12	2-2-2-4			~~SAME AS ABOVE BUT~~ 10YR 7/2 SAND MEDIUM AT TOP BECOMING COARSER, WET, ROUNDED SAND		
S-9	16-18	24	5-5-7-7			10YR 7/2 SAND, COARSE, WET, WITH SOME PIECES OF GRAVEL AT BOTTOM		
S-10	18-20	12"	2-2-2-3			10YR 7/1 GRAVEL AND COARSE SAND, WELL WASHED, SUB ROUNDED TO ROUNDED		
S-11	24-26	14'	3-5-5-5			SAME AS ABOVE, LESS GRAVEL		
S-12	~~29-31~~ 32-34	12"	8-15-20-32			SAME AS ABOVE		
S-13	39-41'	18"	8-10-12-17			TOP 14" SAME AS ABOVE THEN SHARP CONTACT BOTTOM 4" 10YR 6/1 SAND, FINE, NON COHESIVE, NO SILT OR CLAY. FEW HEAVIES		WELL SCREEN AT 30-40 BG
S-14	44-46	6"	12-14-15-17			5Y 5/1 SAND FINE, WITH SOME SILT, NON COHESIVE, NON PLASTIC, WET		

NOTES: PID NOT WORKING

10' SCREEN .01" SLOT
6" WELL POINT
30' ~~CASING~~ RISER
GROUT

BORING TERMINATED AT 44'
SAND UP TO 27.5' BGS
4 - 50LB BAGS OF #2 WELL GRAVEL
BENTONITE UP TO 21' BGS
1 - 50 LB BAG OF BENTONITE

* NOTE: M. COMP. = MAJOR COMPONENT. TEX. = TEXTURE. C. = COLOR. COMP. = COMPONENT. MOIST. = MOISTURE

MALCOLM PIRNIE

BORING 6MW-1

PROJECT: Ft Story - LARC 60 | PROJECT NO: 0285-589

DATE: 3/23/95 | LOCATION: Fort Story - Virginia Beach, VA

ELEVATION: | DATUM:

SAMPLE no.	SAMPLE depth	SAMPLE recovery %	SAMPLE blows per 6"	DEPTH	STRATA	SOIL DESCRIPTION M. COMP., TEX., C., 2nd COMP., TEX. C.: 3rd COMP.. ETC., MOIST.. OTHER *	WELL CONSTR.	REMARKS
S-1	0-2	12	6-8-10			TOP 6" ASPHAULT AND GRAVEL 10YR 7/6 SAND, FINE, SOME HEAVIES, WELL SORTED, MOIS		
S-2	2-4	14	7-8-12-15			10YR 7/6 SAND, MEDIUM TO FINE, SOME HEAVIES, MOIST, MOSTLY FINE SAND		HNU @ 0
S-3	4-6	16	3-5-6-8			TOP 2" SAME AS ABOVE BOTTOM 14" 10YR 7/2 SAND, FINE WITH MEDIUM SAND AND HEAVIES, MOIST TO WET AT BOTTOM		
S-4	6-8	14	5-6-5-7			10YR 5/2 SAND, MEDIUM TO FINE, SOME HEAVIES, WET		
S-5	8-10	18"	4-3-4-5			10YR 5/3 SAND, FINE WITH SOME MEDIUM SAND, SOME HEAVIES, WET		HNU @ 0
S-6	10-12	24"	3-3-4-8			SAME AS ABOVE		
S-7	12-14	24"	5-8-9-9			10YR 5/3 SAND MEDIUM TO FINE, SOME HEAVIES, WET		
S-8	14-16	24	3-4-3-3			SAME AS ABOVE		

NOTES: HNU IN BREATHING ZONE 0
10' SCREEN
3.5' RISER
6" WELL TIP

BORING TERMINATED AT 15'
4 BAGS SAND
1 BAG BENTONITE

* NOTE: M. COMP. = MAJOR COMPONENT, TEX. = TEXTURE, C. = COLOR, COMP. = COMPONENT, MOIST. = MOISTURE

MALCOLM PIRNIE

BORING GMW-2

PROJECT: FT STORY - LARC 60	PROJECT NO: 0285-589
DATE: 3/23/95	LOCATION: FORT STORY - VIRGINIA BEACH, VA
ELEVATION:	DATUM:

SAMPLE no.	depth	recovery %	blows per 6"	DEPTH	STRATA	SOIL DESCRIPTION (M. COMP., TEX., C., 2nd COMP., TEX. C.: 3rd COMP., ETC., MOIST., OTHER *)	WELL CONSTR.	REMARKS
S-1	0-2	14	8-16-11-15			2.5Y 5/3 SAND, FINE,		
S-2	2-4	16	8-9-11-13			10YR 6/3 SAND, FINE TO MEDIUM, SOME HEAVIES, MOIST		
S-3	4-6	12"	4-9-6-6			10YR 7/3 SAND, FINE WITH SOME MEDIUM		
S-4	6-8	12	4-4-4-4			2.5Y 7/3 SAND MEDIUM WITH FINES, WET		HNU @ 10 ODOR
S-5	8-10	4	18-8-5-3			2.5Y 7/3 SAND AND SOME ROCKS,		HNU @ 30
S-6	10-12	20	3-4-4-7			2.5Y 7/2 SAND, MEDIUM TO FINE, SOME HEAVIES, WET. ALSO ZONE OF 2.5Y 6/0 SAND		HNU @ 3-8
S-7	12-14	20"	3-4-7-2			SAME AS ABOVE		HNU @ 1
S-8	14-16	24	5-4-2-2			2.5Y 7/2 SAND, MEDIUM, SOME FINES, WET		HNU @ 1
S-9	16-18	24	2-3-3-5			5Y 6/2 SAND, MEDIUM, SOME HEAVIES AND FINES, WET		HNU @ 0 BUT STILL SLIGHT ODOR
S-10	18-20	8"	4-6-7-3			5Y 8/1 SAND, COARSE AND MEDIUM, WET, SUB ROUNDED.		HNU @ 0 BUT STILL SLIGHT ODOR
S-11	24-26	18"	7-13-17-20			5Y 8/1 TOP 12" COARSE SAND AND GRAVEL WITH BLACK COARSE SAND ZONE FINE BOTTOM 6" 5Y 7/1 SAND, MEDIUM WITH SOME FINE SAND AND HEAVIES, A FEW COARSE PIECES		HNU @ 0, [redacted] NO PETROLEUM ODOR
S-12	29-31	14"	7-14-44-50			5Y 7/1 SAND, COARSE TO GRAVEL. GRAVEL UP TO 1 CM IN SIZE		HNU @ 0 NO PET. ODOR
S-13	34-36	20	13-17-15-19			TOP 10" SAME AS ABOVE BOTTOM 10" 5Y 6/1 SAND, FINE WITH SOME HEAVIES, NON COHESIVE, FRIABLE, WET		HNU @ 0 NO PET. ODOR
S-14	39-41	14"	20-50/5			SAME AS ABOVE		HNU @ 0 NO PET. ODOR
S-15	44-46	5	9-9-13-24			SAME AS ABOVE WITH A CLAY LENSE CLAY IS COHESIVE, PLASTIC		

NOTES: HNU @ 0-1 IN BREATHING ZONE CUTTINGS PLACED IN BARREL AT 6'
6' SCREEN SAND UP TO 25' BGS 4-50 LB BAGS #2 WELL GRAVEL
30' RISER BENTONITE UP TO 22.2' BGS 1-50 LB BAG BENTONITE
6" WELL POINT
BORING TERMINATED AT 44'

* NOTE: M. COMP. = MAJOR COMPONENT. TEX. = TEXTURE. C. = COLOR. COMP. = COMPONENT. MOIST. = MOISTURE

MALCOLM PIRNIE

BORING 6MW-3S

PROJECT: FT STORY - LARC 60	PROJECT NO: 6285-589
DATE: 3/24/95	LOCATION: FORT STORY - VIRGINIA BEACH, VA
ELEVATION:	DATUM:

SAMPLE no.	SAMPLE depth	SAMPLE recovery %	SAMPLE blows per 6"	DEPTH	STRATA	SOIL DESCRIPTION M. COMP., TEX., C., 2nd COMP., TEX. C.: 3rd COMP.. ETC., MOIST., OTHER *	WELL CONST.	REMARKS
						SEE 6MW-3D FOR DESCRIPTION		

NOTES: BORING TERMINATED AT 15

10' ~~RISER~~ SCREEN
3.8' RISER
6" WELL TIP

4 - 50 LB BAG SAND
1 - 50 LB BAG BENTONITE

* NOTE: M. COMP. = MAJOR COMPONENT, TEX. = TEXTURE, C. = COLOR, COMP. = COMPONENT, MOIST. = MOISTURE

MALCOLM PIRNIE

BORING 6MW-30

PROJECT: FT STORY - LARC 60 | PROJECT NO: 0285-589

DATE: 3/23/95 | LOCATION: FORT STORY - VIRGINIA BEACH, VA

ELEVATION: | DATUM:

SAMPLE no.	depth	recovery %	blows per 6"	DEPTH	STRATA	SOIL DESCRIPTION (M. COMP., TEX., C., 2nd COMP., TEX. C.: 3rd COMP., ETC., MOIST., OTHER *)	WELL CONSTR.	REMARKS
S-1	0-2	4	3-8			TOP 14" CONCRETE BOTTOM 10" SAND AN GRAVEL		HNU @ 10 * STRONG PET ODO
S-2	2-4	12"	19-28-44-33			TOP 4" GRAVEL AND SAND BOTTOM 8' 2.5Y 8/0 SAND, FINE, SOME HEAVIES, MOIST		HNU @ 5
S-3	4-6	12"	10-4-6-5			2.5Y 6/0 SAND, MEDIUM, WITH SOME FINES WET.		HNU @ 0 PET. ODOR
S-4	6-8	18"	2-4-8-7			TOP 12" SAME AS ABOVE BOTTOM 6" 2.5Y 3/2 SAND, MEDIUM TO FINE, ORGANIC MATTER, WET		HNU @ 0 PET. ODOR
S-5	8-10	12"	4-4-8-9			5Y 6/2 SAND FINE TO MEDIUM AND SOME ORGANIC MATTER		
S-6	10-12	12"	2-2-3-2			SAME AS ABOVE		
S-7	12-14	24"	12-13-23-24			TOP 12" 5Y 6/1 SAND, COARSE TO MEDIUM, HEAVIES BOTTOM 12" 5Y 6/1 SAND FINE WITH SOME MEDIUM SAND, HEAVIES, WET		HNU @ 0
S-8	14-16	18"	5-7-5-9			5Y 6/1 SAND, COARSE GRADING DOWNWARD TO MEDIUM, SOME ROCK FRAGMENTS		HNU @ 0 PET ODOR
S-9	16-18	20"	4-7-8-9			5Y 6/1 SAND, COARSE WITH SOME MEDIUM SAND, ROCK FRAGMENTS, WET		SLIGHT PET. ODOR
S-10	18-20	20"	7-7-6-7			SAME AS ABOVE		
S-11	24-26	12"	11-19-32-38			2.5Y 4/0 SAND, FINE AT TOP THEN BECOMING MEDIUM TO COARSE, SHELL FRAGMENTS		NO ODOR
S-12	29-31	14"	5-4-30-50/4			2.5Y 5/0 SAND MEDIUM TO COARSE, BECOMING MEDIUM TO FINE SAND, [illegible] AT TIP, WET		SLIGHT PET. ODOR
S-13	34-36	14"	15-25-35-37			2.5Y 4/0 SAND, FINE, LARGE AMOUNT OF HEAVIES, WET		NO PET. ODOR
S-14	39-41	8	8-16-27-50/2			2.5Y 4/0 SAND, COARSE WITH MEDIUM AND FINE SAND, TIP IS FINE SAND WITH SILT		

NOTES: * HNU BATTERY IS LOW — HNU IN BREATHING ZONE 0

10' SCREEN — SAND UP TO 27.5' — 2 - 100 LB BAGS #2 W/G

28.9' RISER — BENTONITE UP TO 24.5' — 1 - 50 LB BAG BENTONITE

6" WELL TIP — GROUT UP TO 2'

INITIAL H_2O 4.95' — WELL DEPTH 39.04

* NOTE: M. COMP. = MAJOR COMPONENT, TEX. = TEXTURE, C. = COLOR, COMP. = COMPONENT, MOIST. = MOISTURE

MALCOLM PIRNIE

BORING GMW-4

PROJECT: Ft. Story - LARC 60 | PROJECT NO: 0285-589

DATE: 3/27/95 | LOCATION: Fort Story - Virginia Beach, VA

ELEVATION: | DATUM:

SAMPLE no.	SAMPLE depth	SAMPLE recovery %	SAMPLE blows per 6"	DEPTH	STRATA	SOIL DESCRIPTION M. COMP., TEX., C., 2nd COMP., TEX. C.: 3rd COMP., ETC., MOIST., OTHER *	WELL CONST.	REMARKS
S-1	0-2	6"	1-2-2-2			2.5Y 3/3 AT TOP TO 2.5Y 6/4, SAND MEDIUM TO FINE WITH SOME HEAVIES, ROOTS, MOIST		
S-2	2-4	8"	2-2-2-3			2.5Y 5/4 SAND, MEDIUM WITH SOME COARSE, SOME HEAVIES, ~~WET~~ MOIST TO WET		
S-3	4-6	8"	3-3-3-6			SAME AS ABOVE		HNU @ 0
S-4	6-8	12"	3-4-7-9			2.5Y 5/3 SAND, MEDIUM WITH SOME HEAVIES AND FINE SAND, WET		
S-5	8-10	10"	3-4-4-5			2.5Y 6/3 SAND, MEDUM, LITTLE FINE SAND, SOME HEAVIES, WET		
S-6	10-12	12	3-2-3-3			SAME AS ABOVE		HNU @ 0
S-7	12-14	18"	1-1-2-2			2.5Y 6/3 SAND, MEDIUM WITH SOME FINE SAND, SOME HEAVIES, ROOT, WET.		
S-8	14-16	12	2-4-7-7			2.5Y 7/0 SAND, MEDIUM TO FINE, FEW HEAVIES, WET.		

NOTES: HNU IN BREATHING ZONE 0 AUGERS 6¼" ID

* NOTE: M. COMP. = MAJOR COMPONENT. TEX. = TEXTURE. C. = COLOR. COMP. = COMPONENT. MOIST. = MOISTURE

MALCOLM PIRNIE

BORING 7MW-1

PROJECT: Ft Story - Auto Craft | PROJECT NO: 0285-590

DATE: 3/22/95 | LOCATION: Fort Story - Virginia Beach, VA

ELEVATION: | DATUM:

SAMPLE no.	SAMPLE depth	SAMPLE recovery %	SAMPLE blows per 6"	DEPTH	STRATA	SOIL DESCRIPTION (M. COMP., TEX., C., 2nd COMP., TEX. C.: 3rd COMP., ETC., MOIST., OTHER *)	WELL CONST.	REMARKS
S-1	0-2	12"	11-16-9			3" ASPHALT 3" BLACK SAND 2.5Y 7/3 SAND, FINE, SOME HEAVIES, DRY TO SLIGHTLY MOIST		
S-2	2-4	14"	9-6-8-9			2.5Y 7/3 TO 2.5 7/4 SAND, FINE, SOME HEAVIES, FRIABLE, SLIGHTLY MOIST		
S-3	4-6	16"	3-6-9-9			10 YR 7/3 SAND, FINE WITH SOME MEDIUM, SOME HEAVIES, MOIST		HNU @ 0
S-4	6-8	18"	6-6-5-6			SAME AS ABOVE, MOIST		
S-5	8-10	16"	7-7-6-4			SAME AS ABOVE, MOIST, INCREASE IN MEDIUM SAND		
S-6	10-12	12"	4-3-2-2			10 YR 7/4 SAND, MEDIUM, SOME HEAVIES, WET		
S-7	12-14	12"	1-1-2-1			10YR 7/1 SAND, MEDIUM, FEW FINES AND HEAVIES, WET.		
S-8	14-16	18"	WOH-18-3			SAME AS ABOVE, SOME ORGANIC MATTER PRESENT (ROOTS)		HNU @ 0
S-9	16-18	24	3-8-10-9			TOP 18" SAME AS ABOVE BOTTOM 6" ~~BOTTOM~~ 10YR 3/2 SAND, FINE TO MEDIUM, AND ORGANIC MATTER (PEAT) FRIABLE, SLIGHTLY COHESIVE.		
S-10	18-20	24	4-6-8-10			TOP 20" 10YR 7/2 SAND, MEDIUM BOTTOM 4" SAND, MEDIUM TO V. COARSE 10YR 7/1		

NOTES: HNU IN BREATHING ZONE 0 — BORING TERMINATED AT 19'

10' SCREEN — 4-50 LB BAGS #2 WELL GRAVEL

8' RISER — 1-50 LB BAG BENTONITE

6" WELL POINT — SAND UP TO 6' BLS

BENTONITE UP TO 4'

* NOTE: M. COMP. = MAJOR COMPONENT, TEX. = TEXTURE, C. = COLOR, COMP. = COMPONENT, MOIST. = MOISTURE

MALCOLM PIRNIE

BORING 7MW-2

PROJECT: Ft Story - Auto Craft	PROJECT NO: 0285-590
DATE: 3/22/95	LOCATION: Fort Story - Virginia Beach, VA
ELEVATION:	DATUM:

SAMPLE no.	SAMPLE depth	SAMPLE recovery %	SAMPLE blows per 6"	DEPTH	STRATA	SOIL DESCRIPTION (M. COMP., TEX., C., 2nd COMP., TEX. C.: 3rd COMP.. ETC.. MOIST.. OTHER *)	WELL CONST.	REMARKS
S-1	0-2	14	3-7-12-1			2.5Y 8/4 SAND, FINE, SOME HEAVIES MOIST,		
S-2	2-4	16	2-2-3-3			SAME AS ABOVE		
S-3	4-6	20	3-6-6-9			SAME AS ABOVE		
S-4	6-8	20	3-4-4-8			SAME AS ABOVE MATERIAL BECOMING VERY MOIST AT BOTTOM SMALL ZONE OF 2.5Y 6/2 SAND, SAME AS ABOVE, MOIST		HNU 0
S-5	8-10	18	3-4-4-5			2.5Y 7/3 SAND, FINE, SOME HEAVIES, NO SILT OR CLAY, WET		
S-6	10-12	20	1-1-2-1			SAME AS ABOVE		
S-7	12-14	24"	2-4-7-6			SAME AS ABOVE		
S-8	14-16	24"	5-7-6-9			5Y 6/3 SAND, FINE WITH SOME HEAVIES, WET, SLIGHTLY COHESIVE		
S-9	16-18	24"	4-5-5-7			SAME AS ABOVE		

NOTES: HNU IN BREATHING ZONE 0 BORING TERMINATED AT 15'

10' SCREEN	4.5 - 50 LB BAGS #2 WELL GRAVEL
4' RISER	1/2 50 LB BAG HOLE PLUG BENTONITE
6" WELL TIP	SAND UP TO 3'
	BENTONITE UP TO 2'

* NOTE: M. COMP. = MAJOR COMPONENT. TEX. = TEXTURE. C. = COLOR. COMP. = COMPONENT. MOIST. = MOISTURE

MALCOLM PIRNIE

BORING 7MW-3

PROJECT: Ft Story - Auto Craft | PROJECT NO: 0285-590

DATE: 3/22/95 | LOCATION: Fort Story - Virginia Beach, VA

ELEVATION: | DATUM:

SAMPLE no.	SAMPLE depth	SAMPLE recovery	SAMPLE blows per 6"	DEPTH	STRATA	SOIL DESCRIPTION (M. COMP., TEX., C., 2nd COMP., TEX. C.: 3rd COMP., ETC., MOIST., OTHER *)	WELL CONST.	REMARKS
S-1	0-2	16	5-2-2-4			TOP 6" ORGANIC SY 3/1 SANDY, ROOTS BOTTOM 10" 2.5Y 6/3 SAND, FINE, SOME HEAVIES, MOIST		
S-2	2-4	16"	5-3-3-6			SAME AS ABOVE		HNU @ 0
S-3	4-6	18"	2-3-4-4			2.5Y 7/6 SAND, FINE, SOME HEAVIES MOIST, SOME MEDIUM SAND		
S-4	6-8	14	3-3-2-2			SAME AS ABOVE, BOTTOM IS WET		
S-5	8-10	16	5-2-3-3			TOP 10" SAME AS ABOVE BOTTOM 6 2.5 6/0 SAND, FINE, SOME HEAVIES, WET, NON COHESIVE		HNU @ 0
S-6	10-12	20	2-2-2-3			2.5Y 7/0 SAND, FINE WITH HEAVIES, NON COHESIVE, WET		
S-7	12-14	~~24~~	4-3-4-3			2.5Y 5/2 SAND, FINE WITH LARGE AMOUNT OF HEAVIES, NO SILT, WET		
S-8	14-16	24"	3-5-5-7			SAME AS ABOVE		
S-9	16-18	20"	5-7-11-11			SAME AS ABOVE, LESS HEAVIES		
S-10	18-20	12"	11-20-26-28			5Y 6/2 SAND, MEDIUM WITH SOME FINES, WET, SOME HEAVIES NON COHESIVE.		HNU @ 0
S-11	24-26	24"	13-13-13-17			SAME AS ABOVE		
S-12	29-31	24	17-19-23-28			5Y 7/1 SAND MEDIUM AT TOP BECOMING COARSE TO VERY COARSE INTERLAYERED WITH FINE SAND		
S-13	34-36	24"	8-22-22-21			5Y 7/1 ALTERNATING MEDIUM TO COARSE AND VERY COARSE SAND WITH GRAVEL AND PEBBLES		
S-14	39-41	24"	9-9-10-13			SAME AS ABOVE		
S-15	44-46		11-20-~~33~~/5			NO RECOVERY		

NOTES: HNU IN BREATHING ZONE @

10' SCREEN .01"	SAND UP TO 26'	4.5 - 50 LB BAGS #2 SAND
30' RISER	BENTONITE UP TO 23'	1 - 50LB BAG BENTONITE
6" WELL POINT	GROUT UP TO	

* NOTE: M. COMP. = MAJOR COMPONENT, TEX. = TEXTURE, C. = COLOR, COMP. = COMPONENT, MOIST. = MOISTURE

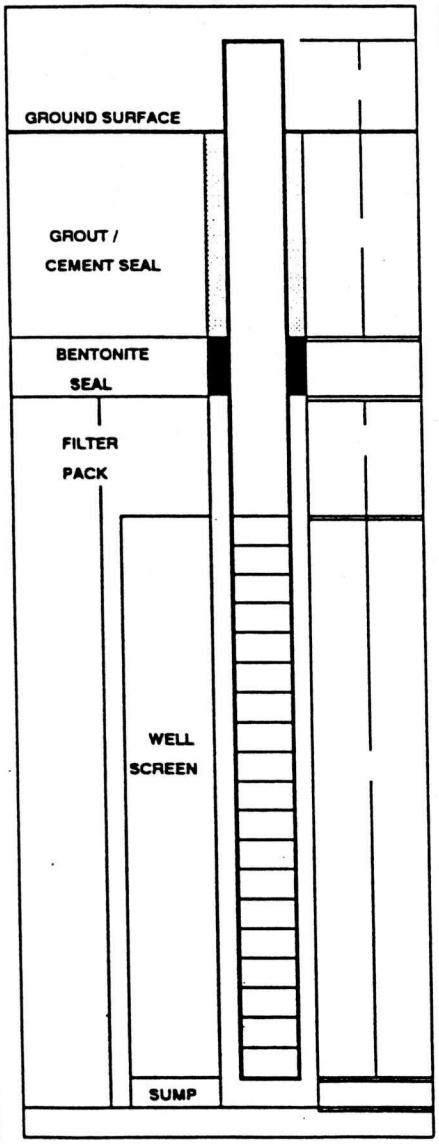
WELL CONSTRUCTION DATA

WELL ID: 4MW-1
BORING ID: 4MW-1

MALCOLM PIRNIE

Malcolm Pirnie, Inc. 11832 Rock Landing Drive Suite 400 Newport News, VA 23606

PROJECT NAME: Ft Story - FTA	PROJECT NO: 0285-588	GROUND ELEVATION:
DATE STARTED: 3/22/95	LOCATION: VA Beach, VA	CASING ELEVATION:
DATE COMPLETED: 3/22/95	DRILLING COMPANY: Fishburne	SAMPLE INTERVAL: Every 2'
MPI PERSONEL: Friedmann	DRILLING METHOD: Hollow Stem	SAMPLE METHOD: Split Spoon



WELL CONSTRUCTION DATA

CASING:
- Size: NA
- From: NA

PROTECTION:
- Locking Cap: Yes
- Protective Posts: No
- Protective outer casing: 9½" Flush Mount
- Material: Steel

WELL MATERIALS:

Screen
- Type: Schedule 40 PVC
- Diameter: 2" O.D.
- Slot: 0.01"
- Length: 10'

Riser
- Type: Schedule 40 PVC
- Diameter: 2"
- Length: 4'

TOTAL DEPTH OF WELL: 14'6"

INITIAL WATER LEVEL:

FILTER PACK:
- Material: #2 Well Gravel
- Amount used: 200 LBS
- Total thickness: 11'
- Supplier: Morie

BENTONITE:
- Type: Granular
- Size: 3/8"
- Amount used: 25 LBS

GROUT:
- Type: Portland Cement
- Amount used:

WEATHER CONDITIONS:
- Temperature:
- Precipitation:

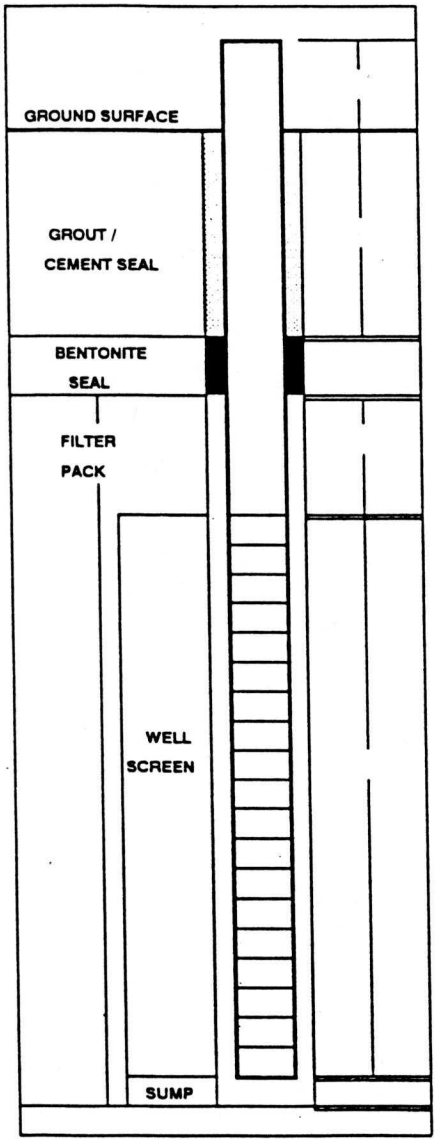
NOTES:

WELL ID: 4MW-2D
BORING ID: 4MW-2D

MALCOLM PIRNIE

Malcolm Pirnie, Inc. 11832 Rock Landing Drive Suite 400 Newport News, VA 23606

PROJECT NAME: Ft Story - FTA	PROJECT NO: 0285-588	GROUND ELEVATION:
DATE STARTED: 3/21/95	LOCATION: VA Beach, VA	CASING ELEVATION:
DATE COMPLETED: 3/21/95	DRILLING COMPANY: Fishburne	SAMPLE INTERVAL: Every 2' then 5'
MPI PERSONEL: Friedmann	DRILLING METHOD: Hollow Stem	SAMPLE METHOD: Split Spoon



WELL CONSTRUCTION DATA

CASING:
- Size: NA
- From: NA

PROTECTION:
- Locking Cap: YES
- Protective Posts: No
- Protective outer casing: 9½" Flush Mount
- Material: Steel

WELL MATERIALS:

Screen
- Type: Schedule 40 PVC
- Diameter: 2"
- Slot: 0.01"
- Length: 10'

Riser
- Type: Schedule 40 PVC
- Diameter: 2"
- Length: 30'

TOTAL DEPTH OF WELL: 40'6"

INITIAL WATER LEVEL:

FILTER PACK:
- Material: #2 well gravel
- Amount used: 200 LB
- Total thickness: 13'
- Supplier: Morie

BENTONITE:
- Type: Granular
- Size: 3/8"
- Amount used: 50 LBS

GROUT:
- Type: Cement and Quik Gel Bentonite
- Amount used:

WEATHER CONDITIONS:
- Temperature:
- Precipitation:

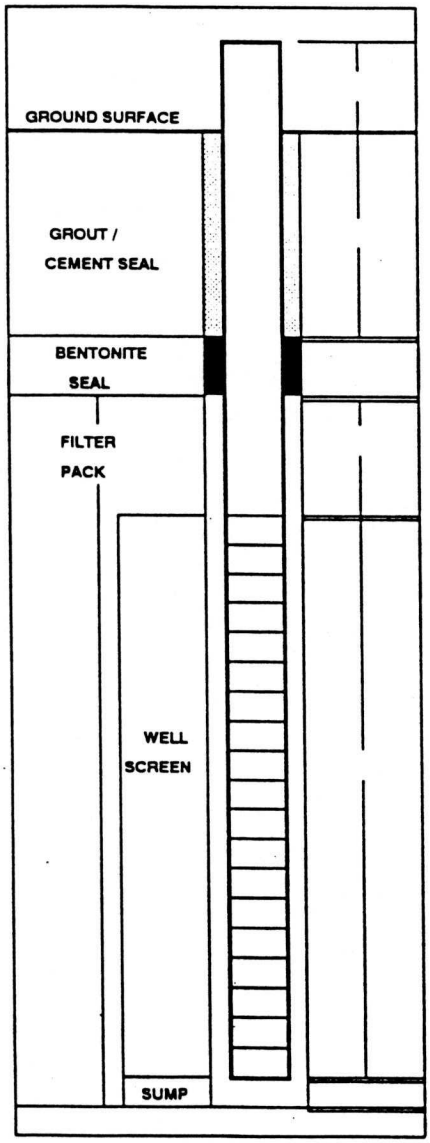
NOTES:

WELL ID: 4MW-2S
BORING ID: 4MW-2S

MALCOLM PIRNIE

Malcolm Pirnie, Inc. 11832 Rock Landing Drive Suite 400 Newport News, VA 23606

PROJECT NAME: Ft Story - FTA	PROJECT NO: 0285-588	GROUND ELEVATION:
DATE STARTED: 3/21/95	LOCATION: VA Beach, VA	CASING ELEVATION:
DATE COMPLETED: 3/21/95	DRILLING COMPANY: Fishburne	SAMPLE INTERVAL: NA
MPI PERSONEL: Friedmann	DRILLING METHOD: Hollow Stem	SAMPLE METHOD: NA



WELL CONSTRUCTION DATA

CASING:
- Size: NA
- From: NA

PROTECTION:
- Locking Cap: YES
- Protective Posts: No
- Protective outer casing: 9½" FLUSH MOUNT
- Material:

WELL MATERIALS:

Screen
- Type: SCHEDULE 40 PVC
- Diameter: 2
- Slot: 0.01"
- Length: 10'

Riser
- Type: SCHEDULE 40 PVC
- Diameter: 2"
- Length: 4'

TOTAL DEPTH OF WELL: 14'6"

INITIAL WATER LEVEL:

FILTER PACK:
- Material: #2 WELL GRAVEL
- Amount used: 200 LBS
- Total thickness: 11'
- Supplier: MORIE

BENTONITE:
- Type: GRANULAR
- Size: 3/8"
- Amount used: 25 LBS

GROUT:
- Type: PORTLAND CEMENT
- Amount used:

WEATHER CONDITIONS:
- Temperature:
- Precipitation:

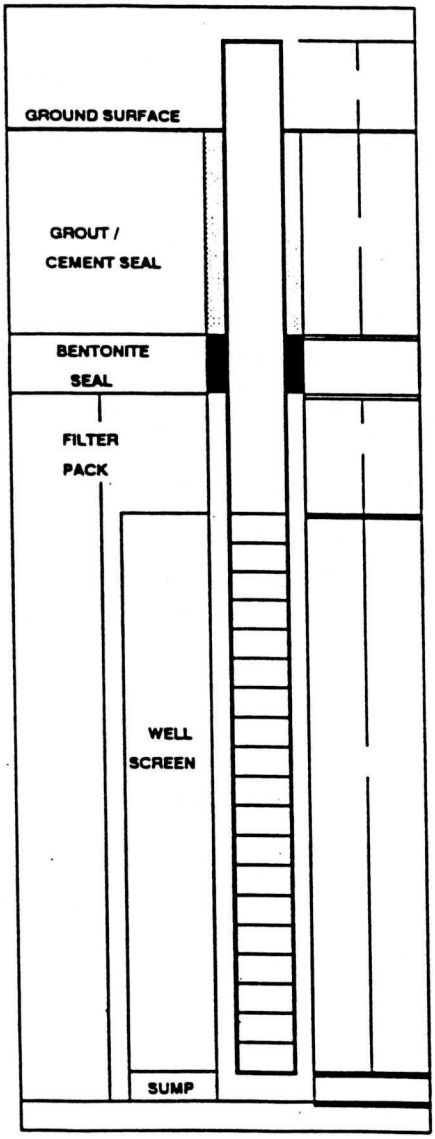
NOTES:

WELL ID: 4MW-3
BORING ID: 4MW-3

MALCOLM PIRNIE

Malcolm Pirnie, Inc. 11832 Rock Landing Drive Suite 400 Newport News, VA 23606

PROJECT NAME: Ft Story - FTA	PROJECT NO: 0285-588	GROUND ELEVATION:
DATE STARTED: 3/22/95	LOCATION: VA Beach, VA	CASING ELEVATION:
DATE COMPLETED: 3/22/95	DRILLING COMPANY: Fishburne	SAMPLE INTERVAL: Every 2'
MPI PERSONEL: Friedmann	DRILLING METHOD: Hollow Stem	SAMPLE METHOD: Split Spoon



WELL CONSTRUCTION DATA

CASING:
- Size: NA
- From: NA

PROTECTION:
- Locking Cap: YES
- Protective Posts: NO
- Protective outer casing: ~~No~~ 9½" FLUSH MOUNT
- Material: STEEL

WELL MATERIALS:

Screen
- Type: SCHEDULE 40 PVC
- Diameter: 2"
- Slot: 0.01"
- Length: 10'

Riser
- Type: SCHEDULE 40 PVC
- Diameter: 2"
- Length: 4'

TOTAL DEPTH OF WELL: 14'6"

INITIAL WATER LEVEL:

FILTER PACK:
- Material: #2 WELL GRAVEL
- Amount used: 200 LBS
- Total thickness: 11'
- Supplier: MARIE

BENTONITE:
- Type: GRANULAR
- Size: 3/8"
- Amount used: 35 LBS

GROUT:
- Type: PORTLAND CEMENT
- Amount used:

WEATHER CONDITIONS:
- Temperature:
- Precipitation:

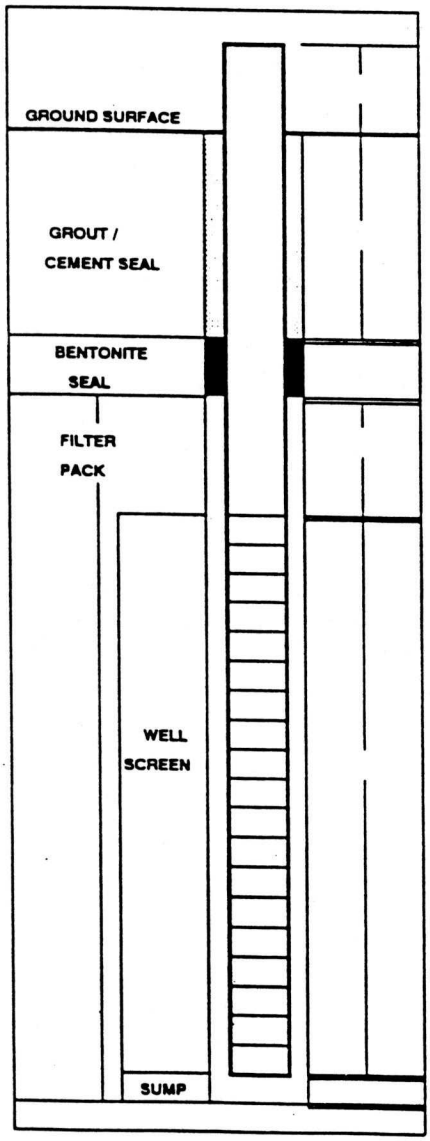
NOTES:

WELL ID: 4MW-4
BORING ID: 4MW-4

MALCOLM PIRNIE

Malcolm Pirnie, Inc. 11832 Rock Landing Drive Suite 400 Newport News, VA 23606

PROJECT NAME: Ft Story - FTA	PROJECT NO: 0285-588	GROUND ELEVATION:
DATE STARTED: 3/27/95	LOCATION: VA Beach, VA	CASING ELEVATION:
DATE COMPLETED: 3/27/95	DRILLING COMPANY: Fishburne	SAMPLE INTERVAL: Every 2'
MPI PERSONEL: Friedmann	DRILLING METHOD: Hollow Stem	SAMPLE METHOD: Split Spoon



WELL CONSTRUCTION DATA

CASING:
- Size: NA
- From: NA

PROTECTION:
- Locking Cap: YES
- Protective Posts: NO
- Protective outer casing: 9½" FLUSH MOUNT
- Material: STEEL

WELL MATERIALS:

Screen
- Type: SCHEDULE 40 PVC
- Diameter: 2"
- Slot: 0.01"
- Length: 10'

Riser
- Type: SCHEDULE 40 PVC
- Diameter: 2"
- Length: 4'

TOTAL DEPTH OF WELL: 14'6"

INITIAL WATER LEVEL:

FILTER PACK:
- Material: #2 WELL GRAVEL
- Amount used: 200 LBS
- Total thickness: 11'
- Supplier: MORIE

BENTONITE:
- Type: GRANULAR
- Size: 3/8"
- Amount used: 50LB

GROUT:
- Type: PORTLAND CEMENT
- Amount used:

WEATHER CONDITIONS:
- Temperature:
- Precipitation:

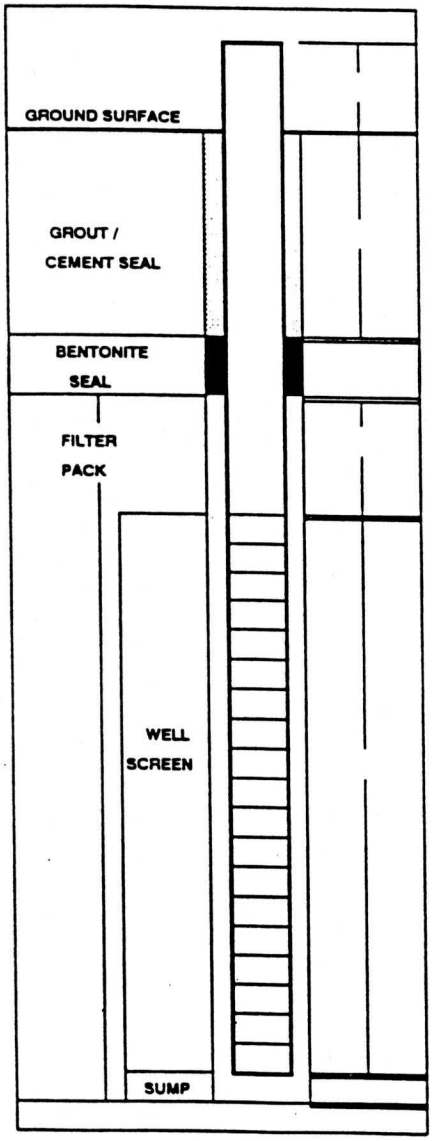
NOTES:

WELL ID: 4MW-5
BORING ID: 4MW-5

MALCOLM PIRNIE

Malcolm Pirnie, Inc. 11832 Rock Landing Drive Suite 400 Newport News, VA 23606

PROJECT NAME: Ft Story-FTA	PROJECT NO: 0285-588		GROUND ELEVATION:
DATE STARTED: 3/21/95	LOCATION: VA Beach, VA		CASING ELEVATION:
DATE COMPLETED: 3/21/95	DRILLING COMPANY: Fishburne		SAMPLE INTERVAL: Every 2'
MPI PERSONEL: Friedmann	DRILLING METHOD: Hollow Stem		SAMPLE METHOD: Split Spoon



WELL CONSTRUCTION DATA

CASING:
- Size: NA
- From: NA

PROTECTION:
- Locking Cap: YES
- Protective Posts: No
- Protective outer casing: 9½" FLUSH MOUNT
- Material: STEEL

WELL MATERIALS:

Screen
- Type: SCHEDULE 40 PVC
- Diameter: 2"
- Slot: 0.01"
- Length: 10'

Riser
- Type: SCHEDULE 40 PVC
- Diameter: 2"
- Length: 30

TOTAL DEPTH OF WELL: 40'6"

INITIAL WATER LEVEL:

FILTER PACK:
- Material: # 2 WELL GRAVEL
- Amount used: 200 LBS
- Total thickness: 12'6"
- Supplier: MORIE

BENTONITE:
- Type: GRANULAR
- Size: 3/8"
- Amount used: 50 LBS

GROUT:
- Type: PORTLAND CEMENT AND QUIKGEL BENTONITE
- Amount used:

WEATHER CONDITIONS:
- Temperature:
- Precipitation:

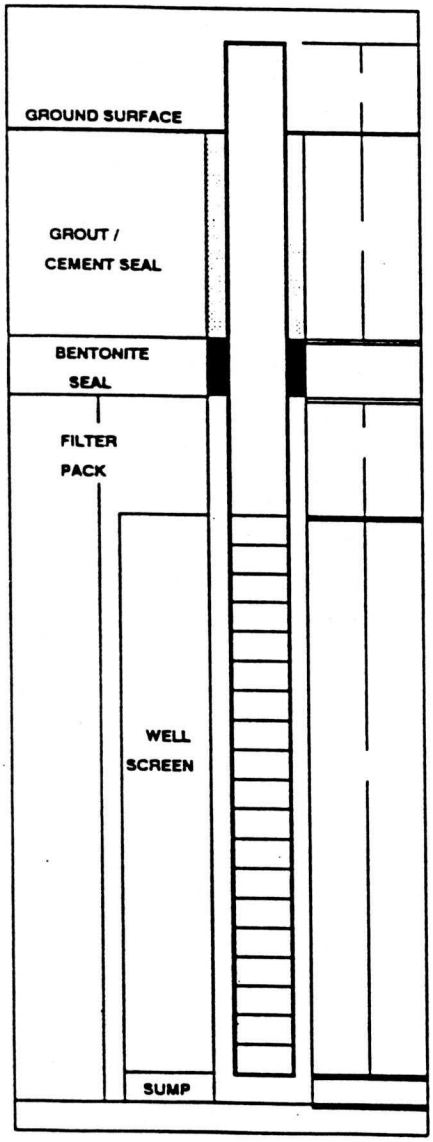
NOTES:

WELL ID: 6MW-1
BORING ID: 6MW-1

MALCOLM PIRNIE

Malcolm Pirnie, Inc. 11832 Rock Landing Drive Suite 400 Newport News, VA 23606

PROJECT NAME: Ft Story - ARC 60	PROJECT NO: 8285-589	GROUND ELEVATION:
DATE STARTED: 3/23/95	LOCATION: VA Beach, VA	CASING ELEVATION:
DATE COMPLETED: 3/23/95	DRILLING COMPANY: Fishburne	SAMPLE INTERVAL: Every 2'
MPI PERSONEL: Friedmann	DRILLING METHOD: Hollow Stem	SAMPLE METHOD: Split Spoon



WELL CONSTRUCTION DATA

CASING:
- Size: NA
- From: NA

PROTECTION:
- Locking Cap: YES
- Protective Posts: No
- Protective outer casing: 9½" Flush Mount
- Material: Steel

WELL MATERIALS:

Screen
- Type: Schedule 40 PVC
- Diameter: 2"
- Slot: 0.01"
- Length: 10'

Riser
- Type: Schedule 40 PVC
- Diameter: 2"
- Length: 3'6"

TOTAL DEPTH OF WELL: 14'

INITIAL WATER LEVEL:

FILTER PACK:
- Material: #2 Well Gravel
- Amount used: ~~11~~ 200 LBS
- Total thickness: 11'
- Supplier: Morie

BENTONITE:
- Type: Granular
- Size: 3/8"
- Amount used: 50 LBS

GROUT:
- Type: Portland Cement
- Amount used:

WEATHER CONDITIONS:
- Temperature:
- Precipitation:

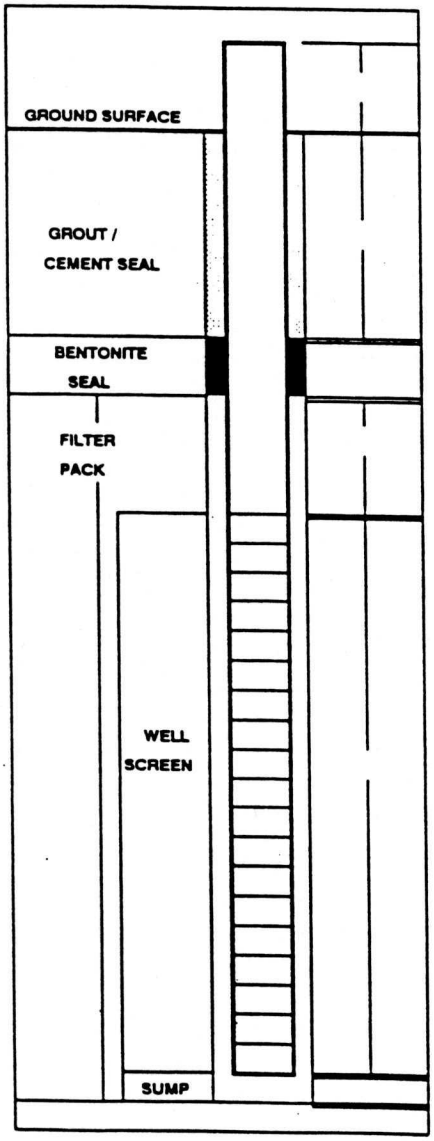
NOTES:

WELL ID: 6MW-2
BORING ID: 6MW-2

MALCOLM PIRNIE

Malcolm Pirnie, Inc. 11832 Rock Landing Drive Suite 400 Newport News, VA 23606

PROJECT NAME: FT STORY - LARC60	PROJECT NO: 0285-589	GROUND ELEVATION:
DATE STARTED: 3/23/95	LOCATION: VA BEACH, VA	CASING ELEVATION:
DATE COMPLETED: 3/23/95	DRILLING COMPANY: FISHBURNE	SAMPLE INTERVAL: 2' THEN 5' AT 20'
MPI PERSONEL: FRIEDMANN	DRILLING METHOD: HOLLOW STEM	SAMPLE METHOD: SPLIT SPOON



WELL CONSTRUCTION DATA

CASING:
- Size: NA
- From: NA

PROTECTION:
- Locking Cap: YES
- Protective Posts: NO
- Protective outer casing: 9½ FLUSH MOUNT
- Material: STEEL

WELL MATERIALS:

Screen
- Type: SCHEDULE 40 PVC
- Diameter: 2"
- Slot: 0.01"
- Length: 10'

Riser
- Type: SCHEDULE 40 PVC
- Diameter: 2"
- Length: 30'

TOTAL DEPTH OF WELL: 40'6"

INITIAL WATER LEVEL:

FILTER PACK:
- Material: # 2 WELL GRAVEL
- Amount used: 200 LBS
- Total thickness: 15'
- Supplier: MORIE

BENTONITE:
- Type: GRANULAR
- Size: 3/8"
- Amount used: 50 LBS

GROUT:
- Type: PORTLAND CEMENT AND QUIK GEL BENTONITE
- Amount used:

WEATHER CONDITIONS:
- Temperature:
- Precipitation:

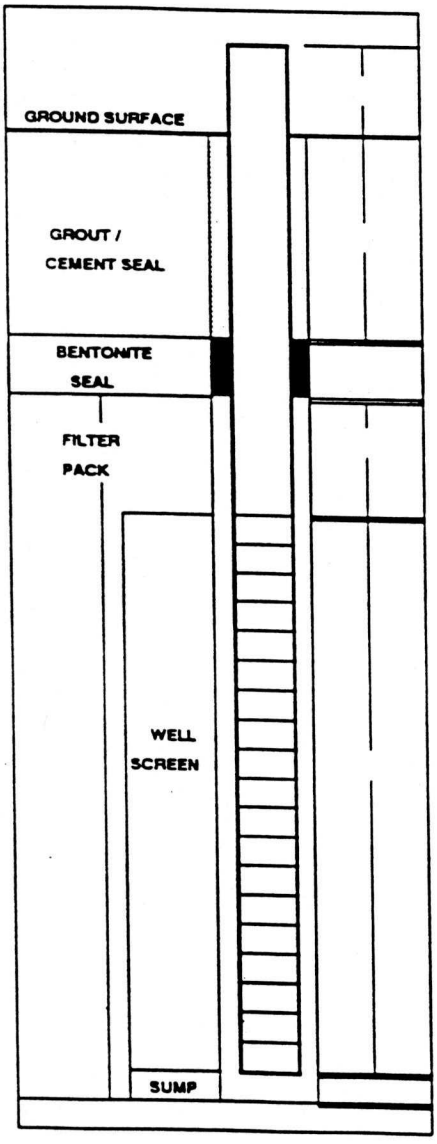
NOTES:

WELL ID: 6MW-35
BORING ID: 6MW-35

MALCOLM PIRNIE

Malcolm Pirnie, Inc. 11832 Rock Landing Drive Suite 400 Newport News, VA 23606

PROJECT NAME: Ft Story-Largo	PROJECT NO: 0285-589	GROUND ELEVATION:	
DATE STARTED: 3/24/95	LOCATION:	CASING ELEVATION:	
DATE COMPLETED: 3/24/95	DRILLING COMPANY: Fish	SAMPLE INTERVAL:	NA
MPI PERSONEL: Friedmann	DRILLING METHOD: Hollow Stem	SAMPLE METHOD:	NA



WELL CONSTRUCTION DATA

CASING:
- Size: NA
- From: NA

PROTECTION:
- Locking Cap: YES
- Protective Posts: No
- Protective outer casing: 9½" FLUSH MOUNT
- Material: STEEL

WELL MATERIALS:

Screen
- Type: SCHEDULE 40 PVC
- Diameter: 2"
- Slot: 0.01"
- Length: 10'

Riser
- Type: SCHEDULE 40 PVC
- Diameter: 2"
- Length: 3'9"

TOTAL DEPTH OF WELL: 14'3"

INITIAL WATER LEVEL:

FILTER PACK:
- Material: #2 WELL GRAVEL
- Amount used: 200 LBS
- Total thickness: 11.5
- Supplier: MORIE

BENTONITE:
- Type: GRANULAR
- Size: 3/8"
- Amount used: 50 LBS

GROUT:
- Type: PORTLAND CEMENT
- Amount used:

WEATHER CONDITIONS:
- Temperature:
- Precipitation:

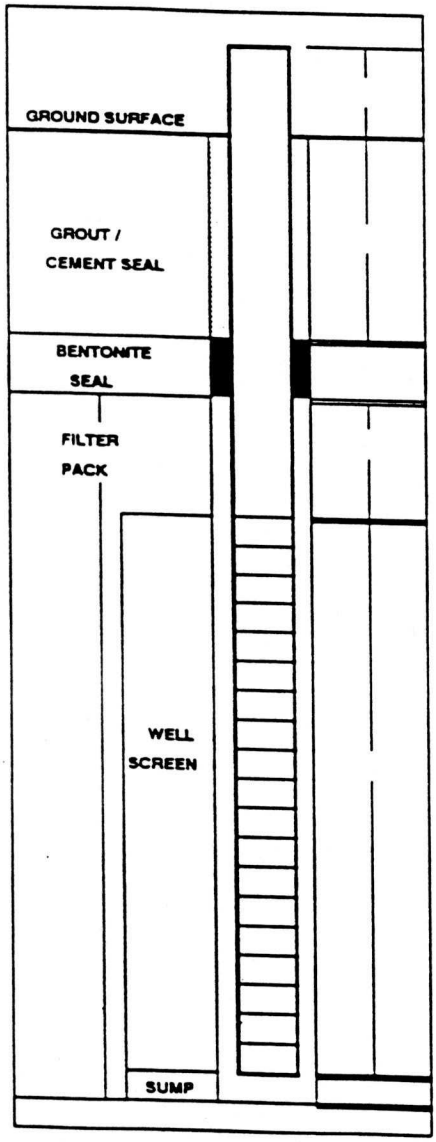
NOTES:

WELL ID: 6MW-3D
BORING ID: 6MW-3D

MALCOLM PIRNIE

Malcolm Pirnie, Inc. 11832 Rock Landing Drive Suite 400 Newport News, VA 23606

PROJECT NAME: Ft Story - LARC 60	PROJECT NO: 0285-589	GROUND ELEVATION:
DATE STARTED: 3/23/95	LOCATION: VA BEACH, VA	CASING ELEVATION:
DATE COMPLETED: 3/23/95	DRILLING COMPANY: FISHBURNE	SAMPLE INTERVAL: 2' TO 20 THEN 5'
MPI PERSONEL: FRIEDMANN	DRILLING METHOD: HOLLOW STEM	SAMPLE METHOD: SPLIT SPOON



WELL CONSTRUCTION DATA

CASING:
- Size: NA
- From: NA

PROTECTION:
- Locking Cap: YES
- Protective Posts: NO
- Protective outer casing: 9½"
- Material: STEEL

WELL MATERIALS:

Screen
- Type: SCHEDULE 40 PVC
- Diameter: 2"
- Slot: 0.01"
- Length: 10'

Riser
- Type: SCHEDULE 40 PVC
- Diameter: 2"
- Length: 28'9"

TOTAL DEPTH OF WELL: 40'3"

INITIAL WATER LEVEL:

FILTER PACK:
- Material: # 2 WELL GRAVEL
- Amount used: 200 LBS
- Total thickness: 12'6"
- Supplier: MORIE

BENTONITE:
- Type: GRANULAR
- Size: 3/8"
- Amount used: 50 LBS

GROUT:
- Type: PORTLAND CEMENT AND QUIK GEL BENTONITE
- Amount used:

WEATHER CONDITIONS:
- Temperature:
- Precipitation:

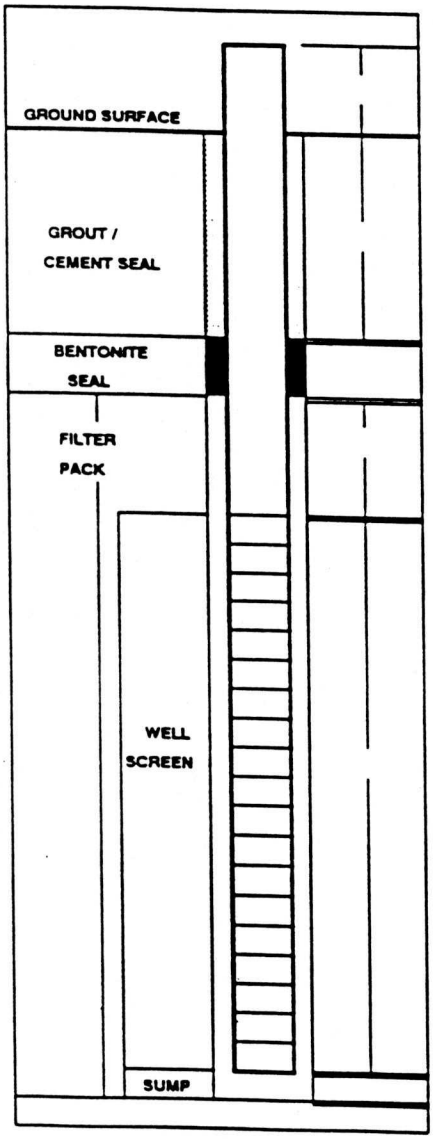
NOTES:

WELL ID: GMW-4
BORING ID: GMW-4

MALCOLM PIRNIE

Malcolm Pirnie, Inc. 11832 Rock Landing Drive Suite 400 Newport News, VA 23606

PROJECT NAME: Ft Story-LARC 60	PROJECT NO: 0285-589	GROUND ELEVATION:
DATE STARTED: 3/27/95	LOCATION: VA BEACH, VA	CASING ELEVATION:
DATE COMPLETED: 3/27/95	DRILLING COMPANY: FISHBURNE	SAMPLE INTERVAL: EVERY 2'
MPI PERSONEL: FRIEDMANN	DRILLING METHOD: HOLLOW STEM	SAMPLE METHOD: SPLIT SPOON



WELL CONSTRUCTION DATA

CASING:
- Size: NA
- From: NA

PROTECTION:
- Locking Cap: YES
- Protective Posts: NO
- Protective outer casing: 9½" FLUSH MOUNT
- Material: STEEL

WELL MATERIALS:

Screen
- Type: SCHEDULE 40 PVC
- Diameter: 2"
- Slot: 0.01"
- Length: 10'

Riser
- Type: SCHEDULE 40 PVC
- Diameter: 2"
- Length: ~~10~~ 4'

TOTAL DEPTH OF WELL: 14'6"

INITIAL WATER LEVEL:

FILTER PACK:
- Material: #2 WELL GRAVEL
- Amount used: 200 LBS
- Total thickness: 11'
- Supplier: MORIE

BENTONITE:
- Type: GRANULAR
- Size: 3/8"
- Amount used: 50 LBS

GROUT:
- Type: PORTLAND CEMENT
- Amount used:

WEATHER CONDITIONS:
- Temperature:
- Precipitation:

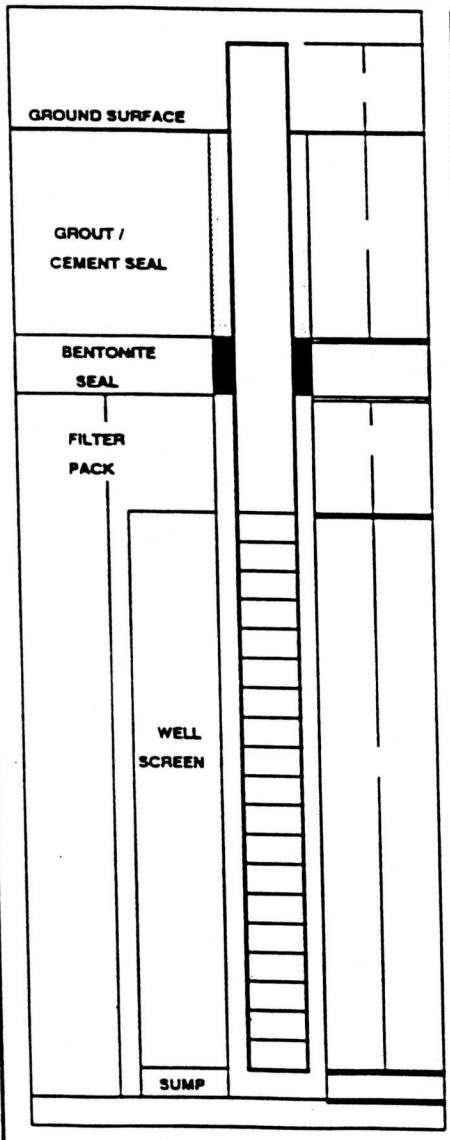
NOTES:

WELL ID: 7MW-1
BORING ID: 7MW-1

MALCOLM PIRNIE

Malcolm Pirnie, Inc. 11832 Rock Landing Drive Suite 400 Newport News, VA 23606

PROJECT NAME: FT STORY - AUTO CRAFT	PROJECT NO: 0285-590	GROUND ELEVATION:
DATE STARTED: 3/22/95	LOCATION: VA BEACH, VA	CASING ELEVATION:
DATE COMPLETED: 3/22/95	DRILLING COMPANY: FISHBURNE	SAMPLE INTERVAL: EVERY 2'
MPI PERSONEL: FRIEDMANN	DRILLING METHOD: HOLLOW STEM	SAMPLE METHOD: SPLIT SPOON



WELL CONSTRUCTION DATA

CASING:
- Size: NA
- From: NA

PROTECTION:
- Locking Cap: YES
- Protective Posts: NO
- Protective outer casing: 9 1/2" FLUSH MOUNT
- Material: STEEL

WELL MATERIALS:

Screen
- Type: SCHEDULE 40 PVC
- Diameter: 2"
- Slot: 0.01"
- Length: 10'

Riser
- Type: SCHEDULE 40 PVC
- Diameter: 2"
- Length: 8'

TOTAL DEPTH OF WELL: 18'6"

INITIAL WATER LEVEL:

FILTER PACK:
- Material: # 2 WELL GRAVEL
- Amount used: 200 LBS
- Total thickness: 12'
- Supplier: MORIE

BENTONITE:
- Type: GRANULAR
- Size: 3/8"
- Amount used: 50 LBS

GROUT:
- Type: PORTLAND CEMENT AND QUIK GEL BENTONITE
- Amount used:

WEATHER CONDITIONS:
- Temperature:
- Precipitation:

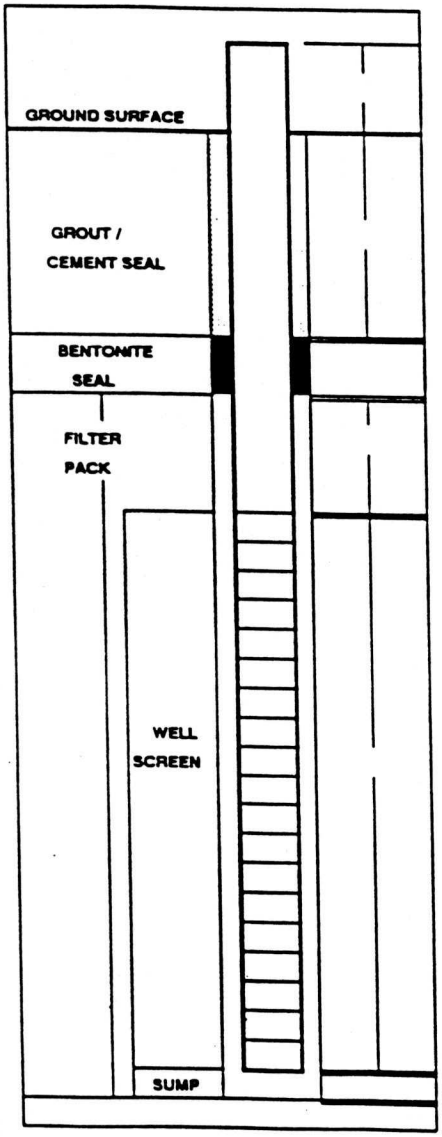
NOTES:

WELL ID: 7MW-2
BORING ID: 7MW-2

MALCOLM PIRNIE

Malcolm Pirnie, Inc. 11832 Rock Landing Drive Suite 400 Newport News, VA 23606

PROJECT NAME: FT STORY AUTO CRAFT	PROJECT NO: 0285-590	GROUND ELEVATION:
DATE STARTED: 3/22/95	LOCATION: VA BEACH, VA	CASING ELEVATION:
DATE COMPLETED: 3/22/95	DRILLING COMPANY: FISHBURNE	SAMPLE INTERVAL: EVERY 2'
MPI PERSONEL: FRIEDMANN	DRILLING METHOD: HOLLOW STEM	SAMPLE METHOD: SPLIT SPOON



WELL CONSTRUCTION DATA

CASING:
- Size: NA
- From: NA

PROTECTION:
- Locking Cap: YES
- Protective Posts: NO
- Protective outer casing: 9½" FLUSH MOUNT
- Material: STEEL

WELL MATERIALS:

Screen
- Type: SCHEDULE 40 PVC
- Diameter: 2"
- Slot: 0.01"
- Length: 10'

Riser
- Type: SCHEDULE 40 PVC
- Diameter: 2"
- Length: 4'

TOTAL DEPTH OF WELL: 14'6"
INITIAL WATER LEVEL:

FILTER PACK:
- Material: #2 WELL GRAVEL
- Amount used: 225 LBS
- Total thickness: 11'
- Supplier: MORIE

BENTONITE:
- Type: GRANULAR
- Size: 3/8"
- Amount used: 25 LBS

GROUT:
- Type: PORTLAND CEMENT
- Amount used:

WEATHER CONDITIONS:
- Temperature:
- Precipitation:

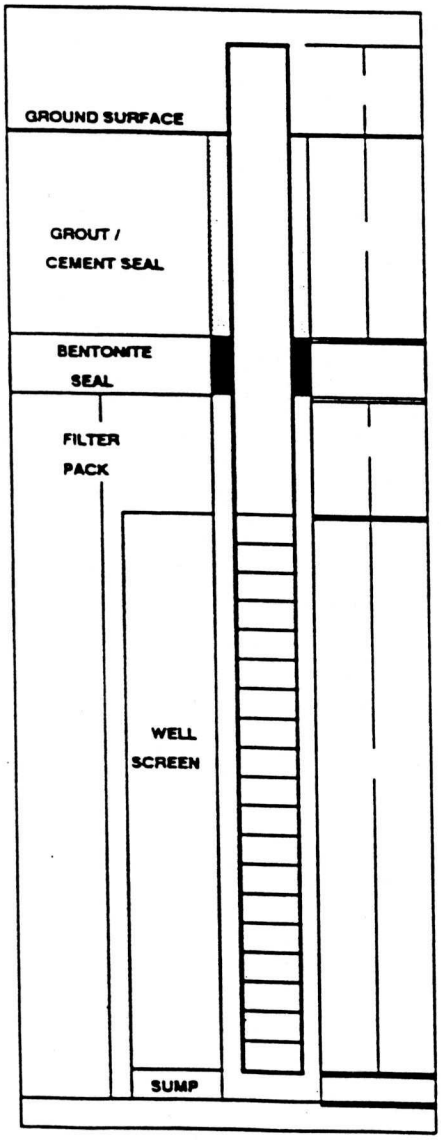
NOTES:

WELL ID: 7MW-3
BORING ID: 7MW-3

MALCOLM PIRNIE

Malcolm Pirnie, Inc. 11832 Rock Landing Drive Suite 400 Newport News, VA 23606

PROJECT NAME: FT. STORY AUTO CRAFT	PROJECT NO: 0285-590	GROUND ELEVATION:
DATE STARTED: 3/22/95	LOCATION: VA BEACH, VA	CASING ELEVATION:
DATE COMPLETED: 3/22/95	DRILLING COMPANY: FISHBURNE	SAMPLE INTERVAL: 2' THEN 5' AT 20'
MPI PERSONEL: FRIEDMANN	DRILLING METHOD: HOLLOW STEM	SAMPLE METHOD: SPLIT SPOON



WELL CONSTRUCTION DATA

CASING:
- Size: NA
- From: NA

PROTECTION:
- Locking Cap: YES
- Protective Posts: NO
- Protective outer casing: 9½" FLUSH MOUNT
- Material: STEEL

WELL MATERIALS:

Screen
- Type: SCHEDULE 40 PVC
- Diameter: 2"
- Slot: 0.01"
- Length: 10'

Riser
- Type: SCHEDULE 40 PVC
- Diameter: 2"
- Length: 30'

TOTAL DEPTH OF WELL: 40'6"

INITIAL WATER LEVEL:

FILTER PACK:
- Material: # 2 WELL GRAVEL
- Amount used: 225 LBS
- Total thickness: 14'
- Supplier: MORIE

BENTONITE:
- Type: GRANULAR
- Size: 3/8"
- Amount used: 50 LBS

GROUT:
- Type: PORTLAND CEMENT AND QUIK-GEL BENTONITE
- Amount used:

WEATHER CONDITIONS:
- Temperature:
- Precipitation:

NOTES:

WELL DEVELOPMENT DATA

BY WJF DATE 3/28/95 CHECK WJF DATE 4/4/95 SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. WELL NUMBER 4MW-1
2. DATE OF INSTALLATION: 3/22/95
3. DATE OF DEVELOPMENT: 3/28/95
4. STATIC WATER LEVEL: BEFORE DEV. ~5 ft. 24 HOURS AFTER _____
5. QUANTITY OF WATER LOSS DURING DRILLING, IF USED _____ GALLONS
6. QUANTITY OF STANDING WATER IN WELL AND ANNULUS BEFORE DEVELOPMENT _____ GALLONS
7.

	START	DURING			END			
	0910	0940		1010	1020	1030	1040	1050	1055
TURBIDITY (NTU)	N/A	669	185	169	123	100	59	47
SPECIFIC CONDUCTANCE(~~umhos/cm~~ MICROSIEMEN/cm)	245	135	133	127	125	120	120	119
TEMPERATURE(°C)	15	14.5	14.5	14.0	14.0	13.7	13.6	13.4
pH(S.U.)	7.5	7.5	7.6	7.5	7.5	7.4	7.3	7.3

8. DEPTH FROM TOP OF WELL CASING TO BOTTOM OF WELL ~14 ft.
9. SCREEN LENGTH 10 ft.
10. DEPTH TO TOP OF SEDIMENT: BEFORE DEV. _____ ft.; AFTER DEV. _____ ft.
11. PHYSICAL CHARACTER OF WATER: BROWN, SOME FINE SAND
12. TYPE AND SIZE OF WELL DEVELOPMENT EQUIPMENT: AIR LIFTING THEN SUBMERSIBLE PUMP
13. DESCRIPTION OF SURGE TECHNIQUE, IF USED: REPEATED SURGING WITH 1¾ SURGE BLOCK ALONG ENTIRE WELL LENGTH
14. HEIGHT OF WELL CASING ABOVE SURFACE: _____ ft.
15. QUANTITY OF WATER REMOVED: 120 gal.

    TIME FOR REMOVAL: 1:25 hr./min.
16. ~~1 PINT~~ 5-GAL WATER SAMPLE COLLECTED: 7 MINS (time) 2 MIN. (SUBMERSIBLE)

DEVELOPMENT CONDITIONS:
1) WELL WATER IS REASONABLY CLEAR
2) SEDIMENT THICKNESS < 5% OF SCREEN LENGTH
3) REMOVAL OF 5 WELL VOLUMES, INCLUDING SATURATED FILTER ANNULUS

MALCOLM PIRNIE

BY WJF DATE 3/24/95 CHECK WJF DATE 4/4/95 SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. WELL NUMBER 4MW-25
2. DATE OF INSTALLATION: 3/21/95
3. DATE OF DEVELOPMENT: 3/24/95
4. STATIC WATER LEVEL: BEFORE DEV. 5.50 ft. 24 HOURS AFTER (AFTER DEV. 5.56) ____
5. QUANTITY OF WATER LOSS DURING DRILLING, IF USED N/A GALLONS
6. QUANTITY OF STANDING WATER IN WELL AND ANNULUS BEFORE DEVELOPMENT ____ GALLONS
7.

	1408 START	1435	1450 DURING		1510	1520	1535 END
TURBIDITY (NTU)	N/A	60.9	60.9	47.6	44.4		43.4
SPECIFIC CONDUCTANCE(~~umhos/cm~~) (MICROSIEMEN/CM)	180	100	90	95	90		95
TEMPERATURE(°C)	15	15	17	15	15		15
pH(S.U.)	6.8	6.8	6.1	6.1	6.0		6.0

8. DEPTH FROM TOP OF WELL CASING TO BOTTOM OF WELL 14.12 ft.
9. SCREEN LENGTH 10' ft.
10. DEPTH TO TOP OF SEDIMENT: BEFORE DEV. 14.12 ft.; AFTER DEV. 14.10 ft.
11. PHYSICAL CHARACTER OF WATER: BROWN, LITTLE FINES
12. TYPE AND SIZE OF WELL DEVELOPMENT EQUIPMENT: 5' BAILER, SUBMERSIBLE PUMP
13. DESCRIPTION OF SURGE TECHNIQUE, IF USED: REPEATED SURGING WITH 1¾" SURGE ALONG ENTIRE WELL LENGTH
14. HEIGHT OF WELL CASING ABOVE SURFACE: ____ ft.
15. QUANTITY OF WATER REMOVED: 176 GALS gal.
    TIME FOR REMOVAL: 1:23 hr./min.
16. ~~1 PINT~~ 5-GAL WATER SAMPLE COLLECTED: 120 SECS (time)

DEVELOPMENT CONDITIONS:
1) WELL WATER IS REASONABLY CLEAR
2) SEDIMENT THICKNESS < 5% OF SCREEN LENGTH
3) REMOVAL OF 5 WELL VOLUMES, INCLUDING SATURATED FILTER ANNULUS

MALCOLM PIRNIE

BY WJF DATE 3/24/95 CHECK WJF DATE 4/4/95 SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. WELL NUMBER 4MW-2D
2. DATE OF INSTALLATION: 3/21/95
3. DATE OF DEVELOPMENT: 3/24/95
4. STATIC WATER LEVEL: BEFORE DEV. 5.35' ft. 24 HOURS AFTER ABT DEV 5.37
5. QUANTITY OF WATER LOSS DURING DRILLING, IF USED N/A GALLONS
6. QUANTITY OF STANDING WATER IN WELL AND ANNULUS BEFORE DEVELOPMENT _____ GALLONS

7.	START	DURING			END		END
	1418	1430	1458	1515	1530	1545	1555
TURBIDITY (NTU)	N/A	238	1000*	165	108	170	33.2
SPECIFIC CONDUCTANCE ~~(umhos/cm)~~ (MICROSIEMEN/CM)	330	380	400	420	415	420	425
TEMPERATURE(°C)	17	18	18	18	19	18	18
pH(S.U.)	7.0	6.9	6.9	6.7	6.6	6.6	6.7

8. DEPTH FROM TOP OF WELL CASING TO BOTTOM OF WELL 40.12 ft.
9. SCREEN LENGTH 10' ft.
10. DEPTH TO TOP OF SEDIMENT: BEFORE DEV. 40.12 ft.; AFTER DEV. 39.75 ft.
11. PHYSICAL CHARACTER OF WATER: BROWN TO BLUE GREEN
12. TYPE AND SIZE OF WELL DEVELOPMENT EQUIPMENT: AIR LIFT WITH "J" TUBE
13. DESCRIPTION OF SURGE TECHNIQUE, IF USED: REPEATED SURGING WITH 1 3/4" SURGE BLOCK ALONG ENTIRE WELL LENGTH
14. HEIGHT OF WELL CASING ABOVE SURFACE: _____ ft.
15. QUANTITY OF WATER REMOVED: 310 GAL gal.

    TIME FOR REMOVAL: 1:37 hr./min.
16. ~~1 PINT~~ 5 GAL WATER SAMPLE COLLECTED: 80 SEC. (time) 55 GALS IN 15 MINUTES

DEVELOPMENT CONDITIONS:
1) WELL WATER IS REASONABLY CLEAR
2) SEDIMENT THICKNESS < 5% OF SCREEN LENGTH
3) REMOVAL OF 5 WELL VOLUMES, INCLUDING SATURATED FILTER ANNULUS

MALCOLM PIRNIE

BY WJF DATE 3/27/95 CHECK WJF DATE 4/4/95 SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. WELL NUMBER 4MW-3
2. DATE OF INSTALLATION: 3/22/95
3. DATE OF DEVELOPMENT: 3/27/95
4. STATIC WATER LEVEL: BEFORE DEV. 6.08 AFT DEV 6.09 ft. 24 HOURS AFTER N/A
5. QUANTITY OF WATER LOSS DURING DRILLING, IF USED N/A GALLONS
6. QUANTITY OF STANDING WATER IN WELL AND ANNULUS BEFORE DEVELOPMENT _____ GALLONS
7.

	START	1500	1535	1600	1630	END 1720
			DURING			
TURBIDITY (NTU)	N/A	365	22.7	42.5		50
SPECIFIC CONDUCTANCE(~~umhos~~ MICROSIEMEN/cm)	214	177	132	136		134
TEMPERATURE(°C)	15	14	14	14		14
pH(S.U.)	6.7	7.2	7.2	7.3		7.3

8. DEPTH FROM TOP OF WELL CASING TO BOTTOM OF WELL 13.77 ft.
9. SCREEN LENGTH 16' ft.
10. DEPTH TO TOP OF SEDIMENT: BEFORE DEV. 13.77 ft.; AFTER DEV. 13.78 ft.
11. PHYSICAL CHARACTER OF WATER: BROWN TO LIGHT BROWN, SOME FINE SAND
12. TYPE AND SIZE OF WELL DEVELOPMENT EQUIPMENT: AIR LIFTING WITH "J" TUBE
13. DESCRIPTION OF SURGE TECHNIQUE, IF USED: REPEATED SURGING WITH 1¾" SURGE BLOCK ALONG ENTIRE LENGTH OF WELL
14. HEIGHT OF WELL CASING ABOVE SURFACE: _____ ft.
15. QUANTITY OF WATER REMOVED: 70 gal.
    TIME FOR REMOVAL: 2:20 hr./min.
16. ~~1-PINT~~ 5 GALLONS WATER SAMPLE COLLECTED: 7 MINS (time)

DEVELOPMENT CONDITIONS:
1) WELL WATER IS REASONABLY CLEAR
2) SEDIMENT THICKNESS < 5% OF SCREEN LENGTH
3) REMOVAL OF 5 WELL VOLUMES, INCLUDING SATURATED FILTER ANNULUS

MALCOLM PIRNIE

BY WJF DATE 3/28/95 CHECK WJF DATE 4/4/95 SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. WELL NUMBER 4MW-4
2. DATE OF INSTALLATION: 3/27/95
3. DATE OF DEVELOPMENT: 3/28/95
4. STATIC WATER LEVEL: BEFORE DEV. ~5 ft. 24 HOURS AFTER N/A
5. QUANTITY OF WATER LOSS DURING DRILLING, IF USED N/A GALLONS
6. QUANTITY OF STANDING WATER IN WELL AND ANNULUS BEFORE DEVELOPMENT _____ GALLONS
7.

	START (1200)	DURING (1220)	DURING (1305)	END (1340)
TURBIDITY (NTU)	460	74	20.2	11.6
SPECIFIC CONDUCTANCE ~~(umhos/cm)~~ (MICROSIEMENS/CM)	198	206	214	226
TEMPERATURE(°C)	13.7	13.8	13.8	13.6
pH(S.U.)	6.1	6.2	6.1	6.2

8. DEPTH FROM TOP OF WELL CASING TO BOTTOM OF WELL _____ ft.
9. SCREEN LENGTH 10 ft.
10. DEPTH TO TOP OF SEDIMENT: BEFORE DEV. NA ft.; AFTER DEV. NA ft.
11. PHYSICAL CHARACTER OF WATER: BROWN, SOME FINE SAND
12. TYPE AND SIZE OF WELL DEVELOPMENT EQUIPMENT: SUBMERSIBLE
13. DESCRIPTION OF SURGE TECHNIQUE, IF USED: REPEATED SURGING WITH 1 3/4" BLOCK ALONG ENTIRE WELL LENGTH
14. HEIGHT OF WELL CASING ABOVE SURFACE: NA ft.
15. QUANTITY OF WATER REMOVED: ~250 gal.
    TIME FOR REMOVAL: 1:40 hr./min.
16. ~~1-PINT~~ 5-GALLON WATER SAMPLE COLLECTED: 120SEC (time)

DEVELOPMENT CONDITIONS:
1) WELL WATER IS REASONABLY CLEAR
2) SEDIMENT THICKNESS < 5% OF SCREEN LENGTH
3) REMOVAL OF 5 WELL VOLUMES, INCLUDING SATURATED FILTER ANNULUS

MALCOLM PIRNIE

BY WJF DATE 3/24/95 CHECK WJF DATE 4/4/95 SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. WELL NUMBER 4MW-5
2. DATE OF INSTALLATION: 3/21/95
3. DATE OF DEVELOPMENT: 3/24/95
4. STATIC WATER LEVEL: BEFORE DEV. 5.45 ft. 24 HOURS AFTER (AFTER DEV 5.50) _____
5. QUANTITY OF WATER LOSS DURING DRILLING, IF USED N/A GALLONS
6. QUANTITY OF STANDING WATER IN WELL AND ANNULUS BEFORE DEVELOPMENT _____ GALLONS
7.

	START		DURING			END				
	1033	1217	1230	1256	1305	1310	1317	1325	1330	1340 END
TURBIDITY (NTU)	N/A	N/A	665	1000*	366	355	196	157	107	96.9
SPECIFIC CONDUCTANCE(~~umhos/cm~~) (MICROSIEMEN/CM)	310	270	140	160	160	150	150	160	160	160
TEMPERATURE(°C)	15	17	16	16	16	16	16	16	16	16
pH(S.U.)	7.7	7.2	7.0	6.9	6.9	6.9	6.9	6.8	6.9	6.9

8. DEPTH FROM TOP OF WELL CASING TO BOTTOM OF WELL 39.52 ft.
9. SCREEN LENGTH 10' ft.
10. DEPTH TO TOP OF SEDIMENT: BEFORE DEV. 38.52' ft.; AFTER DEV. 38.94 ft.
11. PHYSICAL CHARACTER OF WATER: BROWN, GREEN, SOME FINE SAND
12. TYPE AND SIZE OF WELL DEVELOPMENT EQUIPMENT: 5' BAILER, AIR LIFT WITH "J" TUBE
13. DESCRIPTION OF SURGE TECHNIQUE, IF USED: SURGE BLOCKED ENTIRE SCREEN LENGTH, 2 TIMES
14. HEIGHT OF WELL CASING ABOVE SURFACE: _____ ft.
15. QUANTITY OF WATER REMOVED: ~210 gal.
    TIME FOR REMOVAL: 2:23 hr./min.
16. ~~1-PINT~~ 5 GAL WATER SAMPLE COLLECTED: 80 SEC (time)

DEVELOPMENT CONDITIONS:
1) WELL WATER IS REASONABLY CLEAR
2) SEDIMENT THICKNESS < 5% OF SCREEN LENGTH
3) REMOVAL OF 5 WELL VOLUMES, INCLUDING SATURATED FILTER ANNULUS

MALCOLM PIRNIE

BY WJF DATE 3/24/95 CHECK WJF DATE 4/4/95 SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. WELL NUMBER MW-112
2. DATE OF INSTALLATION: _____
3. DATE OF DEVELOPMENT: 3/24/95
4. STATIC WATER LEVEL: BEFORE DEV. 5.71 ft. 24 HOURS AFTER _____ (AFTER DEV. 5.72)
5. QUANTITY OF WATER LOSS DURING DRILLING, IF USED _____ GALLONS
6. QUANTITY OF STANDING WATER IN WELL AND ANNULUS BEFORE DEVELOPMENT _____ GALLONS
7.

	START (1245)	DURING (1259)	DURING (1307)	DURING (1315)	END (1320)	END (1327)
TURBIDITY (NTU)	358	39.8	14.1	11.0	7.15	8.24
SPECIFIC CONDUCTANCE(~~umhos/cm~~) (MICROSIEMEN/CM)	170	175	170	170	175	175
TEMPERATURE(°C)	~~15~~ 13°	14°	14	14	14	14
pH(S.U.)	6.4	6.5	6.4	6.4	6.5	6.5

8. DEPTH FROM TOP OF WELL CASING TO BOTTOM OF WELL 12.45' ft.
9. SCREEN LENGTH _____ ft.
10. DEPTH TO TOP OF SEDIMENT: BEFORE DEV. 12.45 ft.; AFTER DEV. 12.52 ft.
11. PHYSICAL CHARACTER OF WATER: LIGHT BROWN TO BROWN, LOOKS LIKE TEA
12. TYPE AND SIZE OF WELL DEVELOPMENT EQUIPMENT: 5' BAILER, SUBMERSIBLE PUMP
13. DESCRIPTION OF SURGE TECHNIQUE, IF USED: SURGE BLOCKED ENTIRE SCREEN LENGTH, 2 TIMES
14. HEIGHT OF WELL CASING ABOVE SURFACE: _____ ft.
15. QUANTITY OF WATER REMOVED: ~82 gal.

    TIME FOR REMOVAL: 0:42 hr./min.
16. ~~1 PINT~~ ?5-GAL WATER SAMPLE COLLECTED: 1205EC (time)

DEVELOPMENT CONDITIONS:
1) WELL WATER IS REASONABLY CLEAR
2) SEDIMENT THICKNESS < 5% OF SCREEN LENGTH
3) REMOVAL OF 5 WELL VOLUMES, INCLUDING SATURATED FILTER ANNULUS

MALCOLM PIRNIE

BY WJF DATE 3/27/95 CHECK WJF DATE 4/4/95 SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. WELL NUMBER MW-111

2. DATE OF INSTALLATION: _____

3. DATE OF DEVELOPMENT: 3/27/95

4. STATIC WATER LEVEL: BEFORE DEV. 5.96 ft. 24 HOURS AFTER NA (AFTER DEV. 5.98)

5. QUANTITY OF WATER LOSS DURING DRILLING, IF USED NA GALLONS

6. QUANTITY OF STANDING WATER IN WELL AND ANNULUS BEFORE DEVELOPMENT _____ GALLONS

7.

	START (1605)	DURING (1700)	DURING (1730)	END (1830)
TURBIDITY (NTU)	764	177	199	110
SPECIFIC CONDUCTANCE (~~umhos/cm~~) (MICROSIEMEN/CM)	131	138	120	120
TEMPERATURE(°C)	12	13	13	13
pH(S.U.)	2.3	7.3	7.3	7.3

8. DEPTH FROM TOP OF WELL CASING TO BOTTOM OF WELL 12.12 ft.

9. SCREEN LENGTH _____ ft.

10. DEPTH TO TOP OF SEDIMENT: BEFORE DEV. 12.12 ft.; AFTER DEV. 12.22 ft.

11. PHYSICAL CHARACTER OF WATER: BROWN TO LIGHT BROWN, FINE SAND

12. TYPE AND SIZE OF WELL DEVELOPMENT EQUIPMENT: _____

13. DESCRIPTION OF SURGE TECHNIQUE, IF USED: REPEATED SURGING WITH 1 3/4" SURGE BLOCK ALONG ENTIRE WELL LENGTH

14. HEIGHT OF WELL CASING ABOVE SURFACE: _____ ft.

15. QUANTITY OF WATER REMOVED: 45 gal.

TIME FOR REMOVAL: 2:25 hr./min.

16. ~~1~~ 5-PINT WATER SAMPLE COLLECTED: 16 MINS (time)

DEVELOPMENT CONDITIONS:
1) WELL WATER IS REASONABLY CLEAR
2) SEDIMENT THICKNESS < 5% OF SCREEN LENGTH
3) REMOVAL OF 5 WELL VOLUMES, INCLUDING SATURATED FILTER ANNULUS

MALCOLM PIRNIE

BY WJF DATE 3/28/95 CHECK WJ7 DATE 4/4/95 SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. WELL NUMBER MW-14A (MW-3)
2. DATE OF INSTALLATION: _____
3. DATE OF DEVELOPMENT: 3/28/95
4. STATIC WATER LEVEL: BEFORE DEV. ~8 ft. 24 HOURS AFTER NA
5. QUANTITY OF WATER LOSS DURING DRILLING, IF USED NA GALLONS
6. QUANTITY OF STANDING WATER IN WELL AND ANNULUS BEFORE DEVELOPMENT _____ GALLONS
7.

	1205 START	1235 DURING		1310	1330	1400 END
TURBIDITY (NTU)	41.4	~~355~~ 35.5	35.5	50	20.5	19.5
SPECIFIC CONDUCTANCE (~~umhos/cm~~) (MICROSIEMENS/CM)	214	~~185~~ 218	218	224	228	232
TEMPERATURE (°C)	12.6	~~12.5~~ 14.8	14.6	13.3		13.1
pH (S.U.)	6.6	~~6.8~~ 7.1	7.0	6.8		6.9

8. DEPTH FROM TOP OF WELL CASING TO BOTTOM OF WELL ~15 ft.
9. SCREEN LENGTH _____ ft.
10. DEPTH TO TOP OF SEDIMENT: BEFORE DEV. _____ ft.; AFTER DEV. _____ ft.
11. PHYSICAL CHARACTER OF WATER: BROWN SOME FINE SAND
12. TYPE AND SIZE OF WELL DEVELOPMENT EQUIPMENT: AIR LIFTING WITH A "J" TUBE
13. DESCRIPTION OF SURGE TECHNIQUE, IF USED: REPEATE SURGING WITH 1 3/4" BLOCK ALONG ENTIRE WELL LENGTH
14. HEIGHT OF WELL CASING ABOVE SURFACE: _____ ft.
15. QUANTITY OF WATER REMOVED: 20 gal.
    TIME FOR REMOVAL: 1:55 hr./min.
16. 1-PINT WATER SAMPLE COLLECTED: > 2 MIN (time)

DEVELOPMENT CONDITIONS:
1) WELL WATER IS REASONABLY CLEAR
2) SEDIMENT THICKNESS < 5% OF SCREEN LENGTH
3) REMOVAL OF 5 WELL VOLUMES, INCLUDING SATURATED FILTER ANNULUS

MALCOLM PIRNIE

BY WJF DATE 3/28/95 CHECK WJF DATE 4/4/95 SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. WELL NUMBER MW-113A ~~(MW3)~~

2. DATE OF INSTALLATION: _____

3. DATE OF DEVELOPMENT: 3/28/95

4. STATIC WATER LEVEL: BEFORE DEV. ~8 ft. 24 HOURS AFTER NA

5. QUANTITY OF WATER LOSS DURING DRILLING, IF USED NA GALLONS

6. QUANTITY OF STANDING WATER IN WELL AND ANNULUS BEFORE DEVELOPMENT _____ GALLONS

7.

	START (1205)	DURING (1235)	DURING (1310)	END (1325)
TURBIDITY (NTU)	96	~~355~~ 20.4	~~20.4~~ 6.31	4.5
SPECIFIC CONDUCTANCE (~~umhos/cm~~) (MICROSIEMEN/CM)	209	~~218~~ 185	168	174
TEMPERATURE(°C)	15	~~14.8~~ 12.5	12.9	12.4
pH(S.U.)	7.3	~~6.9~~ 6.9	~~6.9~~ 6.5	6.5

8. DEPTH FROM TOP OF WELL CASING TO BOTTOM OF WELL ~12 ft.

9. SCREEN LENGTH _____ ft.

10. DEPTH TO TOP OF SEDIMENT: BEFORE DEV. _____ ft.; AFTER DEV. _____ ft.

11. PHYSICAL CHARACTER OF WATER: BROWN TO LIGHT BROWN, SOME FINE SAND

12. TYPE AND SIZE OF WELL DEVELOPMENT EQUIPMENT: AIR LIFTING USING A "J" TUBE

13. DESCRIPTION OF SURGE TECHNIQUE, IF USED: REPEATE SURGING WITH 1 3/4" BLOCK ALONG ENTIRE WELL LENGTH

14. HEIGHT OF WELL CASING ABOVE SURFACE: _____ ft.

15. QUANTITY OF WATER REMOVED: 20 gal.

TIME FOR REMOVAL: 1:20 hr./min.

16. 1-PINT WATER SAMPLE COLLECTED: >2 MIN (time)

DEVELOPMENT CONDITIONS:
1) WELL WATER IS REASONABLY CLEAR
2) SEDIMENT THICKNESS < 5% OF SCREEN LENGTH
3) REMOVAL OF 5 WELL VOLUMES, INCLUDING SATURATED FILTER ANNULUS

MALCOLM PIRNIE

BY WJF DATE 3/30/95 CHECK WJF DATE 4/4/95 SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. WELL NUMBER 6MW-1
2. DATE OF INSTALLATION: 3/23/95
3. DATE OF DEVELOPMENT: 3/30/95
4. STATIC WATER LEVEL: BEFORE DEV. ~6.5 ft. 24 HOURS AFTER NA
5. QUANTITY OF WATER LOSS DURING DRILLING, IF USED NA GALLONS
6. QUANTITY OF STANDING WATER IN WELL AND ANNULUS BEFORE DEVELOPMENT _____ GALLONS
7.

	0825 START	0835 DURING	0850	0905 END	0910	0915 END
TURBIDITY (NTU)	N/A	17.0	16.9	19.2	9.2	8.9
SPECIFIC CONDUCTANCE (~~umhos/cm~~) (MICROSIEMENS/CM)	193	163	166	172	165	164 16.4
TEMPERATURE(°C)	16.7	16.5	16.0	16.4	16.4	
pH(S.U.)	6.4	6.7	6.0	6.2	6.2	6.2

8. DEPTH FROM TOP OF WELL CASING TO BOTTOM OF WELL ~14 ft.
9. SCREEN LENGTH 10' ft.
10. DEPTH TO TOP OF SEDIMENT: BEFORE DEV. _____ ft.; AFTER DEV. _____ ft.
11. PHYSICAL CHARACTER OF WATER: BROWN SOME FINE SAND, SULFUR ODOR
12. TYPE AND SIZE OF WELL DEVELOPMENT EQUIPMENT: SUBMERSABLE PUMP
13. DESCRIPTION OF SURGE TECHNIQUE, IF USED: REPEATED SURGING WITH 1 3/4" SURGE BLOCK ALONG ENTIRE ~~SCREEN LENGTH~~ WELL
14. HEIGHT OF WELL CASING ABOVE SURFACE: _____ ft.
15. QUANTITY OF WATER REMOVED: 105 gal.

    TIME FOR REMOVAL: 0:50 hr./min.

    5-GALLON
16. ~~1-PINT~~ WATER SAMPLE COLLECTED: 1205EC (time)

DEVELOPMENT CONDITIONS:
1) WELL WATER IS REASONABLY CLEAR
2) SEDIMENT THICKNESS < 5% OF SCREEN LENGTH
3) REMOVAL OF 5 WELL VOLUMES, INCLUDING SATURATED FILTER ANNULUS

MALCOLM PIRNIE

BY WJF DATE 3/30/95 CHECK WJF DATE 4/4/95 SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. WELL NUMBER GMW-2
2. DATE OF INSTALLATION: 3/23/95
3. DATE OF DEVELOPMENT: 3/30/95
4. STATIC WATER LEVEL: BEFORE DEV. ~5 ft. 24 HOURS AFTER NA
5. QUANTITY OF WATER LOSS DURING DRILLING, IF USED NA GALLONS
6. QUANTITY OF STANDING WATER IN WELL AND ANNULUS BEFORE DEVELOPMENT _____ GALLONS
7.

	START 1000	DURING 1010		1036	1045	END 1055	1105
TURBIDITY (NTU)	N/A	196	194	232	~~194~~		85
SPECIFIC CONDUCTANCE (~~umhos/cm~~) (MICROSIEMEN/CM)	255	248	245	232	239		240
TEMPERATURE (°C)	18.5	18.4	18.7	18.4	18.4		18.2
pH (S.U.)	6.4	6.5	6.6	6.5	6.6		6.6

8. DEPTH FROM TOP OF WELL CASING TO BOTTOM OF WELL ~40 ft.
9. SCREEN LENGTH 10' ft.
10. DEPTH TO TOP OF SEDIMENT: BEFORE DEV. _____ ft.; AFTER DEV. _____ ft.
11. PHYSICAL CHARACTER OF WATER: OLIVE GREEN, SOME FINE SAND, SLIGHT PETROLEUM ODOR
12. TYPE AND SIZE OF WELL DEVELOPMENT EQUIPMENT: AIR LIFTING WITH "J" TUBE
13. DESCRIPTION OF SURGE TECHNIQUE, IF USED: ~~AIR~~ REPEATED SURGING WITH 1 3/4" SURGE BLOCK ALONG ENTIRE WELL LENGTH
14. HEIGHT OF WELL CASING ABOVE SURFACE: _____ ft.
15. QUANTITY OF WATER REMOVED: 160 gal.

    TIME FOR REMOVAL: 1:05 hr./min.

    55 GALLON
16. ~~1 PINT~~ WATER SAMPLE COLLECTED: 20 MIN (time)

DEVELOPMENT CONDITIONS:
1) WELL WATER IS REASONABLY CLEAR
2) SEDIMENT THICKNESS < 5% OF SCREEN LENGTH
3) REMOVAL OF 5 WELL VOLUMES, INCLUDING SATURATED FILTER ANNULUS

MALCOLM PIRNIE

BY WJF DATE 3/29/95 CHECK WJF DATE 4/4/95 SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. WELL NUMBER 6MW-3S
2. DATE OF INSTALLATION: 3/24/95
3. DATE OF DEVELOPMENT: 3/29/95
4. STATIC WATER LEVEL: BEFORE DEV. 4.82 ft. ~~24 HOURS~~ AFTER DEV. 4.84
5. QUANTITY OF WATER LOSS DURING DRILLING, IF USED NA GALLONS
6. QUANTITY OF STANDING WATER IN WELL AND ANNULUS BEFORE DEVELOPMENT _____ GALLONS
7.

	START (1515)	DURING (1525)	DURING (1540)	DURING (1555)	END (1600)
TURBIDITY (NTU)	986	17.3	16.3	6.8	5.1
SPECIFIC CONDUCTANCE(~~umhos/cm~~) (MICROSIEMENS/CM)	818	626	537	479	505
TEMPERATURE(°C)	16.1	16.1	15.9	15.8	15.8
pH(S.U.)	6.5	6.6	6.6	6.6	6.6

8. DEPTH FROM TOP OF WELL CASING TO BOTTOM OF WELL 13.74 ft.
9. SCREEN LENGTH 10' ft.
10. DEPTH TO TOP OF SEDIMENT: BEFORE DEV. 13.74 ft.; AFTER DEV. 13.72 ft.
11. PHYSICAL CHARACTER OF WATER: BROWN, PETROLEUM ODOR
12. TYPE AND SIZE OF WELL DEVELOPMENT EQUIPMENT: SUBMERSIBLE PUMP
13. DESCRIPTION OF SURGE TECHNIQUE, IF USED: REPEATED SURGING WITH 1 3/4" SURGE BLOCK ALONG ENTIRE WELL LENGTH
14. HEIGHT OF WELL CASING ABOVE SURFACE: _____ ft.
15. QUANTITY OF WATER REMOVED: 110 gal.
    TIME FOR REMOVAL: 0:45 hr./min.
16. ~~1 PINT~~ 55 GAL WATER SAMPLE COLLECTED: 20 MIN (time)

DEVELOPMENT CONDITIONS:
1) WELL WATER IS REASONABLY CLEAR
2) SEDIMENT THICKNESS < 5% OF SCREEN LENGTH
3) REMOVAL OF 5 WELL VOLUMES, INCLUDING SATURATED FILTER ANNULUS

MALCOLM PIRNIE

BY WJF DATE 3/29/95 CHECK WJF DATE 4/4/95 SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. WELL NUMBER GMW-3D
2. DATE OF INSTALLATION: 3/23/95
3. DATE OF DEVELOPMENT: 3/29/95
4. STATIC WATER LEVEL: BEFORE DEV. 5.05 ft. 24 HOURS AFTER 5.06
5. QUANTITY OF WATER LOSS DURING DRILLING, IF USED NA GALLONS
6. QUANTITY OF STANDING WATER IN WELL AND ANNULUS BEFORE DEVELOPMENT _____ GALLONS
7.

	START	DURING (1520)	DURING (1535)	DURING (1550)	DURING (1610)	END (1620)
TURBIDITY (NTU)	N/A	40.6	119		18.3	50.9
SPECIFIC CONDUCTANCE (MICROSIEMEN/CM)	278	265	264		296	282
TEMPERATURE(°C)	18.4	17.89	17.9		180	17.8
pH(S.U.)	7.4	7.4	7.2		7.2	7.1

8. DEPTH FROM TOP OF WELL CASING TO BOTTOM OF WELL 38.92 ft.
9. SCREEN LENGTH 10' ft.
10. DEPTH TO TOP OF SEDIMENT: BEFORE DEV. 38.97 ft.; AFTER DEV. _____ ft.
11. PHYSICAL CHARACTER OF WATER: BROWN THEN LIGHT GREEN PETROLEUM ODOR
12. TYPE AND SIZE OF WELL DEVELOPMENT EQUIPMENT: AIR LIFTING USING A "J" TUBE
13. DESCRIPTION OF SURGE TECHNIQUE, IF USED: REPEATED SURGING WITH 1¾" SURGE BLOCK ALONG ENTIRE WELL LENGTH
14. HEIGHT OF WELL CASING ABOVE SURFACE: _____ ft.
15. QUANTITY OF WATER REMOVED: 165 gal.

    TIME FOR REMOVAL: 1:00 hr./min.
16. ~~1-PINT~~ 55-GAL WATER SAMPLE COLLECTED: 15 MIN (time)

DEVELOPMENT CONDITIONS:
1) WELL WATER IS REASONABLY CLEAR
2) SEDIMENT THICKNESS < 5% OF SCREEN LENGTH
3) REMOVAL OF 5 WELL VOLUMES, INCLUDING SATURATED FILTER ANNULUS

MALCOLM PIRNIE

BY WJF DATE 3/29/95 CHECK WJF DATE 4/4/95 SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. WELL NUMBER 6MW-4
2. DATE OF INSTALLATION: 3/27/95
3. DATE OF DEVELOPMENT: 3/29/95
4. STATIC WATER LEVEL: BEFORE DEV. 2.85 ft. ~~24~~ HOURS AFTER DEV. 2.84
5. QUANTITY OF WATER LOSS DURING DRILLING, IF USED NA GALLONS
6. QUANTITY OF STANDING WATER IN WELL AND ANNULUS BEFORE DEVELOPMENT _____ GALLONS
7.

	START 0845	DURING 1000	DURING 1020	DURING 1025	END 1040	1050	1100
TURBIDITY (NTU)	N/A	354	327	252	65.7	177	44.1
SPECIFIC CONDUCTANCE (~~umhos/cm~~) (MICROSIEMENS/CM)	262	286	247	254	246	260	272
TEMPERATURE (°C)	15.1	16.1	15.9	15.7	15.8	15.6	15.4
pH (S.U.)	~~15.7~~ 6.2	6.4	6.4	6.1	6.0	6.0	5.9

8. DEPTH FROM TOP OF WELL CASING TO BOTTOM OF WELL 13.68 ft.
9. SCREEN LENGTH 10' ft.
10. DEPTH TO TOP OF SEDIMENT: BEFORE DEV. 13.68 ft.; AFTER DEV. 13.82 ft.
11. PHYSICAL CHARACTER OF WATER: BROWN. SULFUR SMELL
12. TYPE AND SIZE OF WELL DEVELOPMENT EQUIPMENT: BAILER THEN SUBMERSIBLE PUMP
13. DESCRIPTION OF SURGE TECHNIQUE, IF USED: REPEATED SURGING WITH 1¾" SURGE BLOCK ALONG ENTIRE WELL LENGTH
14. HEIGHT OF WELL CASING ABOVE SURFACE: _____ ft.
15. QUANTITY OF WATER REMOVED: 220 GAL gal.
    TIME FOR REMOVAL: 2:15 hr./min.
16. ~~1-PINT~~ 5-GAL. WATER SAMPLE COLLECTED: 120 SEC (time)

DEVELOPMENT CONDITIONS:
1) WELL WATER IS REASONABLY CLEAR
2) SEDIMENT THICKNESS < 5% OF SCREEN LENGTH
3) REMOVAL OF 5 WELL VOLUMES, INCLUDING SATURATED FILTER ANNULUS

MALCOLM PIRNIE

BY WJF DATE 3/29/95 CHECK WJF DATE 4/4/95 SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. WELL NUMBER MW-115
2. DATE OF INSTALLATION: _____
3. DATE OF DEVELOPMENT: 3/29/95
4. STATIC WATER LEVEL: BEFORE DEV. 4.30 ft. 24 HOURS AFTER 4.33
5. QUANTITY OF WATER LOSS DURING DRILLING, IF USED N/A GALLONS
6. QUANTITY OF STANDING WATER IN WELL AND ANNULUS BEFORE DEVELOPMENT _____ GALLONS
7.

	1650 START	1700 DURING	1710 DURING	1725 END
TURBIDITY (NTU)	186	18.3	9.71	8.25
SPECIFIC CONDUCTANCE (~~umhos/cm~~) (MICROSIEMEN/CM)	326	328	332	331
TEMPERATURE(°C)	13.3	13.3	13.3	13.3
pH(S.U.)	6.5	6.5	6.5	6.5

8. DEPTH FROM TOP OF WELL CASING TO BOTTOM OF WELL 10.96 ft.
9. SCREEN LENGTH _____ ft.
10. DEPTH TO TOP OF SEDIMENT: BEFORE DEV. 10.96 ft.; AFTER DEV. 11.76 ft.
11. PHYSICAL CHARACTER OF WATER: GRAY PETROLEUM ODOR
12. TYPE AND SIZE OF WELL DEVELOPMENT EQUIPMENT: SUBMERSIBLE
13. DESCRIPTION OF SURGE TECHNIQUE, IF USED: SURGED WITH SUBMERSIBLE PUMP*
14. HEIGHT OF WELL CASING ABOVE SURFACE: _____ ft.
15. QUANTITY OF WATER REMOVED: 55 gal.

    TIME FOR REMOVAL: 0:35 hr./min.
16. ~~1 PINT~~ 5-GALLON WATER SAMPLE COLLECTED: 120 SECS (time)

DEVELOPMENT CONDITIONS:
1) WELL WATER IS REASONABLY CLEAR
2) SEDIMENT THICKNESS < 5% OF SCREEN LENGTH
3) REMOVAL OF 5 WELL VOLUMES, INCLUDING SATURATED FILTER ANNULUS

* WELL HAD OVERHEAD OBSTRUCTION, ~~AND~~ SURGE BLOCK COULD NOT BE PUT IN WELL.

MALCOLM PIRNIE

BY WJF DATE 3/30/95 CHECK WJF DATE 4/4/95 SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. WELL NUMBER MW-117
2. DATE OF INSTALLATION: 3/20/90
3. DATE OF DEVELOPMENT: 3/30/95
4. STATIC WATER LEVEL: BEFORE DEV. ~6 ft. 24 HOURS AFTER NA
5. QUANTITY OF WATER LOSS DURING DRILLING, IF USED NA GALLONS
6. QUANTITY OF STANDING WATER IN WELL AND ANNULUS BEFORE DEVELOPMENT _____ GALLONS
7.

	START (0950)	DURING (0955)	DURING (1005)	END (1035)
TURBIDITY (NTU)	73.7	10.0	5.0	6.0
SPECIFIC CONDUCTANCE (~~umhos/cm~~) (MICROSIEMEN/CM)	193	149	199	204
TEMPERATURE (°C)	16.2	16.3	16.0	16.0
pH (S.U.)	6.1	6.0	5.9	6.0

8. DEPTH FROM TOP OF WELL CASING TO BOTTOM OF WELL ~14 ft.
9. SCREEN LENGTH _____ ft.
10. DEPTH TO TOP OF SEDIMENT: BEFORE DEV. _____ ft.; AFTER DEV. _____ ft.
11. PHYSICAL CHARACTER OF WATER: GRAY, PETROLEUM ODOR, FINE SAND
12. TYPE AND SIZE OF WELL DEVELOPMENT EQUIPMENT: SUBMERSIBLE PUMP
13. DESCRIPTION OF SURGE TECHNIQUE, IF USED: REPEATED SURGING WITH 1 3/4" SURGE BLOCK ALONG ENTIRE WELL LENGTH
14. HEIGHT OF WELL CASING ABOVE SURFACE: _____ ft.
15. QUANTITY OF WATER REMOVED: 90 gal.

    TIME FOR REMOVAL: 0:45 hr./min.
16. ~~1 PINT~~ 5 GALLON WATER SAMPLE COLLECTED: 140 SEC. (time)

DEVELOPMENT CONDITIONS:
1) WELL WATER IS REASONABLY CLEAR
2) SEDIMENT THICKNESS < 5% OF SCREEN LENGTH
3) REMOVAL OF 5 WELL VOLUMES, INCLUDING SATURATED FILTER ANNULUS

MALCOLM PIRNIE

BY WJF DATE 3/30/95 CHECK WJF DATE 4/4/95 SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. WELL NUMBER ~~MW-118~~ 118
2. DATE OF INSTALLATION: 3/20/90
3. DATE OF DEVELOPMENT: 3/30/95
4. STATIC WATER LEVEL: BEFORE DEV. ~6.5 ft. 24 HOURS AFTER NA
5. QUANTITY OF WATER LOSS DURING DRILLING, IF USED N/A GALLONS
6. QUANTITY OF STANDING WATER IN WELL AND ANNULUS BEFORE DEVELOPMENT _____ GALLONS
7.

	1210 START	1220 DURING	1230 DURING	1245	1250 END
TURBIDITY (NTU)	499	32.6	16.9	9.8	4.9
SPECIFIC CONDUCTANCE(~~umhos/cm~~) (MICROSIEMENS/CM)	247	239	242	240	239
TEMPERATURE(°C)	16.2	16.4	16.3	16.2	16.1
pH(S.U.)	6.0	5.8	6.0	6.0	6.0

8. DEPTH FROM TOP OF WELL CASING TO BOTTOM OF WELL ~14' ft.
9. SCREEN LENGTH _____ ft.
10. DEPTH TO TOP OF SEDIMENT: BEFORE DEV. _____ ft.; AFTER DEV. _____ ft.
11. PHYSICAL CHARACTER OF WATER: BROWN, SOME FINE SAND
12. TYPE AND SIZE OF WELL DEVELOPMENT EQUIPMENT: SUBMERSABLE PUMP
13. DESCRIPTION OF SURGE TECHNIQUE, IF USED: REPEATED SURGING WITH 1¾" SURGE BLOCK ALONG ENTIRE WELL
14. HEIGHT OF WELL CASING ABOVE SURFACE: _____ ft.
15. QUANTITY OF WATER REMOVED: 100 gal.

    TIME FOR REMOVAL: :40 hr./min.
16. ~~1 PINT~~ 5-GALLON WATER SAMPLE COLLECTED: 120 SEC (time)

DEVELOPMENT CONDITIONS:
1) WELL WATER IS REASONABLY CLEAR
2) SEDIMENT THICKNESS < 5% OF SCREEN LENGTH
3) REMOVAL OF 5 WELL VOLUMES, INCLUDING SATURATED FILTER ANNULUS

MALCOLM PIRNIE

BY WJF DATE 3/29/95 CHECK WJF DATE 4/4/95 SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. WELL NUMBER MW-121
2. DATE OF INSTALLATION: 3/23/90
3. DATE OF DEVELOPMENT: 3/29/95
4. STATIC WATER LEVEL: BEFORE DEV. 6.52 ft. ~~24 HOURS~~ AFTER DEV. 6.52
5. QUANTITY OF WATER LOSS DURING DRILLING, IF USED _____ GALLONS
6. QUANTITY OF STANDING WATER IN WELL AND ANNULUS BEFORE DEVELOPMENT _____ GALLONS
7.

	START (0825)	DURING (0845)	DURING (0905)	END (0920)
TURBIDITY (NTU)	222	35.3	19.4	4.57
SPECIFIC CONDUCTANCE(~~umhos/cm~~) (MICROSIEMEN/CM)	1870	1457	1440	1450
TEMPERATURE(°C)	13.7	13.1	13.1	13.0
pH(S.U.)	6.3	6.2	6.1	6.1

8. DEPTH FROM TOP OF WELL CASING TO BOTTOM OF WELL 13.54 ft.
9. SCREEN LENGTH _____ ft.
10. DEPTH TO TOP OF SEDIMENT: BEFORE DEV. 13.54 ft.; AFTER DEV. 14.10 ft.
11. PHYSICAL CHARACTER OF WATER: BROWN THEN TAN, SOME FINE SAND
12. TYPE AND SIZE OF WELL DEVELOPMENT EQUIPMENT: SUBMERSIBLE PUMP
13. DESCRIPTION OF SURGE TECHNIQUE, IF USED: REPEATED SURGING WITH 1 3/4" SURGE BLOCK ALONG ENTIRE WELL LENGTH
14. HEIGHT OF WELL CASING ABOVE SURFACE: _____ ft.
15. QUANTITY OF WATER REMOVED: 120 gal.

    TIME FOR REMOVAL: 0:55 hr./min.
16. ~~1-PINT~~ 5-GAL WATER SAMPLE COLLECTED: ~~2:20~~ 1405 (time)

DEVELOPMENT CONDITIONS:
1) WELL WATER IS REASONABLY CLEAR
2) SEDIMENT THICKNESS < 5% OF SCREEN LENGTH
3) REMOVAL OF 5 WELL VOLUMES, INCLUDING SATURATED FILTER ANNULUS

MALCOLM PIRNIE

BY WJF DATE 3/29/95 CHECK WJF DATE 4/4/95 SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. WELL NUMBER 7MW-1
2. DATE OF INSTALLATION: 3/22/95
3. DATE OF DEVELOPMENT: 3/29/95
4. STATIC WATER LEVEL: BEFORE DEV. 10.84 ft. ~~24 HOURS~~ AFTER DEV 10.84
5. QUANTITY OF WATER LOSS DURING DRILLING, IF USED NA GALLONS
6. QUANTITY OF STANDING WATER IN WELL AND ANNULUS BEFORE DEVELOPMENT _____ GALLONS
7.

	1245 START	1235 DURING	1250 DURING	1350 DURING	1400 END	1410 END
TURBIDITY (NTU)	N/A	190	650	22.3	10.1	7.57
SPECIFIC CONDUCTANCE (~~umhos/cm~~) (MICROSIEMEN/CM)	200	241	253	246	266	254
TEMPERATURE (°C)	18.5	17.8	17.6	17.7	17.3	17.5
pH (S.U.)	6.7	6.9	7.0	6.3	6.1	6.1

8. DEPTH FROM TOP OF WELL CASING TO BOTTOM OF WELL 18.11 ft.
9. SCREEN LENGTH 10 ft.
10. DEPTH TO TOP OF SEDIMENT: BEFORE DEV. 18.11 ft.; AFTER DEV. 17.98 ft.
11. PHYSICAL CHARACTER OF WATER: BROWN, SULFUR SMELL
12. TYPE AND SIZE OF WELL DEVELOPMENT EQUIPMENT: AIR LIFT, THEN SUBMERSIBLE PUMP
13. DESCRIPTION OF SURGE TECHNIQUE, IF USED: REPEATED SURGING WITH 1 3/4 SURGE BLOCK ALONG ENTIRE LENGTH OF WELL
14. HEIGHT OF WELL CASING ABOVE SURFACE: _____ ft.
15. QUANTITY OF WATER REMOVED: 115 gal.

    TIME FOR REMOVAL: 0:55 hr./min.
16. ~~1 PINT~~ 5-GAL WATER SAMPLE COLLECTED: 1405EC (time)

DEVELOPMENT CONDITIONS:
1) WELL WATER IS REASONABLY CLEAR
2) SEDIMENT THICKNESS < 5% OF SCREEN LENGTH
3) REMOVAL OF 5 WELL VOLUMES, INCLUDING SATURATED FILTER ANNULUS

MALCOLM PIRNIE

BY WJF DATE 3/29/95 CHECK WJF DATE 4/4/95 SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. WELL NUMBER MW-120
2. DATE OF INSTALLATION: 3/23/90
3. DATE OF DEVELOPMENT: 3/29/95
4. STATIC WATER LEVEL: BEFORE DEV. 10.61 ft. ~~24 HOURS~~ AFTER DEV. 10.61
5. QUANTITY OF WATER LOSS DURING DRILLING, IF USED NA GALLONS
6. QUANTITY OF STANDING WATER IN WELL AND ANNULUS BEFORE DEVELOPMENT _____ GALLONS
7.

	START (1220)	DURING (1238)	DURING (1255)	END (1305)
TURBIDITY (NTU)	88.9	2.0	3.8	6.0
SPECIFIC CONDUCTANCE (~~umhos/cm~~) (MICROSIEMEN/CM)	237	249	253	255
TEMPERATURE(°C)	17.0	17.0	16.9	16.8
pH(S.U.)	6.2	6.3	6.2	6.3

8. DEPTH FROM TOP OF WELL CASING TO BOTTOM OF WELL Unk. 10 ft.
9. SCREEN LENGTH _____ ft.
10. DEPTH TO TOP OF SEDIMENT: BEFORE DEV. ~~18.11~~ 16.29 ft.; AFTER DEV. 16.29 ft.
11. PHYSICAL CHARACTER OF WATER: BROWN THEN CLEAR, SULFUR SMELL
12. TYPE AND SIZE OF WELL DEVELOPMENT EQUIPMENT: SUBMERSIBLE PUMP
13. DESCRIPTION OF SURGE TECHNIQUE, IF USED: REPEATED SURGING WITH 1 3/4" SURGE BLOCK ALONG ENTIRE LENGTH OF WELL.
14. HEIGHT OF WELL CASING ABOVE SURFACE: _____ ft.
15. QUANTITY OF WATER REMOVED: 120 gal.
    TIME FOR REMOVAL: 0:45 hr./min.
16. ~~1-PINT~~ 5-GAL WATER SAMPLE COLLECTED: 1220 (time)

DEVELOPMENT CONDITIONS:
1) WELL WATER IS REASONABLY CLEAR
2) SEDIMENT THICKNESS < 5% OF SCREEN LENGTH
3) REMOVAL OF 5 WELL VOLUMES, INCLUDING SATURATED FILTER ANNULUS

MALCOLM PIRNIE

BY WJF DATE 3/28/95 CHECK WJF DATE 4/4/95 SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. WELL NUMBER 7MW-2
2. DATE OF INSTALLATION: 3/22/95
3. DATE OF DEVELOPMENT: 3/28/95
4. STATIC WATER LEVEL: BEFORE DEV. ~7.5 ft. 24 HOURS AFTER NA
5. QUANTITY OF WATER LOSS DURING DRILLING, IF USED NA GALLONS
6. QUANTITY OF STANDING WATER IN WELL AND ANNULUS BEFORE DEVELOPMENT _____ GALLONS
7.

	START (1540)	DURING (1540)	DURING (1600)	END (1610)
TURBIDITY	186	29	4.06	10.9
SPECIFIC CONDUCTANCE(~~umhos/cm~~) (MICROSIEMENS/CM)	399	390	398	402
TEMPERATURE(°C)	14.2	14.5	14.5	14.3
pH(S.U.)	6.5	6.6	6.6	6.5

8. DEPTH FROM TOP OF WELL CASING TO BOTTOM OF WELL ~14 ft.
9. SCREEN LENGTH 10 ft.
10. DEPTH TO TOP OF SEDIMENT: BEFORE DEV. _____ ft.; AFTER DEV. _____ ft.
11. PHYSICAL CHARACTER OF WATER: BROWN
12. TYPE AND SIZE OF WELL DEVELOPMENT EQUIPMENT: SUBMERSIBLE
13. DESCRIPTION OF SURGE TECHNIQUE, IF USED: REPEATED SURGING WITH 1¾" SURGE BLOCK ALONG ENTIRE LENGTH OF WELL
14. HEIGHT OF WELL CASING ABOVE SURFACE: _____ ft.
15. QUANTITY OF WATER REMOVED: 100 gal.
    TIME FOR REMOVAL: 1:00 hr./min.
16. ~~1 PINT~~ 5-GAL WATER SAMPLE COLLECTED: 2 MIN (time)

DEVELOPMENT CONDITIONS:
1) WELL WATER IS REASONABLY CLEAR
2) SEDIMENT THICKNESS < 5% OF SCREEN LENGTH
3) REMOVAL OF 5 WELL VOLUMES, INCLUDING SATURATED FILTER ANNULUS

MALCOLM PIRNIE

BY WJF DATE 3/28/95 CHECK WJF DATE 4/4/95 SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. WELL NUMBER 7MW-3
2. DATE OF INSTALLATION: 3/22/95
3. DATE OF DEVELOPMENT: 3/28/95
4. STATIC WATER LEVEL: BEFORE DEV. ~7.5 ft. 24 HOURS AFTER NA
5. QUANTITY OF WATER LOSS DURING DRILLING, IF USED NA GALLONS
6. QUANTITY OF STANDING WATER IN WELL AND ANNULUS BEFORE DEVELOPMENT _____ GALLONS
7.

	START (1515)	DURING (1535)	DURING (1555)	END (1630)
TURBIDITY (NTU)	97.4	53.5	60.4	50.6
SPECIFIC CONDUCTANCE ~~(umhos/cm)~~ (MICROSIEMEN/CM)	224	218	203	248
TEMPERATURE(°C)	17.1	17.2	17.5	17.6
pH(S.U.)	6.9	7.0	6.9	6.9

8. DEPTH FROM TOP OF WELL CASING TO BOTTOM OF WELL ~40 ft.
9. SCREEN LENGTH 10 ft.
10. DEPTH TO TOP OF SEDIMENT: BEFORE DEV. _____ ft.; AFTER DEV. _____ ft.
11. PHYSICAL CHARACTER OF WATER: SULFER SMELL, BROWN, FINE SAND
12. TYPE AND SIZE OF WELL DEVELOPMENT EQUIPMENT: AIR LIFTING WITH "J" TUBE
13. DESCRIPTION OF SURGE TECHNIQUE, IF USED: REPEATED SURGING WITH 1 3/4" SURGE BLOCK ALONG ENTIRE WELL LENGTH
14. HEIGHT OF WELL CASING ABOVE SURFACE: _____ ft.
15. QUANTITY OF WATER REMOVED: 200 gal.
    TIME FOR REMOVAL: 1:30 hr./min.
16. ~~1 PINT~~ 55 GAL WATER SAMPLE COLLECTED: 20 (time)

DEVELOPMENT CONDITIONS:
1) WELL WATER IS REASONABLY CLEAR
2) SEDIMENT THICKNESS < 5% OF SCREEN LENGTH
3) REMOVAL OF 5 WELL VOLUMES, INCLUDING SATURATED FILTER ANNULUS

MALCOLM PIRNIE

BY WJF DATE 3/28/95 CHECK WJF DATE 4/4/95 SHEET 1 OF 1

WELL DEVELOPMENT DATA

1. WELL NUMBER MW-119

2. DATE OF INSTALLATION: _____

3. DATE OF DEVELOPMENT: 3/28/95

4. STATIC WATER LEVEL: BEFORE DEV. ~7.5 ft. 24 HOURS AFTER _____

5. QUANTITY OF WATER LOSS DURING DRILLING, IF USED _____ GALLONS

6. QUANTITY OF STANDING WATER IN WELL AND ANNULUS BEFORE DEVELOPMENT _____ GALLONS

7.

	1525 START	1550 DURING	1605	1645 END	1700
TURBIDITY (NTU)	391	392	191	11.6	7.91
SPECIFIC CONDUCTANCE(~~umhos/cm~~) (MICROSIEMEN/cm)	245	269	261	253	250
TEMPERATURE(°C)	12.1	14.5	14.3	14.8	15.0
pH(S.U.)	7.1	6.6	6.7	6.6	6.7

8. DEPTH FROM TOP OF WELL CASING TO BOTTOM OF WELL _____ ft.

9. SCREEN LENGTH _____ ft.

10. DEPTH TO TOP OF SEDIMENT: BEFORE DEV. _____ ft.; AFTER DEV. _____ ft.

11. PHYSICAL CHARACTER OF WATER: BROWN TO LIGHT BROWN, SOME FINE SAND

12. TYPE AND SIZE OF WELL DEVELOPMENT EQUIPMENT: AIR LIFT THEN SUBMERSIBLE PUMP

13. DESCRIPTION OF SURGE TECHNIQUE, IF USED: REPEATED SURGING WITH 1¾" SURGE BLOCK ALONG ENTIRE LENGTH OF WELL

14. HEIGHT OF WELL CASING ABOVE SURFACE: _____ ft.

15. QUANTITY OF WATER REMOVED: 100 gal.

TIME FOR REMOVAL: _____ hr./min.

16. 1-PINT WATER SAMPLE COLLECTED: _____ (time)

DEVELOPMENT CONDITIONS:
1) WELL WATER IS REASONABLY CLEAR
2) SEDIMENT THICKNESS < 5% OF SCREEN LENGTH
3) REMOVAL OF 5 WELL VOLUMES, INCLUDING SATURATED FILTER ANNULUS

MALCOLM PIRNIE

WATER LEVEL AND TIDAL INFLUENCE DATA

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name: Ft Story (FTA) | Local Municipality: Virginia Beach

Project No.: 0285-588 | County:

Personnel: WJF | State: Virginia

Date: 5/17/95

Weather Conditions

Temperature Range: 75 - 85° | Equipment No.: 10365

Precipitation: 0" | Equipment Name: SOLINST

Barometric Pressure: | Latest Calibration Date:

PIEZOMETER NO.	DATE/TIME	ELEVATION OF REFERENCE POINT (FT)	WATER LEVEL INDICATOR READING (FT)	ADJUSTED DEPTH (FT)	GROUNDWATER ELEVATION (FT)
4MW-1	5/17/95 1348	12.83	5.30		7.53
4MW-5	5/17/95 1356	13.50	5.80		7.70
MW-112	5/17/95 1400	13.74	6.05		7.69
MW-114A	5/17/95 1404	19.66	11.98		7.68
MW-113A	5/17/95 1407	15.95	8.27		7.68
4MW-4	5/17/95 1411	11.07	3.36		7.71
4MW-3	5/17/95 1419	14.08	6.38		7.70
4MW-2S	5/17/95 1426	13.55	5.86		7.69
4MW-2D	5/17/95 1432	13.38	5.71		7.67
MW-111	5/17/95 1440	13.90	5.25		7.84

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name Ft. Story (LARC 60) Local Municipality Virginia Beach

Project No. 0285589 County

Personnel WJF State Virginia

Date 5/17/95

Weather Conditions

Temperature Range 75 - 85° Equipment No. S 10365

Precipitation 0 Equipment Name SOLINST

Barometric Pressure Latest Calibration Date

PIEZOMETER NO.	DATE/TIME	ELEVATION OF REFERENCE POINT (FT)	WATER LEVEL INDICATOR READING (FT)	ADJUSTED DEPTH (FT)	GROUNDWATER ELEVATION (FT)
6MW-3S	5/17/95 1249	9.86	4.82		5.04
MW-118	5/17/95 1253	13.24	6.91		6.33
6MW-4	5/17/95 1304	6.98	2.80		4.18
MW-121	5/17/95 1310		6.42		
6MW-1	5/17/95 1316	11.42	6.23		5.19
6MW-3D	5/17/95 1322	10.09	5.05		5.04
MW-117	5/17/95 1333	16.01	9.91		6.10
6MW-2	5/17/95 1337	13.52	7.38		6.14
MW-115	5/17/95 1445	9.45	4.33		5.12

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name: Ft Story (Auto Craft) Local Municipality: Virginia Beach

Project No.: 0285-590 County:

Personnel: WJF State: Virginia

Date: 5/17/95

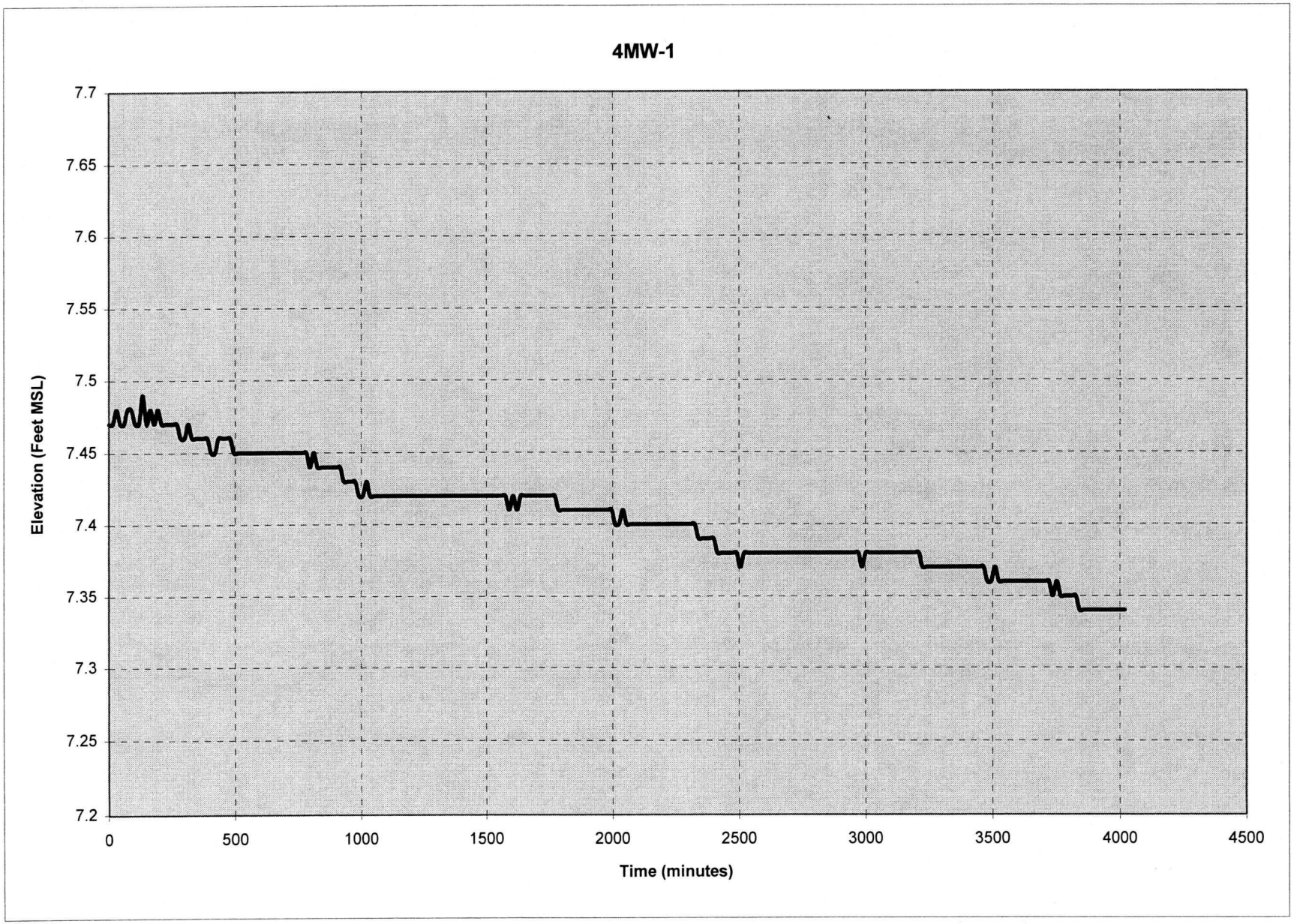
Weather Conditions

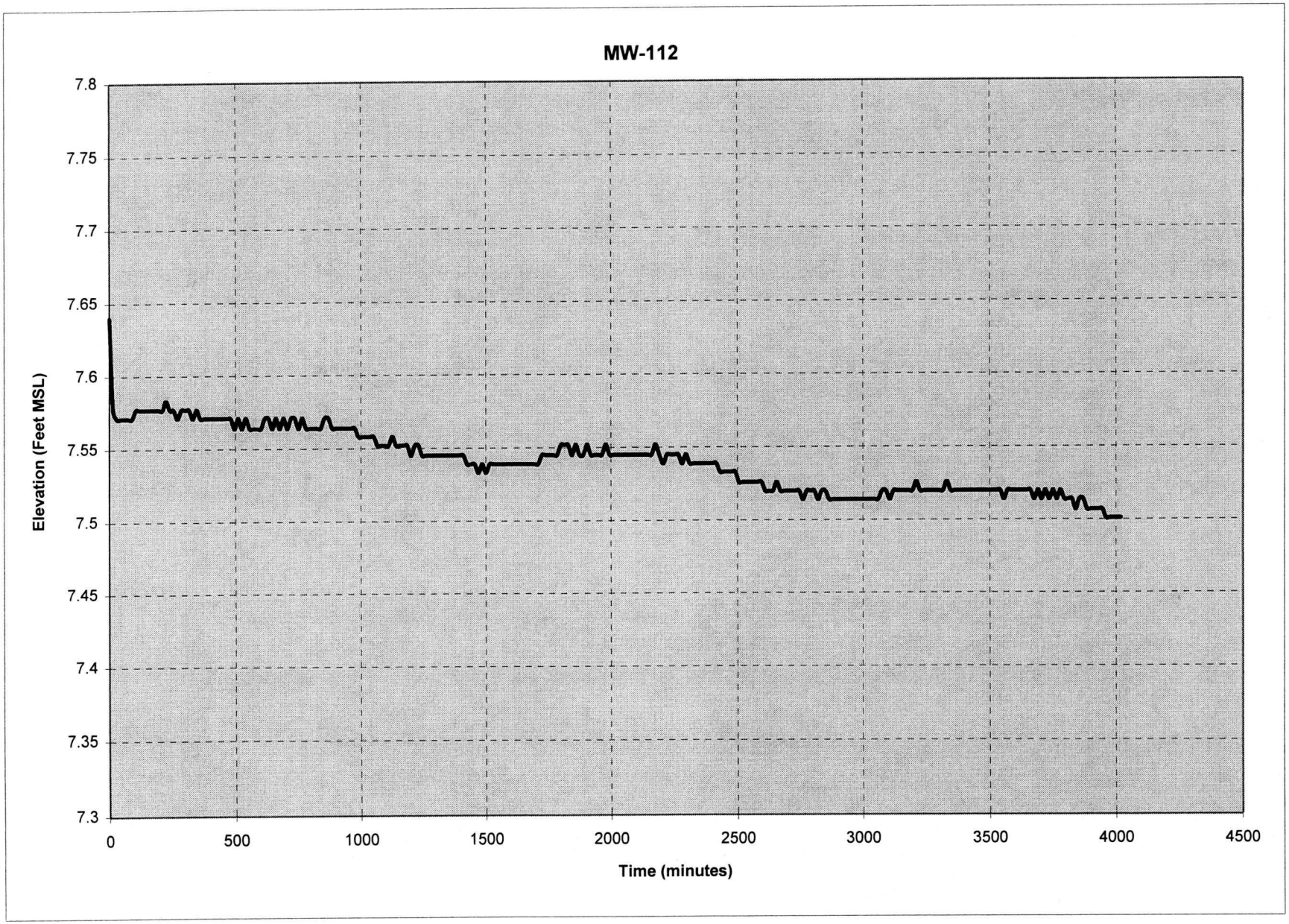
Temperature Range: 75-85° Equipment No.: 10365

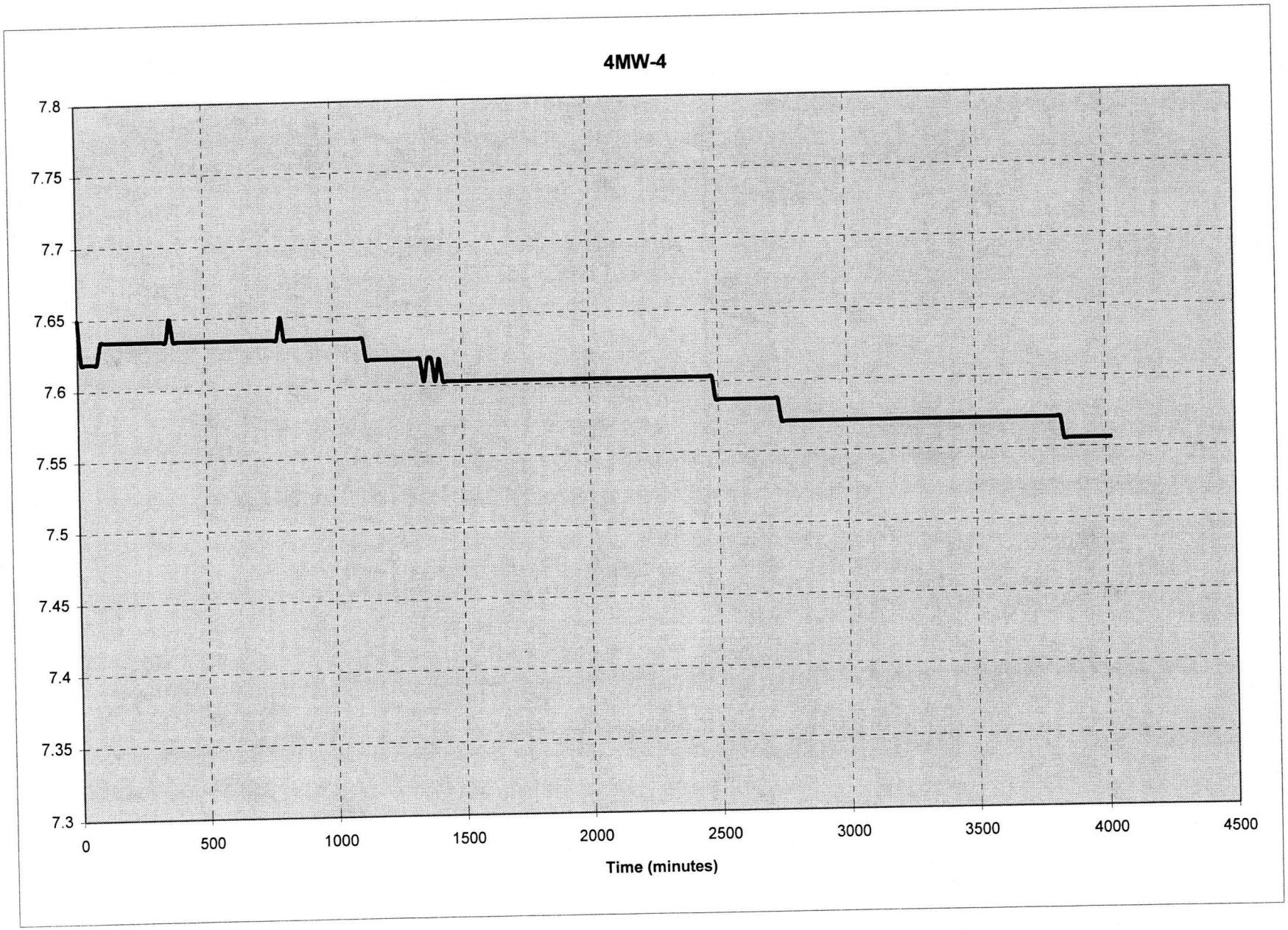
Precipitation: 0' Equipment Name: Solinst

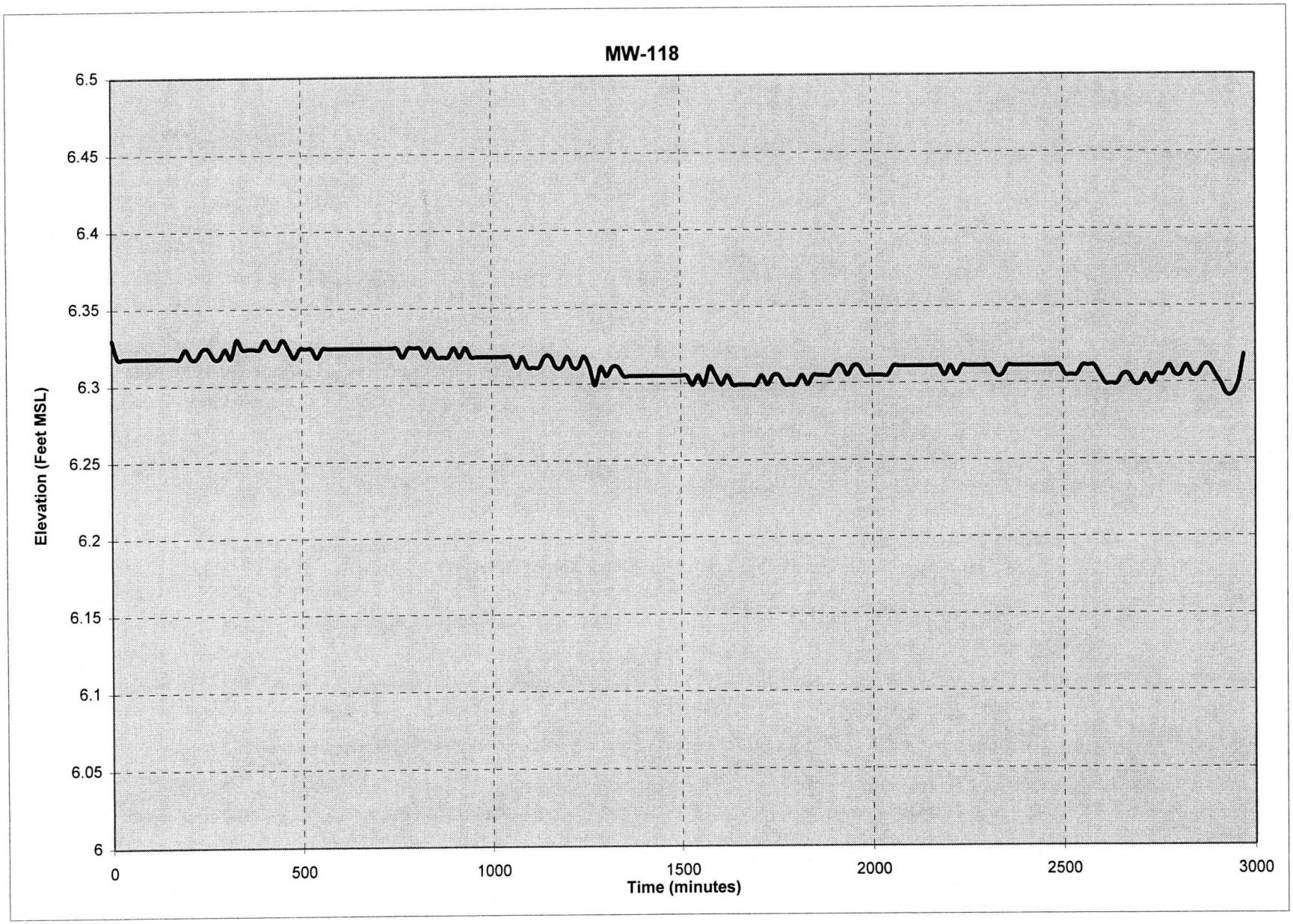
Barometric Pressure: Latest Calibration Date:

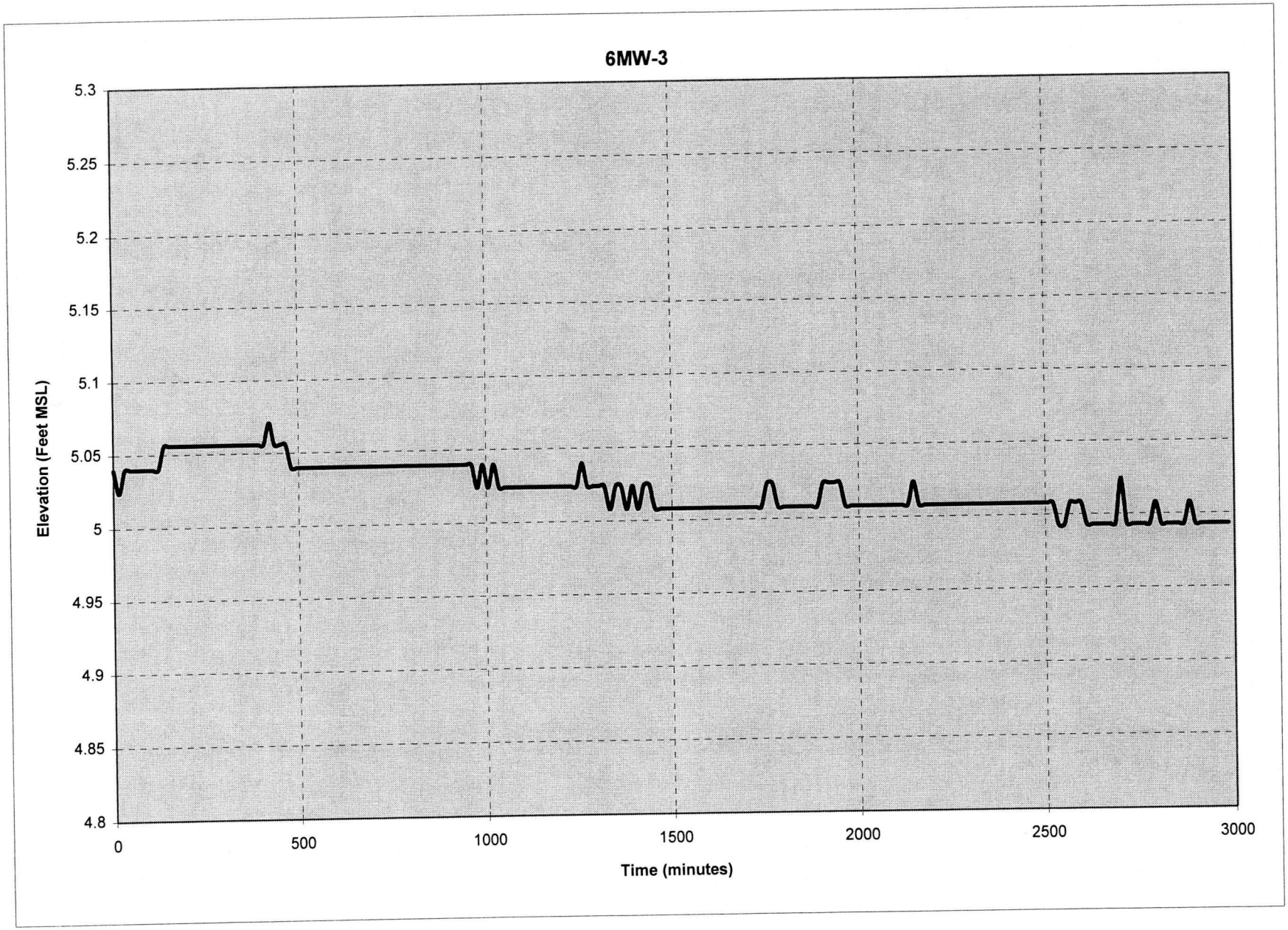
PIEZOMETER NO.	DATE/TIME	ELEVATION OF REFERENCE POINT (FT)	WATER LEVEL INDICATOR READING (FT)	ADJUSTED DEPTH (FT)	GROUNDWATER ELEVATION (FT)
7MW-3	5/17/95 1516	12.28	7.80		4.48
MW-119	5/17/95 1521	12.34	7.87		4.47
7MW-2	5/17/95 1524	12.76	8.35		4.41
MW-120	5/17/95 1537	15.21	10.57		4.64
7MW-1	5/17/95 1542	15.60	10.89		4.71

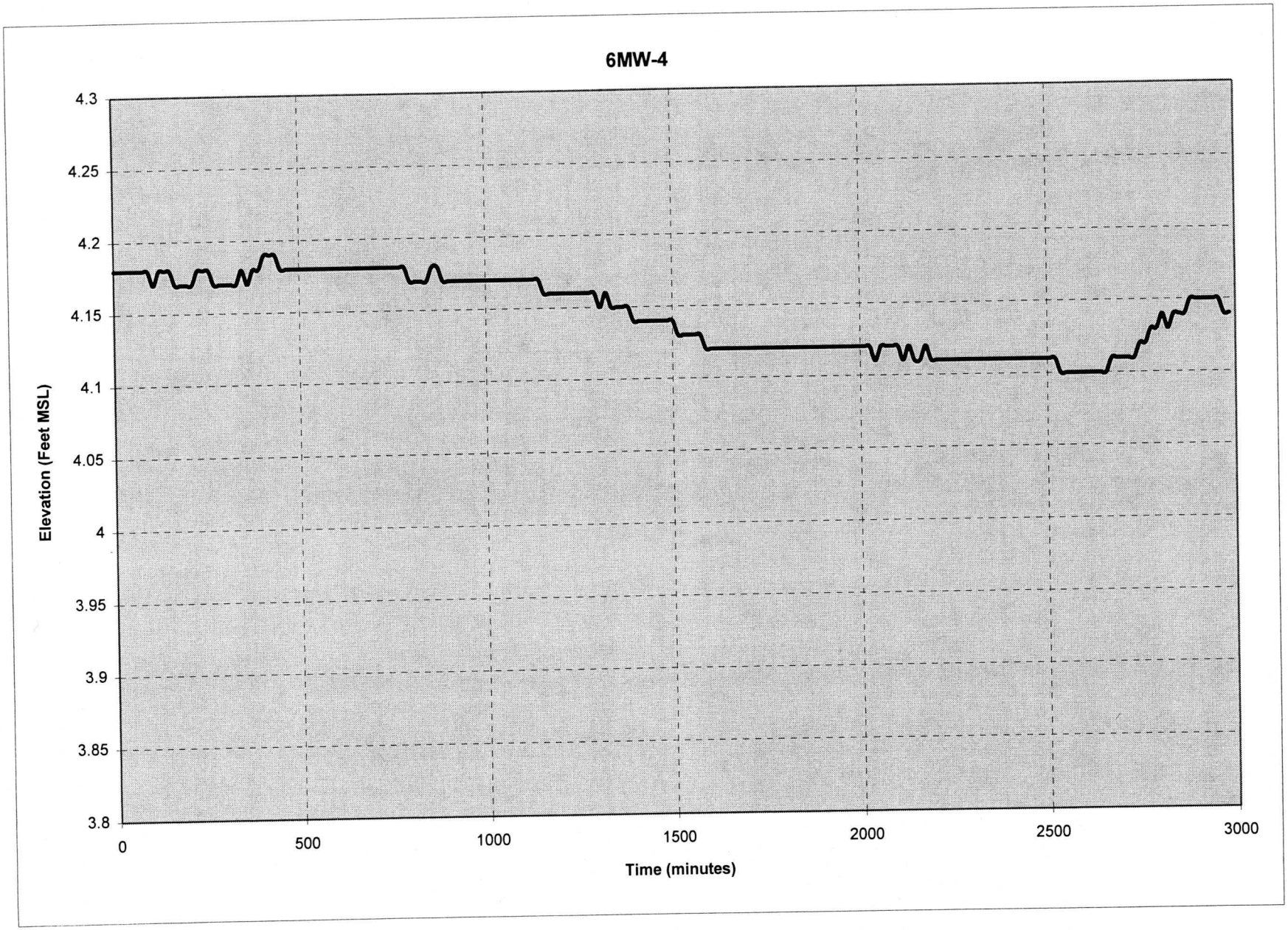

4MW-1
Elevation (Feet MSL)
7.7
7.65
7.6
7.55
7.5
7.45
7.4
7.35
7.3
7.25
7.2
0
500
1000
1500
2000
2500
3000
3500
4000
4500
Time (minutes)

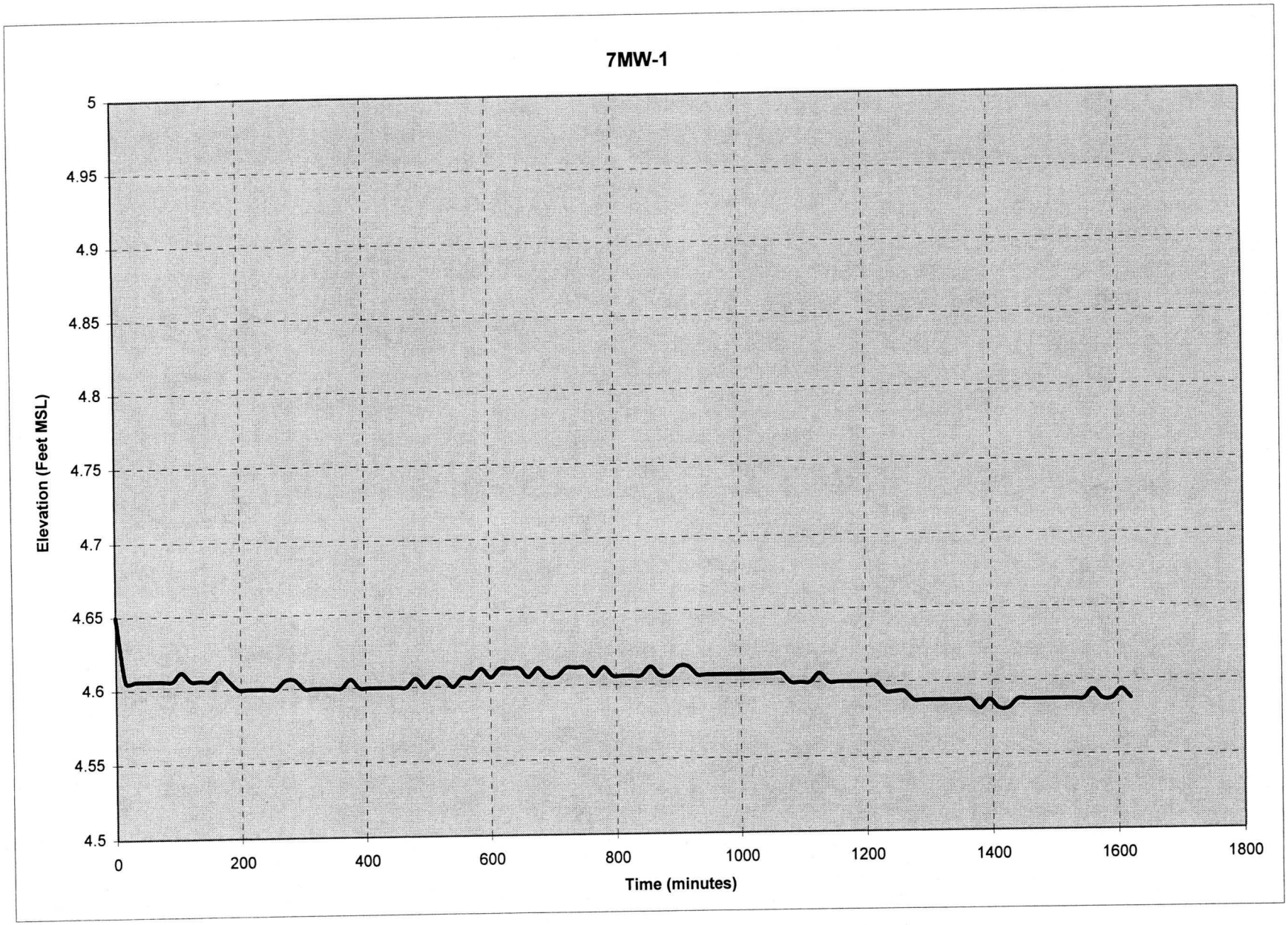

MW-112
Elevation (Feet MSL)
7.8
7.75
7.7
7.65
7.6
7.55
7.5
7.45
7.4
7.35
7.3
0
500
1000
1500
2000
2500
3000
3500
4000
4500
Time (minutes)

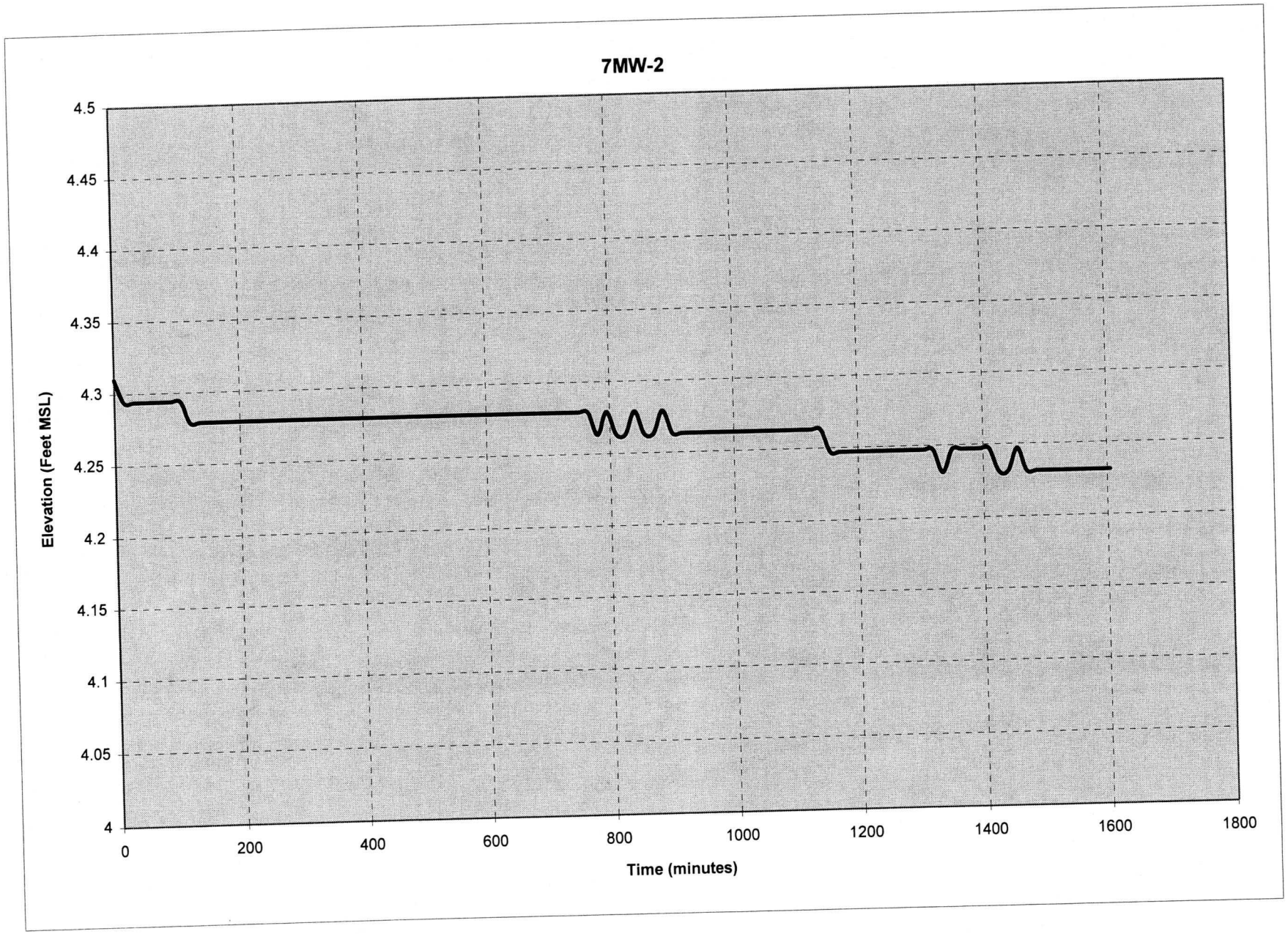

4MW-4
7.8
7.75
7.7
7.65
7.6
7.55
7.5
7.45
7.4
7.35
7.3
0
500
1000
1500
2000
2500
3000
3500
4000
4500
Time (minutes)

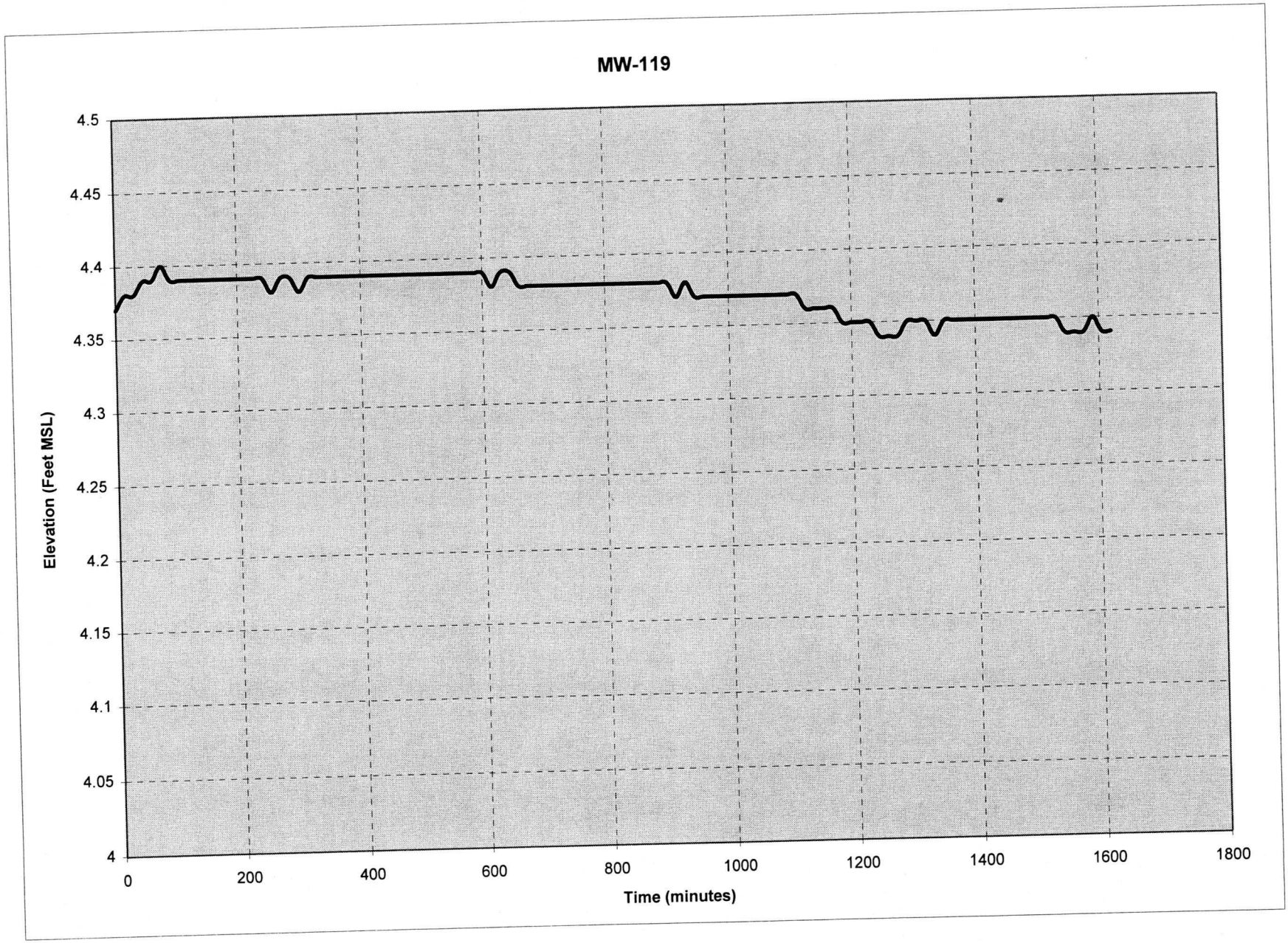

MW-118
Elevation (Feet MSL)
6.5
6.45
6.4
6.35
6.3
6.25
6.2
6.15
6.1
6.05
6
0
500
1000
1500
2000
2500
3000
Time (minutes)


6MW-3
Elevation (Feet MSL)
5.3
5.25
5.2
5.15
5.1
5.05
5
4.95
4.9
4.85
4.8
0
500
1000
1500
2000
2500
3000
Time (minutes)


6MW-4
Elevation (Feet MSL)
4.3
4.25
4.2
4.15
4.1
4.05
4
3.95
3.9
3.85
3.8
0
500
1000
1500
2000
2500
3000
Time (minutes)


7MW-1
Elevation (Feet MSL)
5
4.95
4.9
4.85
4.8
4.75
4.7
4.65
4.6
4.55
4.5
0
200
400
600
800
1000
1200
1400
1600
1800
Time (minutes)


7MW-2
Elevation (Feet MSL)
4.5
4.45
4.4
4.35
4.3
4.25
4.2
4.15
4.1
4.05
4
0
200
400
600
800
1000
1200
1400
1600
1800
Time (minutes)


MW-119
Elevation (Feet MSL)
4.5
4.45
4.4
4.35
4.3
4.25
4.2
4.15
4.1
4.05
4
0
200
400
600
800
1000
1200
1400
1600
1800
Time (minutes)

Appendix C
Sampling Forms

Remedial Investigation Report
FTA, LARC 60, and Auto Craft Sites
Fort Story, Virginia

FTA SAMPLING FORMS

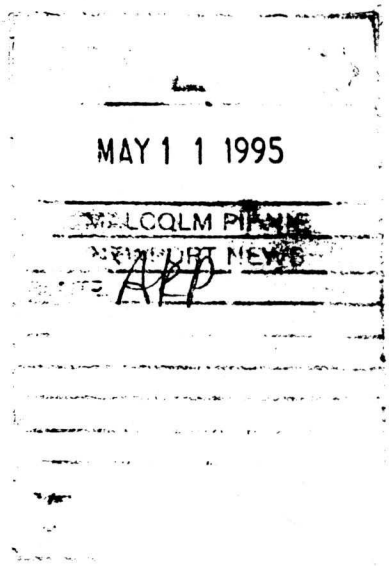
Appendix D
Site Surveying Report

Remedial Investigation Report
FTA, LARC 60, and Auto Craft Sites
Fort Story, Virginia

SRA SLEDD, RUNEY & ASSOCIATES, P.C.
ENGINEERS • PLANNERS • SURVEYORS

May 11, 1995

Mr. Tony Pace
Malcolm Pirnie, Inc.
Suite 400
11832 Rock Landing Drive
Newport News, VA 23606-4206



Re: Final Report
Fort Story
Groundwater Monitoring Program
Horizontal and Vertical Control Survey
Virginia Beach, VA
(SRA #95-819 \5122)

Dear Mr. Pace:

The revised information concerning the referenced monitoring wells is provided below. The coordinates for GW3, SB4 and SB5 have been included. "PVC" refers to the top of the PVC inner well casing (lip, not cap) elevation. "Concrete" refers to the elevation of the top of the concrete pad at a black mark on the concrete. "SB" denotes soil boring; "SS" denotes surface soil and "SD" denotes sediment point. * Denotes well used as bench mark. The identification numbers match the information shown on the Location Maps prepared by Malcolm Pirnie, Inc.

Identification	PVC	Concrete	Coordinates
LARC SITE:			
MW-115	9.45	--	----------
MW-117	16.01	--	N 225436.9 E 2724496.3
* MW-118	13.24	--	N 225250.7 E 2724498.5
6MW-1	11.42	11.81	N 225959.0 E 2724148.7
6MW-2	13.52	13.77	N 225426.9 E 2724484.8
6MW-3D	10.09	10.24	N 226033.4 E 2724546.9
6MW-3S	9.86	10.22	N 226033.3 E 2724551.2
6MW-4	6.98	7.39	N 226409.2 E 2724351.0
SD1, Top Water, 4/22/95	4.4	--	N 226224.9 E 2724382.2
SD2, Top Water, 4/22/95	4.6	--	N 226219.0 E 2724529.5
GW1	--	--	N 225448.7 E 2724567.8
GW2 & GW17	--	--	N 225531.7 E 2724506.9
GW3 & SB4	--	--	N 225884.9 E 2724581.9
GW5	--	--	N 225539.4 E 2724370.2
GW6	--	--	N 226168.4 E 2724703.4
GW7	--	--	N 226069.0 E 2724415.3

GW8	--	--	N 226064.0 E 2724691.7
GW9	--	--	N 226159.1 E 2724541.0
GW10	--	--	N 226186.4 E 2724495.5
GW12	--	--	N 225774.6 E 2724468.9
GW13	--	--	N 225741.4 E 2724249.1
GW14	--	--	N 226422.9 E 2723951.9
GW15	--	--	N 226079.2 E 2725175.6
GW16	--	--	N 225567.4 E 2724792.9
GW18	--	--	N 226273.8 E 2724675.5
GW19	--	--	N 226182.3 E 2724589.4
GW20	--	--	N 226196.6 E 2724330.9
GW21	--	--	N 226180.1 E 2724849.4
GW22	--	--	N 226576.0 E 2724684.5
GW23	--	--	N 226561.9 E 2725219.2
GW24	--	--	N 225887.7 E 2724903.4
GW25	--	--	N 226934.5 E 2724792.7
SB1	--	--	N 225395.1 E 2724481.1
SB2	--	--	N 225385.0 E 2724460.6
SB3	--	--	N 225414.2 E 2724469.3
SB5	--	--	N 225958.7 E 2724550.6
SB6 & GW4	--	--	N 225968.9 E 2724515.1
SB7 & GW11	--	--	N 225988.1 E 2724584.8
SB8	--	--	N 226032.6 E 2724450.8
SB9	--	--	N 226025.9 E 2724631.5
SB10	--	--	N 226030.9 E 2724719.4
SB11	--	--	N 226114.1 E 2724493.0
SB12	--	--	N 226104.2 E 2724585.1
SB13	--	--	N 226091.5 E 2724691.7
SB14	--	--	N 226149.9 E 2724690.9
SB15	--	--	N 226155.3 E 2724583.9
SB16 (APPROX. COORDS.- STAKE KNOCKED DOWN)			
			N 226146.0 E 2724494.0
SB17	--	--	N 226188.4 E 2724730.8
SB18	--	--	N 226191.7 E 2724643.0
SB19	--	--	N 226196.3 E 2724548.4
SB20	--	--	N 226199.3 E 2724445.6
SB21	--	--	N 226247.8 E 2724299.4
SB22	--	--	N 226251.4 E 2724493.6
SB23	--	--	N 226251.5 E 2724387.2

FTA SITE:

MW-111	13.90	--	N 223674.5 E 2720726.2
* MW-112	13.74	--	N 223835.8 E 2721089.1
MW-113A	15.95	--	----------
MW-114A (MW-14A)	19.66	--	----------
4MW-1	12.83	13.06	N 224288.3 E 2720483.7
4MW-2D	13.38	13.78	N 223776.7 E 2720769.3
4MW-2S	13.55	13.86	N 223765.2 E 2720771.0
4MW-3	14.08	14.41	N 223680.3 E 2720866.4
4MW-4	11.07	11.38	N 223636.2 E 2721275.8
4MW-5	13.50	13.92	N 223840.7 E 2721088.1
GW1	--	--	N 224367.8 E 2720785.8
GW2	--	--	N 224258.6 E 2720863.0
GW3 & SB4	--	--	N 224103.2 E 2720722.2
GW4	--	--	N 224046.4 E 2720773.4
GW5	--	--	N 223820.9 E 2720667.8
GW6	--	--	N 223785.4 E 2720723.8
GW7	--	--	N 223709.8 E 2720772.4
GW8	--	--	N 223884.5 E 2720943.5
GW9	--	--	N 223795.6 E 2720979.8
GW10	--	--	N 223766.4 E 2721098.6
GW11	--	--	N 223775.6 E 2721153.7
GW12	--	--	N 223642.1 E 2720786.0
GW13	--	--	N 223775.5 E 2720814.9
GW14	--	--	N 223834.7 E 2721077.7
GW16	--	--	N 223875.2 E 2721024.6
GW17	--	--	N 223743.8 E 2720665.7
GW18	--	--	N 223849.2 E 2720822.7
GW19	--	--	N 223901.5 E 2721106.3
GW20	--	--	N 223931.7 E 2721020.2
GW21	--	--	N 223883.7 E 2721175.0
GW22	--	--	N 223747.9 E 2720873.1
GW23	--	--	N 223689.7 E 2720578.0
SB1	--	--	N 224321.3 E 2720810.9
SB2	--	--	N 224283.0 E 2720819.9
SB3	--	--	N 224291.1 E 2720858.0
SB5	--	--	N 224068.2 E 2720803.0
SB6	--	--	N 224050.9 E 2720735.2
SB7	--	--	N 223819.8 E 2720692.1
SB9	--	--	N 223725.6 E 2720693.9
SB10	--	--	N 223742.6 E 2720748.3

SB11	--	--	N 223800.4 E 2720756.7
SB12	--	--	N 223808.3 E 2720707.6
SB13	--	--	N 223735.7 E 2720728.5
SB14	--	--	N 223767.6 E 2720661.3
SB15	--	--	N 223882.7 E 2720985.7
SB16	--	--	N 223867.5 E 2721038.5
SB17	--	--	N 223842.8 E 2721004.5
SB18	--	--	N 223834.3 E 2721076.4
SB19	--	--	N 223830.7 E 2721033.6
SB20 & GW15	--	--	N 223865.9 E 2721126.1
SB21	--	--	N 223779.5 E 2721145.2
SB22	--	--	N 223743.6 E 2721026.8
SS23	--	--	N 224289.2 E 2720794.0
SS24	--	--	N 224302.3 E 2720833.0
SS25	--	--	N 224279.4 E 2720834.8
SS26	--	--	N 224090.9 E 2720755.0
SS27	--	--	N 224065.1 E 2720748.6
SS28	--	--	N 224079.0 E 2720785.1
SD1	--	--	N 223720.2 E 2721193.1
SD2	--	--	N 223650.8 E 2721111.4
SD3	--	--	N 223602.5 E 2720931.1
SD4	--	--	N 223574.1 E 2720741.5
CRAFT SITE:			
MW-119	12.34	--	N 224825.0 E 2728717.7
* MW-120	15.21	--	N 224724.7 E 2728729.2
7MW-1	15.60	15.92	N 224644.2 E 2728675.8
7MW-2	12.76	13.23	N 224902.7 E 2728642.8
7MW-3	12.28	12.71	N 224818.2 E 2728719.5
GW3	--	--	N 224781.6 E 2728676.0
GW6	--	--	N 224920.0 E 2728751.0
SB1 & GW1	--	--	N 224649.4 E 2728664.1
SB2 & GW2	--	--	N 224778.0 E 2728591.5
SB3	--	--	N 224782.7 E 2728672.9
SB4 & GW4	--	--	N 224851.5 E 2728629.9
SB5 & GW5	--	--	N 224800.4 E 2728755.0
SB6	--	--	N 224761.4 E 2728712.8

The elevations are based on bench marks provided by Malcolm Pirnie, Inc. and the coordinates are based on coordinate system information provided by Malcolm Pirnie, Inc.

Please call if there are any questions or if additional information is required.

Sincerely,

SLEDD, RUNEY & ASSOCIATES, P.C.

Garrett S. Runey, II, P.E., L.S.
Vice President

GSR/bsc

Appendix E
On-site GC Analytical Data

Remedial Investigation Report
FTA. LARC 60, and Auto Craft Sites
Fort Story, Virginia

Client: EARTH TECH-Richmond, VA

Location: Fort Story, Virginia Site Project Number: 1528-004

Sample ID	Compound	Result	Units ug/L	Matrix	Date Sampled	Time Sampled
GW04-11	Vinyl Chloride	<10	ug/L	Water	2/22/95	---
	1,1 DCE	<10	ug/L	Water	2/22/95	---
	Cis 1,2-DCE	<10	ug/L	Water	2/22/95	---
	Benzene	<10	ug/L	Water	2/22/95	---
	TCE	<10	ug/L	Water	2/22/95	---
	PCE	<10	ug/L	Water	2/22/95	---
GW04-10	Vinyl Chloride	<10	ug/L	Water	2/22/95	---
	1,1-DCE	<10	ug/L	Water	2/22/95	---
	Cis-1,2-DCE	<10	ug/L	Water	2/22/95	---
	Benzene	<10	ug/L	Water	2/22/95	---
	TCE	<10	ug/L	Water	2/22/95	---
	PCE	<10	ug/L	Water	2/22/95	---

All positive results for vinyl chloride should be considered estimated due to an interfering peak.

Client: EARTH TECH-Richmond, VA

Location: Fort Story, Virginia Site Project Number: 1528-004

Sample ID	Compound	Result	Units ug/L	Matrix	Date Sampled	Time Sampled
GW04-09	Vinyl Chloride	<10	ug/L	Water	2/22/95	---
	1,1 DCE	<10	ug/L	Water	2/22/95	---
	Cis 1,2-DCE	<10	ug/L	Water	2/22/95	---
	Benzene	<10	ug/L	Water	2/22/95	---
	TCE	<10	ug/L	Water	2/22/95	---
	PCE	<10	ug/L	Water	2/22/95	---
GW04-12	Vinyl Chloride	<10	ug/L	Water	2/22/95	---
	1,1-DCE	<10	ug/L	Water	2/22/95	---
	Cis-1,2-DCE	<10	ug/L	Water	2/22/95	---
	Benzene	<10	ug/L	Water	2/22/95	---
	TCE	<10	ug/L	Water	2/22/95	---
	PCE	<10	ug/L	Water	2/22/95	---

All positive results for vinyl chloride should be considered estimated due to an interfering peak.

Client: EARTH TECH-Richmond, VA

Location: Fort Story, Virginia Site Project Number: 1528-004

Sample ID	Compound	Result	Units ug/L	Matrix	Date Sampled	Time Sampled
GW04-007	Vinyl Chloride	<10	ug/L	Water	2/23/95	---
	1,1 DCE	<10	ug/L	Water	2/23/95	---
	Cis 1,2-DCE	<10	ug/L	Water	2/23/95	---
	Benzene	<10	ug/L	Water	2/23/95	---
	TCE	<10	ug/L	Water	2/23/95	---
	PCE	<10	ug/L	Water	2/23/95	---
GW04-005	Vinyl Chloride	<10	ug/L	Water	2/23/95	---
	1,1-DCE	<10	ug/L	Water	2/23/95	---
	Cis-1,2-DCE	<10	ug/L	Water	2/23/95	---
	Benzene	<10	ug/L	Water	2/23/95	---
	TCE	<10	ug/L	Water	2/23/95	---
	PCE	<10	ug/L	Water	2/23/95	---

All positive results for vinyl chloride should be considered estimated due to an interfering peak.

Client: EARTH TECH-Richmond, VA

Location: Fort Story, Virginia Site

Project Number: 1528-004

Sample ID	Compound	Result	Units ug/L	Matrix	Date Sampled	Time Sampled
GW04-006	Vinyl Chloride	>50	ug/L	Water	2/23/95	---
	1,1 DCE	<10	ug/L	Water	2/23/95	---
	Cis 1,2-DCE	<10	ug/L	Water	2/23/95	---
	Benzene	<10	ug/L	Water	2/23/95	---
	TCE	<10	ug/L	Water	2/23/95	---
	PCE	<10	ug/L	Water	2/23/95	---
GW04-008	Vinyl Chloride	<10	ug/L	Water	2/23/95	---
	1,1-DCE	<10	ug/L	Water	2/23/95	---
	Cis-1,2-DCE	<10	ug/L	Water	2/23/95	---
	Benzene	<10	ug/L	Water	2/23/95	---
	TCE	<10	ug/L	Water	2/23/95	---
	PCE	<10	ug/L	Water	2/23/95	---

All positive results for vinyl chloride should be considered estimated due to an interfering peak.

Client: EARTH TECH-Richmond, VA

Location: Fort Story, Virginia Site

Project Number: 1528-004

Sample ID	Compound	Result	Units ug/L	Matrix	Date Sampled	Time Sampled
GW04-004	Vinyl Chloride	<10	ug/L	Water	2/23/95	---
	1,1 DCE	<10	ug/L	Water	2/23/95	---
	Cis 1,2-DCE	<10	ug/L	Water	2/23/95	---
	Benzene	<10	ug/L	Water	2/23/95	---
	TCE	<10	ug/L	Water	2/23/95	---
	PCE	<10	ug/L	Water	2/23/95	---
GW04-004 DUP	Vinyl Chloride	<10	ug/L	Water	2/23/95	---
	1,1-DCE	<10	ug/L	Water	2/23/95	---
	Cis-1,2-DCE	<10	ug/L	Water	2/23/95	---
	Benzene	<10	ug/L	Water	2/23/95	---
	TCE	<10	ug/L	Water	2/23/95	---
	PCE	<10	ug/L	Water	2/23/95	---

All positive results for vinyl chloride should be considered estimated due to an interfering peak.

Client: EARTH TECH-Richmond, VA

Location: Fort Story, Virginia Site Project Number: 1528-004

Sample ID	Compound	Result	Units ug/L	Matrix	Date Sampled	Time Sampled
GW04-001	Vinyl Chloride	<10	ug/L	Water	2/23/95	---
	1,1 DCE	<10	ug/L	Water	2/23/95	---
	Cis 1,2-DCE	<10	ug/L	Water	2/23/95	---
	Benzene	<10	ug/L	Water	2/23/95	---
	TCE	<10	ug/L	Water	2/23/95	---
	PCE	<10	ug/L	Water	2/23/95	---
GW04-003	Vinyl Chloride	7.4	ug/L	Water	2/24/95	---
	1,1-DCE	<5.0	ug/L	Water	2/24/95	---
	Cis-1,2-DCE	<5.0	ug/L	Water	2/24/95	---
	Benzene	<5.0	ug/L	Water	2/24/95	---
	TCE	<5.0	ug/L	Water	2/24/95	---
	PCE	<5.0	ug/L	Water	2/24/95	---

All positive results for vinyl chloride should be considered estimated due to an interfering peak.

Client: EARTH TECH-Richmond, VA

Location: Fort Story, Virginia Site Project Number: 1528-004

Sample ID	Compound	Result	Units ug/L	Matrix	Date Sampled	Time Sampled
GW04-013	Vinyl Chloride	12	ug/L	Water	2/24/95	---
	1,1 DCE	<5.0	ug/L	Water	2/24/95	---
	Cis 1,2-DCE	<5.0	ug/L	Water	2/24/95	---
	Benzene	<5.0	ug/L	Water	2/24/95	---
	TCE	<5.0	ug/L	Water	2/24/95	---
	PCE	<5.0	ug/L	Water	2/24/95	---
GW04-002	Vinyl Chloride	7.0	ug/L	Water	2/24/95	---
	1,1-DCE	<5.0	ug/L	Water	2/24/95	---
	Cis-1,2-DCE	<5.0	ug/L	Water	2/24/95	---
	Benzene	<5.0	ug/L	Water	2/24/95	---
	TCE	<5.0	ug/L	Water	2/24/95	---
	PCE	<5.0	ug/L	Water	2/24/95	---

All positive results for vinyl chloride should be considered estimated due to an interfering peak.

Client: EARTH TECH-Richmond, VA

Location: Fort Story, Virginia Site Project Number: 1528-004

Sample ID	Compound	Result	Units ug/L	Matrix	Date Sampled	Time Sampled
GW07-002	Vinyl Chloride	<50*	ug/L	Water	2/24/95	---
	1,1 DCE	<5.0	ug/L	Water	2/24/95	---
	Cis 1,2-DCE	<5.0	ug/L	Water	2/24/95	---
	Benzene	<5.0	ug/L	Water	2/24/95	---
	TCE	<5.0	ug/L	Water	2/24/95	---
	PCE	<5.0	ug/L	Water	2/24/95	---
GW07-005	Vinyl Chloride	7.2	ug/L	Water	2/24/95	---
	1,1-DCE	<5.0	ug/L	Water	2/24/95	---
	Cis-1,2-DCE	<5.0	ug/L	Water	2/24/95	---
	Benzene	<5.0	ug/L	Water	2/24/95	---
	TCE	<5.0	ug/L	Water	2/24/95	---
	PCE	<5.0	ug/L	Water	2/24/95	---

All positive results for vinyl chloride should be considered estimated due to an interfering peak.

*Raised detection limit due to interfering peak.

Client: EARTH TECH-Richmond, VA

Location: Fort Story, Virginia Site

Project Number: 1528-004

Sample ID	Compound	Result	Units ug/L	Matrix	Date Sampled	Time Sampled
GW07-003	Vinyl Chloride	<50*	ug/L	Water	2/27/95	---
	1,1 DCE	<5.0	ug/L	Water	2/27/95	---
	Cis 1,2-DCE	<5.0	ug/L	Water	2/27/95	---
	Benzene	<5.0	ug/L	Water	2/27/95	---
	TCE	<5.0	ug/L	Water	2/27/95	---
	PCE	<5.0	ug/L	Water	2/27/95	---
GW07-004	Vinyl Chloride	8.9	ug/L	Water	2/27/95	---
	1,1-DCE	<5.0	ug/L	Water	2/27/95	---
	Cis-1,2-DCE	<5.0	ug/L	Water	2/27/95	---
	Benzene	<5.0	ug/L	Water	2/27/95	---
	TCE	<5.0	ug/L	Water	2/27/95	---
	PCE	<5.0	ug/L	Water	2/27/95	---

All positive results for vinyl chloride should be considered estimated due to an interfering peak.

*Raised detection limit due to interfering peak.

Client: EARTH TECH-Richmond, VA

Location: Fort Story, Virginia Site

Project Number: 1528-004

Sample ID	Compound	Result	Units ug/L	Matrix	Date Sampled	Time Sampled
GW07-001	Vinyl Chloride	<30*	ug/L	Water	2/27/95	---
	1,1 DCE	<5.0	ug/L	Water	2/27/95	---
	Cis 1,2-DCE	<5.0	ug/L	Water	2/27/95	---
	Benzene	<5.0	ug/L	Water	2/27/95	---
	TCE	<5.0	ug/L	Water	2/27/95	---
	PCE	<5.0	ug/L	Water	2/27/95	---
GW04-014	Vinyl Chloride	11**	ug/L	Water	2/27/95	---
	1,1-DCE	<5.0	ug/L	Water	2/27/95	---
	Cis-1,2-DCE	<5.0	ug/L	Water	2/27/95	---
	Benzene	<5.0	ug/L	Water	2/27/95	---
	TCE	<5.0	ug/L	Water	2/27/95	---
	PCE	<5.0	ug/L	Water	2/27/95	---

All positive results for vinyl chloride should be considered estimated due to an interfering peak.

*Raised detection limit due to interfering peak.

**Separate vial duplicate was 26 ug/l.

Client: EARTH TECH-Richmond, VA

Location: Fort Story, Virginia Site Project Number: 1528-004

Sample ID	Compound	Result	Units ug/L	Matrix	Date Sampled	Time Sampled
GW04-15	Vinyl Chloride	12*	ug/L	Water	2/27/95	---
	1,1 DCE	<5.0	ug/L	Water	2/27/95	---
	Cis 1,2-DCE	<5.0	ug/L	Water	2/27/95	---
	Benzene	<5.0	ug/L	Water	2/27/95	---
	TCE	<5.0	ug/L	Water	2/27/95	---
	PCE	<5.0	ug/L	Water	2/27/95	---
GW04-014-20	Vinyl Chloride	6.6	ug/L	Water	2/27/95	---
	1,1-DCE	<5.0	ug/L	Water	2/27/95	---
	Cis-1,2-DCE	<5.0	ug/L	Water	2/27/95	---
	Benzene	<5.0	ug/L	Water	2/27/95	---
	TCE	<5.0	ug/L	Water	2/27/95	---
	PCE	<5.0	ug/L	Water	2/27/95	---

All positive results for vinyl chloride should be considered estimated due to an interfering peak.

*Separate vial duplicate was 12 ug/l.

Client: EARTH TECH-Richmond, VA

Location: Fort Story, Virginia Site Project Number: 1528-004

Sample ID	Compound	Result	Units ug/L	Matrix	Date Sampled	Time Sampled
GW04-016	Vinyl Chloride	83	ug/L	Water	2/28/95	---
	1,1 DCE	<5.0	ug/L	Water	2/28/95	---
	Cis 1,2-DCE	<5.0	ug/L	Water	2/28/95	---
	Benzene	<5.0	ug/L	Water	2/28/95	---
	TCE	<5.0	ug/L	Water	2/28/95	---
	PCE	<5.0	ug/L	Water	2/28/95	---
GW04-017	Vinyl Chloride	6.2*	ug/L	Water	2/28/95	---
	1,1-DCE	<5.0	ug/L	Water	2/28/95	---
	Cis-1,2-DCE	<5.0	ug/L	Water	2/28/95	---
	Benzene	<5.0	ug/L	Water	2/28/95	---
	TCE	<5.0	ug/L	Water	2/28/95	---
	PCE	<5.0	ug/L	Water	2/28/95	---

All positive results for vinyl chloride should be considered estimated due to an interfering peak.
*Separate vial duplicate was 6.7 ug/l.

Client: EARTH TECH-Richmond, VA

Location: Fort Story, Virginia Site Project Number: 1528-004

Sample ID	Compound	Result	Units ug/L	Matrix	Date Sampled	Time Sampled
GW04-019	Vinyl Chloride	<5.0	ug/L	Water	2/28/95	---
	1,1 DCE	<5.0	ug/L	Water	2/28/95	---
	Cis 1,2-DCE	<5.0	ug/L	Water	2/28/95	---
	Benzene	<5.0	ug/L	Water	2/28/95	---
	TCE	<5.0	ug/L	Water	2/28/95	---
	PCE	<5.0	ug/L	Water	2/28/95	---
GW04-20	Vinyl Chloride	<5.0	ug/L	Water	2/28/95	---
	1,1-DCE	<5.0	ug/L	Water	2/28/95	---
	Cis-1,2-DCE	<5.0	ug/L	Water	2/28/95	---
	Benzene	<5.0	ug/L	Water	2/28/95	---
	TCE	<5.0	ug/L	Water	2/28/95	---
	PCE	<5.0	ug/L	Water	2/28/95	---

All positive results for vinyl chloride should be considered estimated due to an interfering peak.

Client: EARTH TECH-Richmond, VA

Location: Fort Story, Virginia Site Project Number: 1528-004

Sample ID	Compound	Result	Units ug/L	Matrix	Date Sampled	Time Sampled
GW04-21	Vinyl Chloride	<5.0	ug/L	Water	2/28/95	---
	1,1 DCE	<5.0	ug/L	Water	2/28/95	---
	Cis 1,2-DCE	<5.0	ug/L	Water	2/28/95	---
	Benzene	<5.0	ug/L	Water	2/28/95	---
	TCE	<5.0	ug/L	Water	2/28/95	---
	PCE	<5.0	ug/L	Water	2/28/95	---
GW04-014-22	Vinyl Chloride	<5.0	ug/L	Water	2/28/95	---
	1,1-DCE	<5.0	ug/L	Water	2/28/95	---
	Cis-1,2-DCE	<5.0	ug/L	Water	2/28/95	---
	Benzene	<5.0	ug/L	Water	2/28/95	---
	TCE	<5.0	ug/L	Water	2/28/95	---
	PCE	<5.0	ug/L	Water	2/28/95	---

All positive results for vinyl chloride should be considered estimated due to an interfering peak.

Client: EARTH TECH-Richmond, VA

Location: Fort Story, Virginia Site

Project Number: 1528-004

Sample ID	Compound	Result	Units ug/L	Matrix	Date Sampled	Time Sampled
GW04-022	Vinyl Chloride	<5.0	ug/L	Water	2/28/95	---
	1,1 DCE	<5.0	ug/L	Water	2/28/95	---
	Cis 1,2-DCE	<5.0	ug/L	Water	2/28/95	---
	Benzene	<5.0	ug/L	Water	2/28/95	---
	TCE	<5.0	ug/L	Water	2/28/95	---
	PCE	<5.0	ug/L	Water	2/28/95	---
GW04-023	Vinyl Chloride	<5.0	ug/L	Water	3/1/95	---
	1,1-DCE	<5.0	ug/L	Water	3/1/95	---
	Cis-1,2-DCE	<5.0	ug/L	Water	3/1/95	---
	Benzene	<5.0	ug/L	Water	3/1/95	---
	TCE	<5.0	ug/L	Water	3/1/95	---
	PCE	<5.0	ug/L	Water	3/1/95	---

All positive results for vinyl chloride should be considered estimated due to an interfering peak.

Client: EARTH TECH-Richmond, VA

Location: Fort Story, Virginia Site

Project Number: 1528-004

Sample ID	Compound	Result	Units ug/L	Matrix	Date Sampled	Time Sampled
GW06-03	Vinyl Chloride	<5.0	ug/L	Water	3/1/95	---
	1,1 DCE	<5.0	ug/L	Water	3/1/95	---
	Cis 1,2-DCE	13	ug/L	Water	3/1/95	---
	Benzene	<5.0	ug/L	Water	3/1/95	---
	TCE	180	ug/L	Water	3/1/95	---
	PCE	160	ug/L	Water	3/1/95	---
GW06-002	Vinyl Chloride	<25	ug/L	Water	3/1/95	---
	1,1-DCE	<25	ug/L	Water	3/1/95	---
	Cis-1,2-DCE	150	ug/L	Water	3/1/95	---
	Benzene	<25	ug/L	Water	3/1/95	---
	TCE	47	ug/L	Water	3/1/95	---
	PCE	<25	ug/L	Water	3/1/95	---

All positive results for vinyl chloride should be considered estimated due to an interfering peak.

Client: EARTH TECH-Richmond, VA

Location: Fort Story, Virginia Site

Project Number: 1528-004

Sample ID	Compound	Result	Units ug/L	Matrix	Date Sampled	Time Sampled
GW06-001	Vinyl Chloride	<5.0	ug/L	Water	3/1/95	---
	1,1 DCE	<5.0	ug/L	Water	3/1/95	---
	Cis 1,2-DCE	<5.0	ug/L	Water	3/1/95	---
	Benzene	<5.0	ug/L	Water	3/1/95	---
	TCE	<5.0	ug/L	Water	3/1/95	---
	PCE	<5.0	ug/L	Water	3/1/95	---
GW06-005	Vinyl Chloride	<10*	ug/L	Water	3/1/95	---
	1,1-DCE	<5.0	ug/L	Water	3/1/95	---
	Cis-1,2-DCE	<5.0	ug/L	Water	3/1/95	---
	Benzene	<5.0	ug/L	Water	3/1/95	---
	TCE	<5.0	ug/L	Water	3/1/95	---
	PCE	<5.0	ug/L	Water	3/1/95	---

All positive results for vinyl chloride should be considered estimated due to an interfering peak.

*Detection limit raised due to interfering peaks.

Client: EARTH TECH-Richmond, VA

Location: Fort Story, Virginia Site

Project Number: 1528-004

Sample ID	Compound	Result	Units ug/L	Matrix	Date Sampled	Time Sampled
GW06-007	Vinyl Chloride	<5.0	ug/L	Water	3/2/95	---
	1,1 DCE	<5.0	ug/L	Water	3/2/95	---
	Cis 1,2-DCE	<5.0	ug/L	Water	3/2/95	---
	Benzene	<5.0	ug/L	Water	3/2/95	---
	TCE	<5.0	ug/L	Water	3/2/95	---
	PCE	<5.0	ug/L	Water	3/2/95	---
GW06-008	Vinyl Chloride	21	ug/L	Water	3/2/95	---
	1,1-DCE	<5.0	ug/L	Water	3/2/95	---
	Cis-1,2-DCE	<5.0	ug/L	Water	3/2/95	---
	Benzene	<5.0	ug/L	Water	3/2/95	---
	TCE	<5.0	ug/L	Water	3/2/95	---
	PCE	<5.0	ug/L	Water	3/2/95	---

All positive results for vinyl chloride should be considered estimated due to an interfering peak.

Client: EARTH TECH-Richmond, VA

Location: Fort Story, Virginia Site Project Number: 1528-004

Sample ID	Compound	Result	Units ug/L	Matrix	Date Sampled	Time Sampled
GW06-006	Vinyl Chloride	60	ug/L	Water	3/2/95	---
	1,1 DCE	<10	ug/L	Water	3/2/95	---
	Cis 1,2-DCE	<10	ug/L	Water	3/2/95	---
	Benzene	<10	ug/L	Water	3/2/95	---
	TCE	<10	ug/L	Water	3/2/95	---
	PCE	<10	ug/L	Water	3/2/95	---
GW06-019	Vinyl Chloride	11	ug/L	Water	3/2/95	---
	1,1-DCE	<5.0	ug/L	Water	3/2/95	---
	Cis-1,2-DCE	<5.0	ug/L	Water	3/2/95	---
	Benzene	<5.0	ug/L	Water	3/2/95	---
	TCE	<5.0	ug/L	Water	3/2/95	---
	PCE	<5.0	ug/L	Water	3/2/95	---

All positive results for vinyl chloride should be considered estimated due to an interfering peak.

Client: EARTH TECH-Richmond, VA

Location: Fort Story, Virginia Site Project Number: 1528-004

Sample ID	Compound	Result	Units ug/L	Matrix	Date Sampled	Time Sampled
GW06-010	Vinyl Chloride	200	ug/L	Water	3/2/95	---
	1,1 DCE	<5.0	ug/L	Water	3/2/95	---
	Cis 1,2-DCE	<5.0	ug/L	Water	3/2/95	---
	Benzene	<5.0	ug/L	Water	3/2/95	---
	TCE	<5.0	ug/L	Water	3/2/95	---
	PCE	<5.0	ug/L	Water	3/2/95	---
GW06-020	Vinyl Chloride	24	ug/L	Water	3/3/95	---
	1,1-DCE	<5.0	ug/L	Water	3/3/95	---
	Cis-1,2-DCE	<5.0	ug/L	Water	3/3/95	---
	Benzene	<5.0	ug/L	Water	3/3/95	---
	TCE	<5.0	ug/L	Water	3/3/95	---
	PCE	<5.0	ug/L	Water	3/3/95	---

All positive results for vinyl chloride should be considered estimated due to an interfering peak.

Client: EARTH TECH-Richmond, VA

Location: Fort Story, Virginia Site Project Number: 1528-004

Sample ID	Compound	Result	Units ug/L	Matrix	Date Sampled	Time Sampled
GW06-009	Vinyl Chloride	85	ug/L	Water	3/3/95	---
	1,1 DCE	<10	ug/L	Water	3/3/95	---
	Cis 1,2-DCE	<10	ug/L	Water	3/3/95	---
	Benzene	<10	ug/L	Water	3/3/95	---
	TCE	<10	ug/L	Water	3/3/95	---
	PCE	<10	ug/L	Water	3/3/95	---
GW06-018	Vinyl Chloride	110	ug/L	Water	3/3/95	---
	1,1-DCE	<5.0	ug/L	Water	3/3/95	---
	Cis-1,2-DCE	<5.0	ug/L	Water	3/3/95	---
	Benzene	<5.0	ug/L	Water	3/3/95	---
	TCE	<5.0	ug/L	Water	3/3/95	---
	PCE	<5.0	ug/L	Water	3/3/95	---

All positive results for vinyl chloride should be considered estimated due to an interfering peak.

Client: EARTH TECH-Richmond, VA

Location: Fort Story, Virginia Site Project Number: 1528-004

Sample ID	Compound	Result	Units ug/L	Matrix	Date Sampled	Time Sampled
GW06-021	Vinyl Chloride	56*	ug/L	Water	3/3/95	---
	1,1 DCE	<5.0	ug/L	Water	3/3/95	---
	Cis 1,2-DCE	<5.0	ug/L	Water	3/3/95	---
	Benzene	<5.0	ug/L	Water	3/3/95	---
	TCE	<5.0	ug/L	Water	3/3/95	---
	PCE	<5.0	ug/L	Water	3/3/95	---
GW06-022	Vinyl Chloride	18	ug/L	Water	3/3/95	---
	1,1-DCE	<5.0	ug/L	Water	3/3/95	---
	Cis-1,2-DCE	<5.0	ug/L	Water	3/3/95	---
	Benzene	<5.0	ug/L	Water	3/3/95	---
	TCE	<5.0	ug/L	Water	3/3/95	---
	PCE	<5.0	ug/L	Water	3/3/95	---

All positive results for vinyl chloride should be considered estimated due to an interfering peak.

*Estimated due to linear range.

Client: EARTH TECH-Richmond, VA

Location: Fort Story, Virginia Site Project Number: 1528-004

Sample ID	Compound	Result	Units ug/L	Matrix	Date Sampled	Time Sampled
GW06-023	Vinyl Chloride	13	ug/L	Water	3/3/95	---
	1,1 DCE	<5.0	ug/L	Water	3/3/95	---
	Cis 1,2-DCE	<5.0	ug/L	Water	3/3/95	---
	Benzene	<5.0	ug/L	Water	3/3/95	---
	TCE	<5.0	ug/L	Water	3/3/95	---
	PCE	<5.0	ug/L	Water	3/3/95	---
GW06-024	Vinyl Chloride	24	ug/L	Water	3/3/95	---
	1,1-DCE	<5.0	ug/L	Water	3/3/95	---
	Cis-1,2-DCE	<5.0	ug/L	Water	3/3/95	---
	Benzene	<5.0	ug/L	Water	3/3/95	---
	TCE	<5.0	ug/L	Water	3/3/95	---
	PCE	<5.0	ug/L	Water	3/3/95	---

All positive results for vinyl chloride should be considered estimated due to an interfering peak.

Sample Location GW04 (PTA)	Date Analyzed	Results (ppm)
GW04-001	2-23	ND
GW04-002	2-24	ND
GW04-003	2-24	ND
GW04-004	2-23	ND
GW04-004 Duplicate	2-23	ND
GW04-005	2-23	ND
GW04-006	2-23	13.0[1]
GW04-007	2-23	ND
GW04-008	2-23	ND
GW04-009	2-22	<.5
GW04-010	2-22	<.5
GW04-011	2-22	<.5
GW04-012	2-22	ND
GW04-013	2-24	ND
GW04-014	2-27	ND
GW04-014-20	2-28	ND
GW04-014-20 Duplicate	2-28	ND
GW04-014-22	3-1	ND
GW04-015	2-27	ND
GW04-015 Matrix spike 2 ppm	2-27	2.1
GW04-016	2-28	ND
GW04-017	2-28	ND
GW04-019	2-28	ND
GW04-020	2-28	ND
GW04-021	2-28	ND
GW04-022	3-1	ND
GW04-023	3-1	ND

Sample Location GW-07 (Autocraft)	Date Analyzed	Results (ppm)
GW07-001	2-27	ND
GW07-002	2-24	ND
GW07-003	2-27	ND
GW07-004	2-27	ND
GW07-005	2-24	ND

Sample Location GW-07 (LARC)	Date Analyzed	Results (ppm)
GW06-001	3-1	ND
GW06-002	3-1	8
GW06-002 Duplicate	3-1	8
GW06-003	3-1	<.5
GW06-005	3-2	ND
GW06-006	3-2	ND
GW06-007	3-2	ND
GW06-008	3-2	<.5
GW06-009	3-3	<.5
GW06-010	3-2	ND
GW06-018	3-3	ND
GW06-019	3-2	<.5
GW06-020	3-3	ND
GW06-020 Matrix spike 2 ppm	3-3	1.9
GW06-021	3-3	ND
GW06-022	3-3	ND
GW06-023	3-3	ND
GW06-024	3-3	ND

Blanks	Date	Result (ppm)
Blank	2-22	ND
Blank	2-23	ND
Blank	2-24	ND
Blank	3-2	ND
Blank	3-3	ND

[1]Screened value from HNU-PID, analysis suggested TPH "heavy-fraction"

<.5: THP components detected but below quantification limits

ND = Non detected

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Appendix F
Fort Story Map

Remedial Investigation Report
FTA. LARC 60, and Auto Craft Sites
Fort Story, Virginia

Appendix G
ETI Report

Remedial Investigation Report
FTA, LARC 60, and Auto Craft Sites
Fort Story, Virginia

DEQ Tracking Number
PC90-1092

Environmental Technology
of North America, Inc.
A HazWaste Company

February 20, 1995

Mr. Donald W. Dow, Jr.
U.S. Army Corps of Engineers
Southern Virginia Area Office
P.O. Drawer B
Fort Eustis, Virginia 23604

RE: Contract DACA65-94-D-0067
Delivery Order 0013
Additional Data for Building 1081, Fort Story, Virginia
ETI Job No. 1395-V13

Dear Mr. Dow:

Environmental Technology of North America, Inc. (ETI) is pleased to provide additional data to help determine the extent of waste oil contamination at Fort Story's Building 1081. We have investigated the area where excavated soils are thought to have been used as backfill in the excavation created after the removal of a 10,000-gallon waste oil tank. ETI used Direct Push Technology (DPT), a quick and accurate sampling method, to collect continuous soil samples at four locations around the inside perimeter of the backfilled area and at one location in the center of the backfilled area (see Attachment 1). Each continuous soil sample was screened with a photoionization detector (PID) and a sample was collected from the backfill material exhibiting the highest PID reading per the state's request (Attachment 2). Samples were sent to an off-site Missouri River District U.S. Army Corps of Engineers (COE)-approved laboratory for total petroleum hydrocarbon (TPH) analysis. A composite sample from the five borings was collected and analyzed for TPH and disposal parameters. A composite of four grab samples from the soil stockpile was collected and analyzed for TPH and disposal parameters.

Following collection of all soil samples, a clean, dedicated ground water sampling probe was used to collect a ground water sample from the boring in the center of the backfilled tank pit. The sample was collected using a Teflon® bailer. The ground water sample was analyzed for TPH, benzene, toluene, ethyl benzene and xylenes (BTEX), perchloroethylene (PCE), and PCE breakdown components. The use of DPT methodology generated no well cuttings, which would have required additional sampling and costly disposal. Due to access problems (deep sand), DPT proved to be the most effective tool to complete the work.

The field investigation was conducted on January 26, 1995. Soil borings were advanced using the DPT rig and a 4-foot corer that collects the cores in an acetate sleeve. By observing the cores in the acetate sleeve, it was possible to differentiate between the backfill material (coarse white

2229 TOMLYNN STREET • RICHMOND, VIRGINIA 23230
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FAX 804-358-6868

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sand) and the native material (medium tan sand). PID readings were taken by slitting the sleeve lengthwise and moving the PID probe down the length of the core. The results for the PID screening are presented in Attachment 3.

The ground water sampling depth was selected based on observation of saturated soils in the soil cores between 10.5 feet and 12 feet below ground surface. The ground water sample was collected from the interval between 11.2 feet to 12.2 feet below ground surface at soil sampling location 5.

Analytical Results

Soil samples collected from the backfill material were analyzed for TPH volatiles and semivolatiles using United States Environmental Protection Agency (EPA) Method 5030/8015-Modified and Method 3550/8015-Modified. The composite soil samples were analyzed for TPH volatiles and semivolatiles and for the following disposal parameters:

Parameter	Method
BTEX	EPA Method 8020
IRC	Method SW 846 7.1 - 7.3
TCLP/RCRA Metals	EPA Method 1310
PCBs	EPA Method 8080
EOX (Total Organic Halides)	Dohrman
Paint Filter	EPA Method 9095

The ground water sample was analyzed for the following parameters:

Parameter	Method
TPH Volatiles	EPA Method 5030/8015
TPH Semivolatiles	EPA Method 3510/8015
BTEX	EPA Method 8020
PCE and breakdown components	EPA Method 8010

A copy of the laboratory report with the chain-of-custody form is included as Attachment 4. The analytical results are summarized in the Tables 2 and 3, which appear in Attachment 2.

Recommendations

Based on the visual inspection of the continuous soil cores, the soil removed from the tank pit (approximately 50 cubic yards) was not used as backfill. It was placed on two layers of polyethylene sheeting adjacent to the excavated tank pit and left uncovered. A composite sample of the excavated soil, which was collected at the time of excavation (September 28, 1992) by members of the Environmental Restoration Company (ERC), contained 12,173 milligrams per kilogram (mg/kg) TPH.

Concentrations of TPH in three samples collected from the bottom of the excavated tank pit by ERC on September 28, 1992, ranged from 62,823 mg/kg TPH to 36,353 mg/kg TPH.

ETI recommends:

- Removal and proper disposal of the soil stockpile;
- Excavation and proper disposal of all saturated soils in and around the tank pit;
- Staging of all unsaturated backfill material for reuse as backfill following excavation of the saturated soils; and
- Backfilling the excavation with clean backfill in accordance with the Contract.

At this time, there is not adequate information to determine the potential volume of saturated soil that will require removal. Therefore, there are two options:

1. Begin excavation of the saturated soil and continue excavation until the limits of the saturated soil are reached; or
2. Use the DPT rig to delineate the extent of saturated soils prior to excavation to obtain a volume estimate prior to beginning excavation.

The ground water sample analysis indicated elevated concentrations of TPH, PCE, and PCE breakdown products. Because another investigation is underway through the Baltimore District of the COE addressing chlorinated contaminants and TPH in the ground water, ETI recommends no action regarding these contaminants, pending completion of the Baltimore study.

If you have any questions concerning this report or the recommendations made, please contact me at (804) 358-5400.

Sincerely,

Dale E. Wright
Project Manager
DPT Program Manager

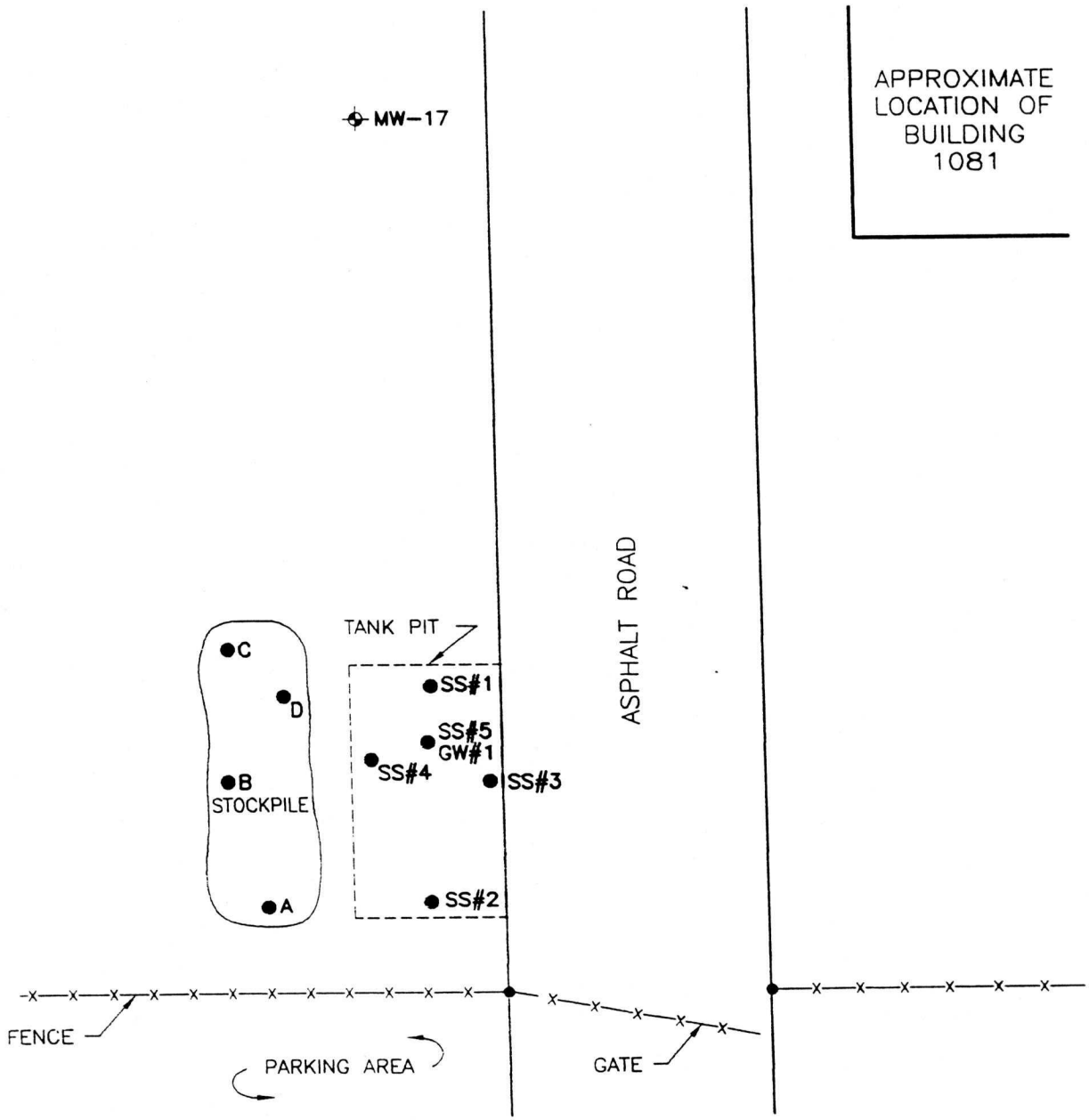
DEW/mtr
ed:vs

Attachments

I:\WP\COE\FTSTORY\DOW.V13

Attachment 1

Sample Locations



LEGEND

MW-17 — MONITORING WELL LOCATION AND DESIGNATION

SS#2 — SOIL SAMPLE LOCATION AND DESIGNATION

GRAPHIC SCALE

20 0 20 40

1" = 20'

PROJECT: FORT STORY, VIRGINIA BEACH, VIRGINIA		Environmental Technology of North America, Inc.		
PROJECT MANAGER: D.E.W.	PROJECT NO.: 1395-V13	FIGURE TITLE: SAMPLE LOCATIONS AT OLD TANK PIT NEAR BUILDING 1081		
DRAWN BY: C.B.W.	REVIEWED BY: B.F.H.	DATE: 2/20/95	SCALE: AS SHOWN	FIGURE NO.: 1

CADD FILE: FOR1395B.DWG

Attachment 2

Letter from VDEQ

PETER W. SCHMIDT
DIRECTOR

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

TIDEWATER REGIONAL OFFICE
287 INDEPENDENCE BOULEVARD
PEMBROKE TWO, SUITE 310
VIRGINIA BEACH, VIRGINIA 23462
(804) 552-1840
FAX (804) 552-1849 TDD # - RICHMOND (804) 762-4021

FRANCIS L. DANIEL
REGIONAL DIRECTOR

December 21, 1994

Commander
U.S. Army Transportation Center
Directorate of Public Works
Attn: ATZR-EHE, Stephen A. McCall
Chief, Environmental and Natural
Resources Division
Fort Eustis, Virginia 23604-5332

re: Facility/Location: Fort Story, Building 1081, 10,000 Gallon Waste Oil Underground Storage Tank (UST)
DEQ Tracking Number: PC 90-1092

Dear Sir:

Thank you for providing the Department of Environmental Quality (DEQ) with an Initial Abatement Measures and Site Check (IAM/SC) report for the former 10,000 gallon waste oil UST and the results of tank tightness testing for two 10,000 gallon heating oil USTs located at the above referenced site. The DEQ required no further action at this site in a letter dated August 15, 1994. However, based on the information presented in the IAM/SC report and the observation of stockpiled soil adjacent to the former waste oil UST we are re-opening this case and requesting additional assessments. According to the IAM/SC, petroleum contaminated soil containing very high levels of total petroleum hydrocarbons (up to 62,823 mg/kg) was placed back in the waste oil UST excavation pit. Please provide the following additional site check information to this office by February 27, 1995:

1. Perform five borings (hand auger borings are sufficient) in the backfill of the former waste oil tank location. One boring should be completed in the center of the backfill; the other four should be completed around the inside perimeter of the backfilled area. Collect at least one soil sample (where the heaviest contamination is noted) from each boring and analyze each sample for TPH.

2. Install a temporary monitoring well in the center boring location. Collect a ground water sample for analysis of TPH, BTEX, PCE and PCE breakdown components.

3. Collect a composite soil sample from the stockpiled soil. The soil sample should be analyzed for TPH and any parameters required by the Solid Waste Management Regulations, Disposal Criteria.

Once we have evaluated the additional site check information, you will be contacted if further assessments or remediation are required. The DEQ will not be requiring further assessments related to the two 10,000 gallon heating oil USTs.

If you have questions regarding this matter, please contact me at (804) 552-1157.

Sincerely,

Amy T. Webster
Geologist Senior
Ground Water Section

cc: DEQ-TRO-OE
file ref. PC 90-1092

Attachment 3

Tables

TABLE 1
PID Screening Results

Location	Sample Depth (ft)	PID Measurement (ppm)	Soil Type
SS-1*	0 to 5	<.5	Coarse white sand
	5 to 8	1.0 to 1.2	Coarse white sand
	8 to 9	12	Coarse white sand
	9 to 10.5	25	Medium tan sand
	10.5 to 12	42	Medium tan sand
SS-2**	0 to 6	<.5	Coarse white sand
	6 to 7	.6	Coarse white sand
	7 to 8	1.1	Coarse white sand
	8 to 9	9.0	Coarse white sand
	9 to 9.5	21.2	Coarse white sand
	9.5 to 12	70.1	Medium tan sand
SS-3***	0 to 6	<.5	Coarse white sand
	6 to 7	1.1	Coarse white sand
	7 to 7.5	12.7	Coarse white sand
	7.5 to 9	10.1	Medium tan sand
	9 to 11	19.2	Medium tan sand
	11 to 12	43.2	Medium tan sand
SS-4****	0 to 2	<.5	Coarse white sand
	2 to 3.5	.5	Coarse white sand
	3.5 to 4	.6	Medium tan sand
	4 to 6	<.5	Medium tan sand
	6 to 7	1.0	Medium tan sand
	7 to 8	1.3	Medium tan sand
	8 to 10	27.7	Medium tan sand
	10 to 12	53.3	Medium tan sand
SS-5*****	0 to 6	<.5	Coarse white sand
	6 to 7	1.7	Coarse white sand
	7 to 7.8	5.6	Coarse white sand
	7.8 to 9	22.4	Medium tan sand

*Soil sample #1 collected from backfill at the 8' to 9'interval.
**Soil sample #2 collected from backfill from the 8.5' to 9.5' interval.
***Soil sample #3 collected from backfill from the 6.5' to 7.5' interval.
****Soil Sample #4 collected from backfill from the 2.5' to 3.5' interval.
*****Soil sample #5 collected from backfill from the 7.0' to 7.8' interval.

TABLE 2

Analytical results from soil samples by sample location

	SS–1*	SS–2	SS–3	SS–4	SS–5	Comp. SS1–5	Comp. Soil Sk	Detection Limit & Units
Organic constituents								
Total Recoverable Petroleum Hydro–carbons: Diesel	600	1550	BDL	BDL	40.7		329	10 mg/kg 0.1 mg/kg 50 mg/kg
Total Recoverable Petroleum Hydro–carbons: Gas	10	12	BDL	BDL	11		BDL	2.5 mg/kg 5 mg/kg 0.1 mg/kg
Benzene						BDL	BDL	100 ug/kg 2 ug/kg
Toulene						140	18	100 ug/kg 2 ug/kg
Ethylbenzene						100	BDL	100 ug/kg 2 ug/kg
M & P Xylene						130	5	200 ug/kg 4 ug/kg
O Xylene						190	3	100 ug/kg 2 ug/kg
Total Xylene						320	8	300 ug/kg 6 ug/kg
Polychlorinated Biphenyls						BDL	BDL	0.33 ug/kg 3.3 ug/kg
H2S						BDL	BDL	0.125 mg/kg
CN						BDL	BDL	0.125 mg/kg
Inorganic constituents (TCLP Metals)								
Arsenic						BDL	BDL	0.1 mg/L
Barium						1.10	0.679	0.01 mg/L
Cadmium						BDL	BDL	0.01 mg/L
Chromium						BDL	BDL	0.01 mg/L
Lead						BDL	BDL	0.05 mg/L
Mercury						BDL	BDL	0.0005 mg/L
Selenium						BDL	BDL	0.01 mg/L
Wet chemistry results								
Corrosivity						7.48	7.24	pH units
Extractable Organic Halogens						0.21	0.27	0.1 mg/kg
Ignitability						>70	>70	Deg. C
Paint Filter						Pass	Pass	Pass/Fail

*SS–1, 2, 3, 4, 5 are soil samples collected at locations shown on Figure 1

Comp. SS 1–5 is a composite sample from soil sample locations 1–5

Comp. Soil Sk is a composite sample from the soil stock pile

TABLE 3
Analytical Results from Water Samples

	GW–1*	Trip Blank	Field Blank	Detection Limit & Units
Organic constituents Total Recoverable Petroleum Hydro–carbons	180			40 mg/L
Total Recoverable Petroleum Hydro–carbons: Gas	180	BDL	BDL	100 mg/L 0.10 mg/L
Benzene	BLD			1000 ug/L
Toulene	11,000			1000 ug/L
Ethylbenzene	1200			1000 ug/L
M & P Xylene	3700			2000 ug/L
O Xylene	3500			1000 ug/L
Total Xylene	7200			3000 ug/L
1,1–Dichlorethene	BDL			250 ug/L
Tetrachloroethylene	2700			250 ug/L
Trichloroethene	8800			250 ug/L
Vinyl Chloride	BDL			250 ug/L
cis 1,2–Dichloroethene	5200			250 ug/L
trans–1,2–Dichloroethene	BDL			250 ug/L

*GW–1 groundwater sample collected near the center of the tank pit

Appendix H
Background Soils Data

Remedial Investigation Report
FTA, LARC 60, and Auto Craft Sites
Fort Story, Virginia

FTA SURFACE SOIL AND SEDIMENT COMPARISON

Parameters	Surface Soil Results (mg/kg)		Sediment Results (mg/kg)		Fort Story Background 95th UCL [1]	USGS Regional Soils Data [2]	
	Surface Soil Range	Mean	Sediment Range	Mean		Observed Range	Mean
Aluminum	420 – 980	676	160 – 7,600	2,120	Not analyzed	7,000 – > 100,000	33,000
Arsenic	1.2 – 1.6	1.3	2.5	1.1	2.1	< 0.2 – 73	5.4
Barium	3.9 – 12	8.4	2.4 – 110	30.6	5	15 – 1,000	300
Calcium	71 – 370	153	64 – 120	95	Not analyzed	< 100 – 160,000	3,200
Chromium	1.7 – 5.8	3.1	21	5.7	2.8	1 – 100	36
Cobalt	Not detected	– –	2.6	1.1	Not analyzed	< 3 – 70	7
Copper	3.2 – 13	5.9	26	7.6	1.4	< 1 – 150	14
Iron	1,200 – 5,400	2,700	230 – 17,000	4,488	Not analyzed	100 – > 100,000	15,000
Lead	7 – 33	24	4.3 – 210	59.1	7.1	< 7 – 300	14
Magnesium	62 – 190	112	960	262	Not analyzed	50 – 50,000	2,300
Manganese	10 – 34	24	1.7 – 42	11.9	Not analyzed	< 2 – 7,000	290
Mercury	0.011 – 0.013	0.008	0.017 – 0.051	0.045	0.01	0.01 – 0.34	0.096
Nickel	Not detected	– –	9.4	4.1	2	< 3 – 700	13
Potassium	160	74	260	110	Not analyzed	50 – 37,000	7,400
Sodium	Not detected	– –	87 – 180	80	Not analyzed	< 200 – 15,000	2,600
Thallium	Not detected	– –	1.4	0.8	Not analyzed	– –	– –
Vanadium	1.8 – 3.7	2.7	2 – 18	5	Not analyzed	< 5 – 300	46
Zinc	14 – 22	18	6 – 76	21	5.7	< 5 – 400	36

FTA SURFACE SOIL RESULTS

Parameters	Surface Soil Results (mg/kg)					Arithmetic Mean
Aluminum	420.00	850.00	980.00	490.00	640.00	676
Arsenic	0.55	1.50	1.60	1.20	1.40	1.25
Barium	3.90	9.00	12.00	8.00	9.20	8.42
Calcium	71.00	150.00	370.00	26.00	150.00	153.40
Chromium	1.70	2.30	3.10	5.80	2.50	3.08
Copper	3.50	5.70	4.30	13.00	3.20	5.94
Iron	1200.00	3200.00	2100.00	5400.00	1600.00	2700.00
Lead	7.00	33.00	33.00	15.00	31.00	23.80
Magnesium	88.00	100.00	190.00	62.00	120.00	112.00
Manganese	10.00	34.00	25.00	32.00	19.00	24.00
Mercury	0.0055	0.0055	0.0110	0.0050	0.0130	0.0080
Potassium	55.00	55.00	160.00	50.00	50.00	74.00
Vanadium	1.80	3.10	3.70	1.80	3.10	2.70
Zinc	18.00	14.00	22.00	15.00	22.00	18.20

FTA SEDIMENT RESULTS

Parameters	Sediment Results (mg/kg)					Arithmetic Mean
Aluminum	7600.00	560.00	160.00	160.00		2120.00
Arsenic	2.50	0.70	0.55	0.55		1.08
Barium	110.00	6.50	3.60	2.40		30.63
Calcium	120.00	120.00	64.00	77.00		95.25
Chromium	21.00	0.70	0.55	0.55		5.70
Cobalt	2.60	0.70	0.55	0.55		1.10
Copper	26.00	1.80	1.35	1.35		7.63
Iron	17000.00	440.00	230.00	280.00		4487.50
Lead	210.00	15.00	7.20	4.30		59.13
Magnesium	960.00	35.50	26.50	27.00		262.25
Manganese	42.00	0.70	3.10	1.70		11.88
Mercury	0.0510	0.0170	0.0550	0.0550		0.045
Nickel	9.40	2.85	2.15	2.15		4.14
Potassium	260.00	70.00	55.00	55.00		110.00
Sodium	180.00	87.00	26.50	27.00		80.13
Thallium	0.70	1.40	0.55	0.55		0.80
Vanadium	18.00	2.00	0.55	0.55		5.28
Zinc	76.00	6.00	1.05	1.10		21.04

LARC 60 SURFACE SOIL AND SEDIMENT COMPARISON

Parameters	Surface Soil Results (mg/kg)		Sediment Results (mg/kg)		Fort Story Background 95th UCL [1]	USGS Regional Soils Data [2]	
	Surface Soil Range	Mean	Sediment Range	Mean		Observed Range	Mean
Aluminum	250 – 2,700	814	310 – 650	2,120	Not analyzed	7,000 – > 100,000	33,000
Arsenic	1.1	0.6	Not detected	--	2.1	< 0.2 – 73	5.4
Barium	1.8 – 19	6.9	1.4 – 2.7	2.1	5	15 – 1,000	300
Calcium	56 – 980	266	53 – 210	132	Not analyzed	< 100 – 160,000	3,200
Chromium	1.7 – 4.3	2.8	1.6 – 2.5	2.1	2.8	1 – 100	36
Cobalt	2.3	0.86	Not detected	--	Not analyzed	< 3 – 70	7
Copper	2.5 – 41	13.2	3.8 – 9	6.4	1.4	< 1 – 150	14
Iron	400 – 1,100	770	310 – 940	675	Not analyzed	100 – > 100,000	15,000
Lead	3.1 – 12	8	8.2 – 14	11.1	7.1	< 7 – 300	14
Magnesium	77 – 1,400	341	110 – 250	180	Not analyzed	50 – 50,000	2,300
Manganese	2.4 – 120	29.4	3.4 – 6.9	5.2	Not analyzed	< 2 – 7,000	290
Mercury	Not detected	--	Not detected	--	0.01	0.01 – 0.34	0.096
Nickel	Not detected	--	Not detected	--	2	< 3 – 700	13
Potassium	1,200	280	Not detected	--	Not analyzed	50 – 37,000	7,400
Sodium	Not detected	--	70	51	Not analyzed	< 200 – 15,000	2,600
Thallium	Not detected	--	Not detected	--	Not analyzed	--	--
Vanadium	1.2 – 9.2	3.1	1.3 – 2.7	2	Not analyzed	< 5 – 300	46
Zinc	3.8 – 33	16.2	11 – 30	21	5.7	< 5 – 400	36

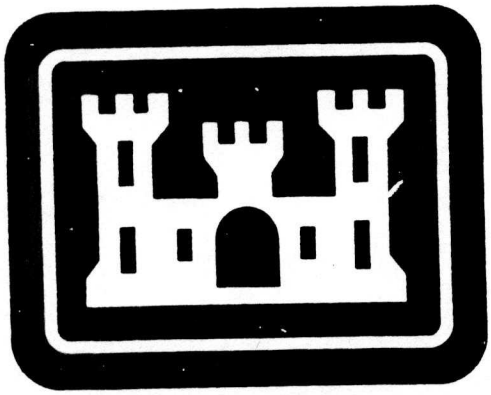
LARC 60 SURFACE SOIL RESULTS

Parameters	Surface Soil Results (mg/kg)					Arithmetic Mean
Aluminum	2700.00	310.00	440.00	250.00	370.00	814
Arsenic	1.10	0.50	0.50	0.50	0.50	0.62
Barium	19.00	3.90	3.70	1.80	5.90	6.86
Calcium	980.00	160.00	110.00	25.50	56.00	266.30
Chromium	4.30	2.40	2.30	1.70	3.20	2.78
Cobalt	2.30	0.50	0.50	0.50	0.50	0.86
Copper	9.10	41.00	1.30	2.50	12.00	13.18
Iron	510.00	1000.00	1100.00	400.00	840.00	770.00
Lead	7.60	11.00	6.40	3.10	12.00	8.02
Magnesium	1400.00	94.00	110.00	25.50	77.00	341.30
Manganese	120.00	12.00	7.20	2.40	5.60	29.44
Potassium	1200.00	50.00	50.00	50.00	50.00	280.00
Vanadium	9.20	1.60	1.90	1.20	1.80	3.14
Zinc	26.00	33.00	6.40	3.80	12.00	16.24

LARC 60 SEDIMENT RESULTS

Parameters	Sediment Results (mg/kg)			Arithmetic Mean
Aluminum	310.00	650.00		480.00
Barium	1.40	2.70		2.05
Calcium	53.00	210.00		131.50
Chromium	1.60	2.50		2.05
Copper	3.80	9.00		6.40
Iron	410.00	940.00		675.00
Lead	8.20	14.00		11.10
Magnesium	110.00	250.00		180.00
Manganese	3.40	6.90		5.15
Sodium	32.00	70.00		51.00
Vanadium	1.30	2.70		2.00
Zinc	11.00	30.00		20.50

5
220



U.S. Army Corps of Engineers
Missouri River Division
Omaha District

Final Site Investigation Report for the

Fort Story Preliminary Assessment/Site Investigation and Fort Story NIKE Preliminary Assessment/Site Investigation

Fort Story, Virginia
January 1992

JMM James M. Montgomery

and the appropriate site number. For example, the generic designation for a soil sample collected from a monitoring well is as follows: S(site number)MW(associated number)(sample depth), e.g., S12MW104(0).

2.1.2 Identification of Trigger Levels

The analytical results from the Fort Story PA/SI sites and NIKE PA/SI field investigations were utilized to evaluate site specific contamination and the need for further investigations at the sites. To provide a basis for evaluating the data, media-specific trigger levels were developed for each of the analytes detected. The trigger levels are based on statistically-significant site background data and regulatory standards promulgated by the EPA or the Commonwealth of Virginia for the chemicals of concern.

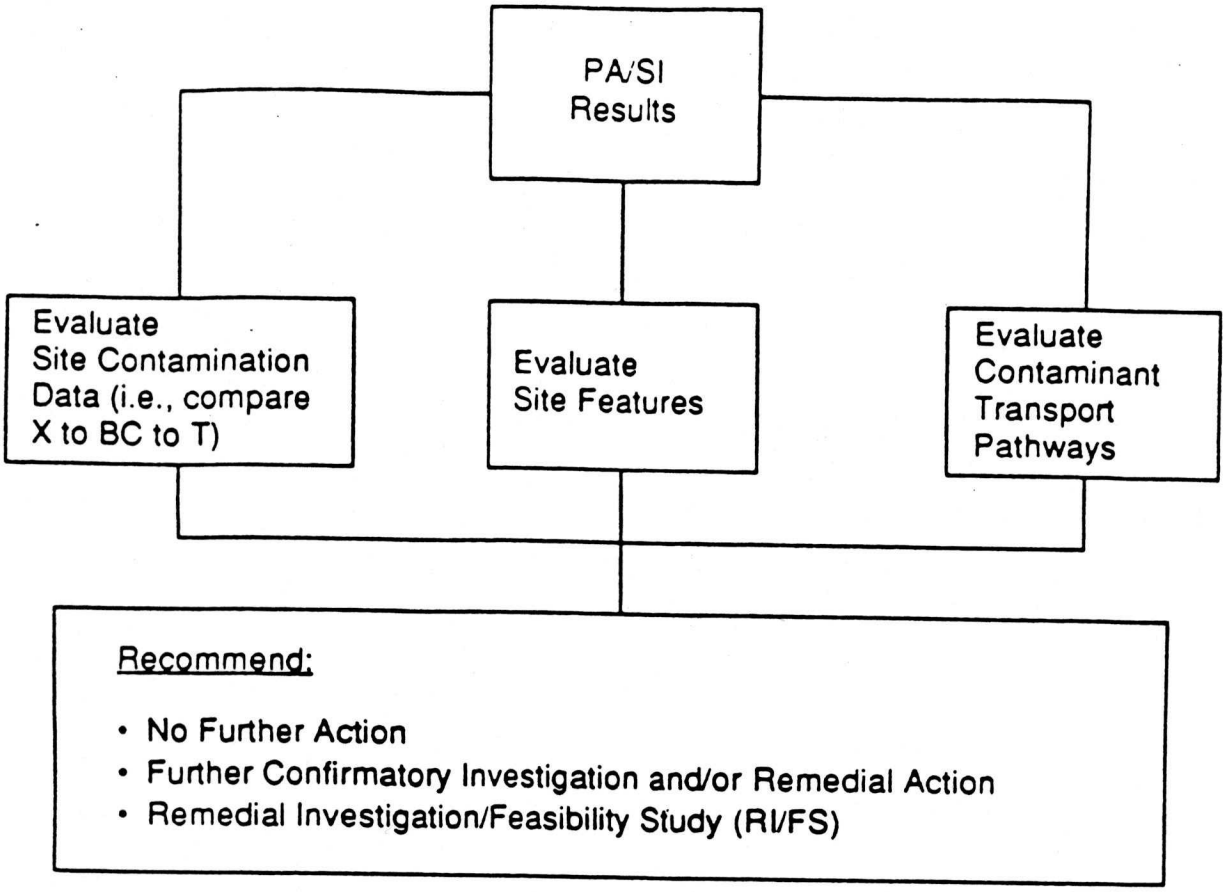
The selection of the type of further investigation that is appropriate for a given PA/SI or NIKE PA/SI site is based on comparison of analytical results to trigger levels for compounds of concern, evaluation of contaminant transport pathways for compounds of concern and consideration of pertinent site features. The assessment of site contamination data involved comparison of contaminant concentrations measured in site media to appropriate background concentrations and/or trigger levels. This interpretation is not strictly quantitative, however. For example, if one contaminant is detected at a level above the trigger level in the groundwater from an isolated monitoring well, this factor would not necessarily constitute recommending further investigative activity. However, if the presence of this contaminant in the groundwater was indicative of the presence of a plume or a source at the site, further study would be recommended. Other data, such as site features and contaminant transport pathways, are relevant for consideration in this context and in those instances where multiple site contaminants are present in site media at levels above background but below trigger levels. Figure 2-1 is a matrix showing the decision and recommendation process for PA/SI sites. The possible additional site activities presented in order of increasing levels of effort required are:

- **No Further Action:** This option may be recommended for a PA/SI site when analyte concentrations in site environmental media are below the background concentrations. In this instance, trace levels of environmental contamination imply that any potential contaminant transport at or near the site would be insignificant.

- **Further Confirmatory Investigation and/or Removal Action:** This option may be recommended for a PA/SI site when concentrations of a limited number of compounds of concern in site environmental media are above the trigger levels. Additional confirmatory investigation might focus on particular media, compounds of concern or site locations in an attempt to verify existing data. Removal action denotes mitigation of possibly contaminated material or media present at a PA/SI site to reduce or eliminate potential contaminant transport.

- **Remedial Investigation/Feasibility Study (RI/FS):** This option may be recommended for a PA/SI site when concentrations of many compounds of concern in site environmental media are above the corresponding trigger levels or when data possibly indicate the presence of a contaminated groundwater plume. An RI/FS involves focused additional investigation at a site to confirm source areas and delineate the nature and extent of environmental contamination. An RI/FS provides additional data necessary for estimating exposure concentrations and dosages and predicting health or environmental risks associated with exposure.

The trigger levels represent a mechanism to screen each of the sites for the purpose of determining whether there is sufficient cause to warrant further inquiry into site conditions. As such, they are generally not intended to be action levels in a regulatory sense.



X = Detected Concentration of Analyte
BC = Background Concentration of Analyte
T = Trigger Level Concentration of Analyte

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Site Evaluation and Recommendation Decision Matrix

Figure 2-1

The following sections discuss how the trigger levels are developed.

2.1.2.1 Soil. To date, regulatory standards have not been promulgated by federal or state authorities for most of the soil contaminants detected at Fort Story. As such, TFH and PCBs represent the only analytes that have regulatory-based trigger levels. The trigger levels for metals in soil were derived from a statistical analysis of the background boring results. No trigger level has been set for VOCs, BNAs or cyanide. DDT, DDD, DDE and Chlordane, while not having any set regulatory levels for soil, represent particular analytes that were widely used throughout the Installation in the past and warrant special consideration, as discussed below.

Total Fuel Hydrocarbons (TFH). Contaminant-specific guidelines for hydrocarbons in soil are provided in *Underground Storage Tanks; Technical Standards and Corrective Action Requirements VR-680-13-02* (Commonwealth of Virginia, 1989). Based on these regulations, any contaminated soil exhibiting a total fuel hydrocarbon level in excess of 100 parts per million (ppm) or 100 milligrams per kilogram (mg/kg) must be disposed of in accordance with state and federal guidelines. Although this criterion is disposal related, this concentration level (100 mg/kg) was adopted for this evaluation as a regulatory-based trigger level for TFH in soil.

Polychlorinated Biphenyls (PCBs). The EPA regulates PCBs under the Toxic Substance Control Act (TSCA). No regulatory requirements exist for PCB cleanup with the exception of the requirement for timely cleanup. However, EPA has published a nationwide TSCA PCB spill clean-up policy stipulating clean-up levels for PCB discharges to the environment (40 CFR Part 761) (EPA, 1987).

Since the sites at Fort Story are not considered by the Commonwealth of Virginia Department of Waste Management to be restricted access areas, the relevant section of the policy serves as the basis for the trigger level for PCBs. The TSCA policy for defining "clean fill" is less than 1 ppm by weight. JMM has adopted this standard as the appropriate trigger level for PCBs in soil at Fort Story PA/SI and NIKE PA/SI sites.

DDT, DDD, DDE and Chlordane. Review of previous investigations at Fort Story suggests that these compounds were used widely throughout the Installation in the past. They have been detected at low levels at numerous locations (USAEHA, 1987; ESE, 1988). JMM also determined through contacts with Commonwealth of Virginia employees associated with Virginia Polytechnic Institute and State University and Consolidated Laboratory Services, Pesticide Lab, respectively, that the levels of DDT and its metabolites, DDD and DDE along with Chlordane present at the sampling sites at Fort Story were not unusual compared to other areas in Virginia, given the extensive use of DDT and Chlordane at the installation in the past. Both contacts considered JMM's detected values to be within a reasonable range for concentrations of DDT and its metabolites, as well as Chlordane, within the soils in the area of the project sites (Personal Communication, Young, Chase, 1991). Subsequently, no trigger level has been set for DDT and its metabolites, along with Chlordane, as all concentrations are considered to be within expected background ranges (Personal Communication, Young, Chase, 1991).

Cyanide. Cyanide was detected in the analysis of soil at one site at Fort Story. Because of the highly toxic nature of this compound, further investigation into the nature of this compound was conducted.

Cyanide compounds all share the common ^-CN group. The simplest form of cyanide is HCN. The ^-CN group can also form simple salts with such cations such as potassium and sodium. More complex organic forms include the cyanates ^-OCN, and the thiocyanates ^-SCN. Metal cyanide complexes, ferricyanides, and ferrocyanides are also common.

Hydrogen cyanide and the simple salt forms (free cyanide) are highly toxic. In contrast, the complexed cyanide compounds appear to exhibit low toxicity. Toxicity of ferrocyanide complexes is related to the degree to which dissociation occurs and free cyanide is available. There is no evidence of cyanide accumulation in mammals or aquatic organisms.

A related problem in assessing the toxicity of cyanide at these sites concerns the methods by which the chemicals are analyzed. There are a number of methods available. However, there is considerable uncertainty concerning the form or species of cyanide that is actually being measured. Because different forms of cyanide differ in toxicity, there is a need to define better the methods used. When a priority pollutant analysis is done, only total cyanide analysis is required. This is the case at Fort Story.

Iron cyanide complexes are generated in the manufactured gas and coal industry through the process by which the produced gas is cleaned. Cyanide is commonly present in areas where coal is stored, and used to be a common ingredient in rodenticides. Cyanide was found in the soil at Site 2, Landfill 2, at a concentration of 2 mg/kg in a surface soil sample. It is possible that the cyanide found in the soil sample was from either of these sources if they were dumped in the landfill.

Cyanide has also been found in uncontaminated soils in some areas throughout the United States - levels for cyanide reported as indicative of uncontaminated conditions are (Kelly, 1979):

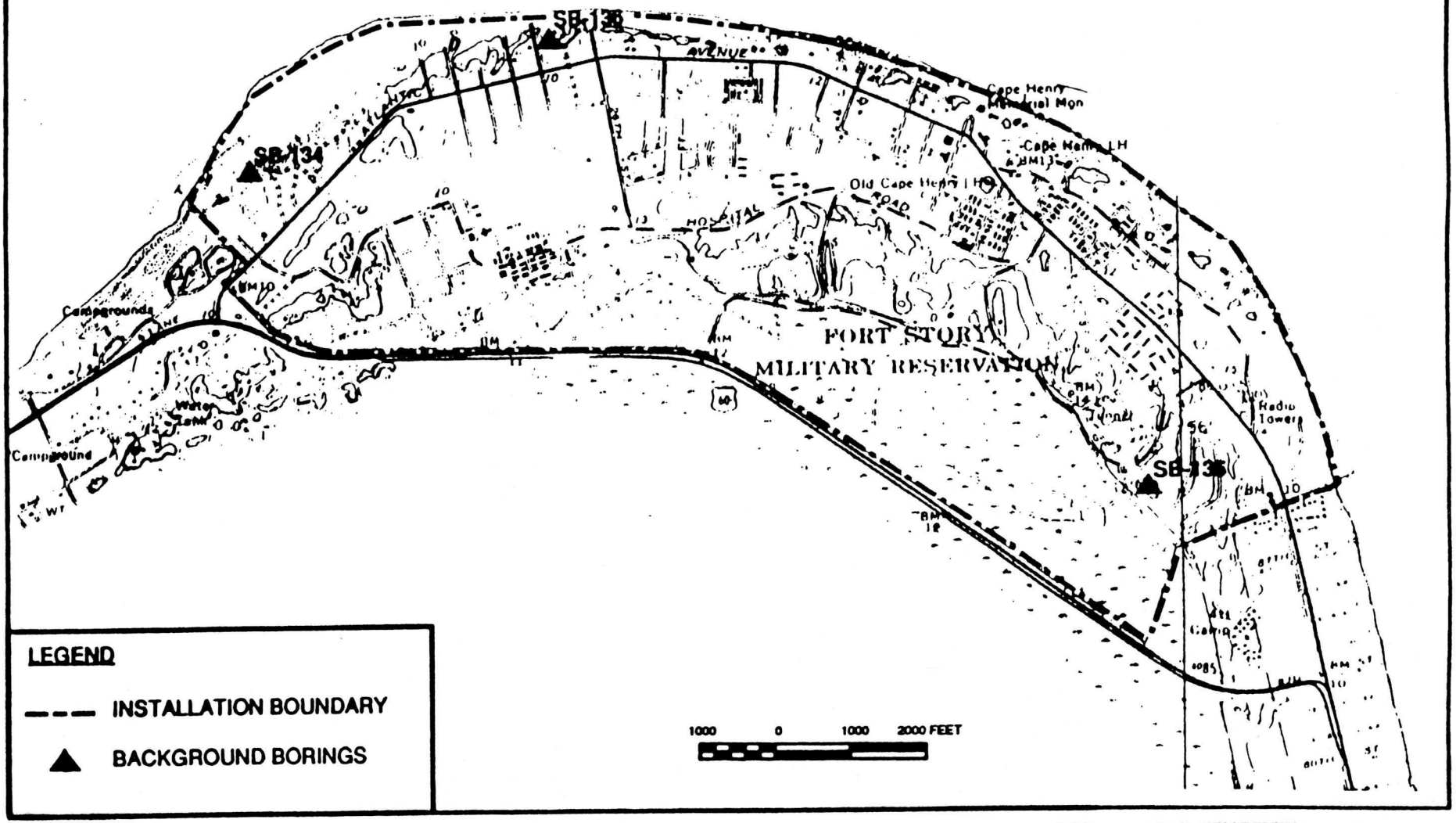
- Free cyanide, 0 - 1 mg/kg
- Total cyanide, 0 - 5 mg/kg
- Ferricyanide, 0 - 100 mg/kg
- Thiocyanide, 0 - 10 mg/kg

Several countries have developed guidelines for assessment and/or clean-up of contaminated soil. These guidelines consider background for total cyanide to be equal to or less than 1 mg/kg for total free cyanide and equal to or less than 5 mg/kg for total complex cyanide [(Moen, J.E.T., J.P. Cornet and C.W.A. Evers, 1985) (Quebec, Ministry of the Environment of, 1986) (Interdepartmental Committee on the Redevelopment of Contaminated Land (ICRCL), 1983a.) (Guidance on the Assessment and Redevelopment of Contaminated Land, ICRCL 59/83.) (CDEP/EPTS, Romney House, 43 Marsham Street, London, SWIP 3PY, UK, CDEP/EPTS, 1983b.); Notes on the Redevelopment of Gas Works Sites, ICRCL 18/79, 1983c.)].

The exact form of cyanide at Site 2 is unknown. It is possible that the cyanide is in a metal complex form and therefore less toxic than free cyanide. Despite the unknown form, the concentrations of cyanide found are within the range of total cyanide considered representative of uncontaminated soils. The concentrations identified on-site are sufficiently low to not be a human health concern. Regardless of the source, cyanide at the site does not require further evaluation.

Background Borings. Background borings were drilled and sampled during the project to determine the background levels of analytes at Fort Story. Figure 2-2 shows the location of background borings sampled for the Fort Story investigation. These include borings SB-134, SB-135 and SB-136. Soil boring SB-134 was located near the eastern perimeter of Fort Story and is representative of conditions in the sand flat area. Soil boring SB-135 was located adjacent to the western boundary of Fort Story and is representative of conditions in the central sand ridge area. Located in the north-central perimeter of Fort Story, SB-136 is representative of conditions in the coastal dune complex.

Two soil samples were collected from each background boring for analytical characterization. Seven analytical samples, including one field duplicate sample, were collected from the



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Background Boring Locations
Ft. Story, VA

Figure 2-2

background borings. The analytical soil samples were collected from the ground surface and at the total depth of each boring. Table 2-6 summarizes the soil sampling depths for the samples collected from the three background borings. The laboratory analyses performed on each of the analytical soil samples collected included pesticides/PCBs, VOCs, BNAs, total metals, EP Toxicity metals and total solids. Results of these analyses are presented in the *FTSFARD*.

Statistical Evaluation of Background Soil Analytical Data. A statistical evaluation was performed on the analytical data for metals obtained from the Fort Story background boring analytical data. The purpose of the evaluation was to develop a single background concentration for each of the metal analytes found in native Fort Story area soils, i.e., areas where anthropogenic activities were not expected to have occurred. These single background concentration values were set equal to the upper one-sided 95 percent confidence limit of the mean concentration of each metal, using a standard statistical procedure described in a standard engineering statistics textbook (Devore, 1982).

This statistical method is based on the assumption that the metals concentrations are distributed according to the T-distribution, which is a distribution for a limited number of sample sizes, such as the background boring metals concentrations for Fort Story. The method involves estimating the upper limit of the range within which the true mean soil concentration of a metal at Fort Story lies, based upon the characteristics of data from background borings and a confidence criterion. In this case, that upper limit is called the upper one-sided (1-α) percent confidence limit ($\mu_{u,\alpha}$) where α represents the confidence criterion. For this analysis, α is set equal to 0.05 for a 95 percent confidence limit.

The value of the upper one-sided confidence limit of the mean is given by:

$$\mu_{u\alpha} = \bar{x} + t_{\alpha/2,\, df} \left(\frac{S}{\sqrt{n}} \right) \qquad (1)$$

where: $\bar{x}$ is the computed mean concentration in soil background samples; the quantity ($t_{\alpha/2}$,df) is the "t value" (obtained from standard statistics tables) for a given confidence criterion (α) and number of degrees of freedom (df), which is defined as the sample size (n) minus one; and S is the standard deviation of the set of concentration data.

At Fort Story, seven background soil samples were analyzed for metals. Therefore, for a 95 percent confidence limit (α = 0.05) and seven data points (n = 7, d.f. = 6), Equation (1) becomes:

$$\mu_{u,\,0.05} = \bar{x} + 2.447 \left(\frac{S}{\sqrt{7}} \right), \text{ or}$$

$$\mu_{u,\,0.05} = \bar{x} + 0.9249\,(S) \qquad (2)$$

Thus, the upper confidence limit values for metals at Fort Story were calculated using Equation (2) and the mean ($\bar{x}$) and standard deviation (S) of the set of concentrations obtained for each metal. In order to calculate the mean and standard deviation for each metal, a value had to be assigned to samples that had no detectable concentration (ND) to include their occurrence in the statistical evaluation. One method is to assign ND concentrations a value equal to the detection limit (DL) divided by two (DL/2). This method assumes that the data below the detection limit are uniformly distributed; i.e., every value between zero and the detection limit has an equal probability of occurrence. Hornung and Reed of the National Institute for Occupational Safety and Health (NIOSH) present another approach to estimating ND values in which they assume that the ND

SOIL SAMPLING FORM

1. Date/Time 3/13/95 Sample No. S SB06-003-01
2. Location LARC Pad
3. Previous Sample ~~SS~~ SB06-006(600)-45
4. Sampler WJL
5. Others SAB
6. Organic Vapor Detector FEL No. Micro Tip, Reading 0ppm
7. Weather: Wind 10mph E, Precipitation 0, Air Temperature 60°F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 0-1 feet of sand below pad
10. Sampling Method (ss, tr, (au)) _____
11. Presampling sampler decon method (lab/(field)) _____
12. Presample Equipment Blank taken (y/(n)) _____
13. Equipment blank no. N/A
14. Sample type (composite/voc) both
15. Comments _____

16. Reviewed by: AKP Date/Time 3/15/95 1400

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 3/13/95 ~~13:30~~ 14:30 Sample No. SB06-009-01 S
2. Location LARC Pad
3. Previous Sample SB06-008-45
4. Sampler DJL
5. Others SAD
6. Organic Vapor Detector FEL No. Micro-Tip, Reading 0 ppm
7. Weather: Wind 10-15 E, Precipitation 0, Air Temperature 70°F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 0-1 feet of sand below concrete pad
10. Sampling Method (ss, tr, (au)) _____
11. Presampling sampler decon method (lab/(field)) _____
12. Presample Equipment Blank taken (y/(n)) _____
13. Equipment blank no. N/A
14. Sample type (composite/voc) both
15. Comments _____

16. Reviewed by: AWP Date/Time 3/15/95 1400

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 3/13/95 15:30 Sample No. SB06-010-01S
2. Location LARC Pad
3. Previous Sample SB06-009-45
4. Sampler BJL
5. Others SAB
6. Organic Vapor Detector FEL No. Microtip, Reading 0ppm
7. Weather: Wind 10mph E, Precipitation 0, Air Temperature 70°F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 0-1 feet of sand below pad
10. Sampling Method (ss, tr, (au)) _____
11. Presampling sampler decon method (lab/(field)) _____
12. Presample Equipment Blank taken ((y)/n) _____
13. Equipment blank no. N/A
14. Sample type (composite/voc) both
15. Comments _____

16. Reviewed by: AKP Date/Time 3/15/95 1400

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/13/95 1045 Sample No. SS06-011-01
2. Location Sandbox
3. Previous Sample SS06-005-01
4. Sampler Tony Pace
5. Others Stephanie Bishop
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 10 mph, Precipitation _____, Air Temperature 28°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/(field)) Same as SS06-004-01
12. Presample Equipment Blank taken (y/n) _____
13. Equipment blank no. _____
14. Sample type (composite/voc) Same as SS06-004-01
15. Comments Tan sand

16. Reviewed by: AKP Date/Time 2/13/95 1720

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/13/95 1050 Sample No. SS06-012-01
2. Location Sandbox
3. Previous Sample SS06-011-01
4. Sampler Tony Pece
5. Others Stephanie Bishop
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 10 mph, Precipitation ____, Air Temperature 28°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/(field)) Same as SS06-004-01
12. Presample Equipment Blank taken (y/(n))
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS06-004-01
15. Comments Tan Sand
16. Reviewed by: AKP Date/Time 2/13/95 1720

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/13/95 1100 Sample No. SS06-013-01
2. Location Sandbox
3. Previous Sample SS06-012-01
4. Sampler Tony Pace
5. Others Stephanie Bishop
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 10 mph, Precipitation —, Air Temperature 30°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/(field)) Same as SS06-004-01
12. Presample Equipment Blank taken (y/(n))
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS06-004-01
15. Comments Tan Sand
16. Reviewed by: AHP Date/Time 2/13/95 1720

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/13/95 1105 Sample No. SS06-014-01
2. Location Sandbox
3. Previous Sample SS06-013-01
4. Sampler Tony Pace
5. Others Stephanie Bishop
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 10 mph, Precipitation —, Air Temperature 30°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/(field)) Same as SS06-004-01
12. Presample Equipment Blank taken (y/(n)) —
13. Equipment blank no. —
14. Sample type (composite/voc) Same as SS06-004-01
15. Comments Tan sand

16. Reviewed by: AVP Date/Time 2/13/95 1720

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/14/95 1400 Sample No. SS06-015-01
2. Location LARC Sand-pit
3. Previous Sample N/A (First After Lunch)
4. Sampler SAB
5. Others SJBishop
6. Organic Vapor Detector FEL No. M'Tip HL-200 Reading Oppm
7. Weather: Wind 10-15, Precipitation N/A, Air Temperature 35°F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 0-1 Foot
10. Sampling Method (ss, tr, (au)) _____
11. Presampling sampler decon method (lab/(field)) _____
12. Presample Equipment Blank taken (y/(n)) _____
13. Equipment blank no. _____
14. Sample type (composite/voc) Both
15. Comments _____

16. Reviewed by: AVP Date/Time 2/15/95 0900

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/13/95 1135 Sample No. SS06-016-01
2. Location Sandbox
3. Previous Sample SS06-014-01
4. Sampler Tony Pace
5. Others Stephanie Bishop
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 10 mph, Precipitation —, Air Temperature 30°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/field) Same as SS06-004-01
12. Presample Equipment Blank taken (y/n) —
13. Equipment blank no. —
14. Sample type (composite/voc) Same as SS06-004-01
15. Comments Tan sand
16. Reviewed by: AVP Date/Time 2/13/95 1720

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/13/95 1150 Sample No. SS06-017-01
2. Location Sandbox
3. Previous Sample SS06-016-01
4. Sampler Tony Pace
5. Others Stephanie Bishop
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 10 mph, Precipitation None, Air Temperature 30°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/(field)) Same as SS06-004-01
12. Presample Equipment Blank taken (y/(n))
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS06-004-01
15. Comments Tan Sand
16. Reviewed by: AWP Date/Time 2/13/95 1720

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/13/95 1205 Sample No. SS06-018-01
2. Location Sandbox
3. Previous Sample SS06-017-01
4. Sampler Tony Pace
5. Others Stephanie Bishop
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 10 mph, Precipitation None, Air Temperature 30°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/~~field~~) Same as SS06-004-01
12. Presample Equipment Blank taken (y/n) n
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS06-004-01
15. Comments TAN sand
16. Reviewed by: AKP Date/Time 2/13/95 1720

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/14/95 ~~1445~~ 1430 Sample No. SB06-01-01
2. Location LARC Sandbox
3. Previous Sample SB06-015-01
4. Sampler SABailey
5. Others SJ Bishop
6. Organic Vapor Detector FEL No. MiniRAE HL-200, Reading ~~103 ppm~~ 0 ppm
7. Weather: Wind 10-15, Precipitation N/A, Air Temperature 33°
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 0-1 Foot
10. Sampling Method (ss, tr, (au)) _____
11. Presampling sampler decon method (lab/(field)) _____
12. Presample Equipment Blank taken (y/(n)) _____
13. Equipment blank no. N/A
14. Sample type (composite/voc) Both
15. Comments _____

→ SB06-910-01 is dupe of this Sample ←

16. Reviewed by: AVP Date/Time 2/15/95 0900

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/14/95 1445 Sample No. SB06-019-01 S 020
2. Location LARC Sandbox
3. Previous Sample SB06-019-01
4. Sampler SABailey
5. Others SJBishop
6. Organic Vapor Detector FEL No. MiniRae HL-200, Reading 0ppm
7. Weather: Wind 10-15mph, Precipitation _____, Air Temperature 35°F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 0-1 Foot
10. Sampling Method (ss, tr, (au)) _____
11. Presampling sampler decon method (lab/(field)) _____
12. Presample Equipment Blank taken (y/(n)) _____
13. Equipment blank no. N/A
14. Sample type (composite/voc) Both
15. Comments _____

16. Reviewed by: AMP Date/Time 2/15/95 0900

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 3/14/95 15:20 Sample No. SS06-021-01
2. Location LARC
3. Previous Sample SB06-023-23
4. Sampler BJL
5. Others SAB
6. Organic Vapor Detector FEL No. Micro Tip, Reading Oppm
7. Weather: Wind CA/m, Precipitation 0, Air Temperature 70°F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 0-1' BGL
10. Sampling Method (ss, tr, au) (au)
11. Presampling sampler decon method (lab/field) (field)
12. Presample Equipment Blank taken (y/n) (n)
13. Equipment blank no. N/A
14. Sample type (composite/voc) both
15. Comments _____

16. Reviewed by: AWP Date/Time 3/15/95 1400

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 3/14/95 14:15 Sample No. SB06-022-01 S
2. Location LARC
3. Previous Sample SB06-019-4S
4. Sampler BJL
5. Others SAD
6. Organic Vapor Detector FEL No. Micro Tip, Reading 0 ppm
7. Weather: Wind CA/M, Precipitation 0, Air Temperature 70°F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 0-1 feet BGL
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/field) field
12. Presample Equipment Blank taken (y/n) n
13. Equipment blank no. N/A
14. Sample type (composite/voc) both
15. Comments _____
16. Reviewed by: AMP Date/Time 3/15/95 1400

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 3/14/95 14:45 Sample No. SS06-023-01
2. Location LARC
3. Previous Sample SS06-022-45
4. Sampler BJL
5. Others SAB
6. Organic Vapor Detector FEL No. MicroTip, Reading 0 ppm
7. Weather: Wind CA/m, Precipitation 0, Air Temperature 70°F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 0-1' BGL
10. Sampling Method (ss, tr, ~~au~~) _____
11. Presampling sampler decon method (lab/field) _____
12. Presample Equipment Blank taken (y/n) _____
13. Equipment blank no. N/A
14. Sample type (composite/voc) both
15. Comments _____

16. Reviewed by: AKD Date/Time 3/15/95 1400

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 10, 1995 / 1155 Sample No. SB06-001-S7
2. Location FORT STORY - LARC SITE
3. Previous Sample FIRST SAMPLE OF DAY
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, BRIAN HAMMOND, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading ____
7. Weather: Wind 5 - 10 MPH, Precipitation 0", Air Temperature 35°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 5-7'
10. Sampling Method (ss), tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/(n)) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) IMMEDIATELY PLACE SOIL IN TPH-LIGHT AND TCL-VOCS. HOMOGENIZE REST OF SAMPLE AND PLACE INTO TPH-HEAVY AND TCL-SVOCS (AND METALS IF COLLECTED)
15. Comments METAL SAMPLE

16. Reviewed by: AKP Date/Time 2/13/95 1640

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 10, 1995 / 1155 Sample No. SB06-100-57
2. Location FORT STORY - LARC SITE
3. Previous Sample ~~WJF~~ NEAL WOHLGAMUTH, BRIAN EPPARD
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, BRIAN HAMMOND, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading _____
7. Weather: Wind 5 - 10 MPH, Precipitation 0", Air Temperature 35°F
8. FEL No.'s Cond. ——, pH ——, Temp. ——, Redox ——
9. Sampling Depth 5 - 7'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB06-001-57
15. Comments _____
16. Reviewed by: AVP Date/Time 2/13/95 1640

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 10, 1995 / 1205 Sample No. SB06-001-1012
2. Location FORT STORY - LARC SITE
3. Previous Sample SB06-001-57
4. Sampler WJF
5. Others NEAL WOOLCAMOTH, ANTHONY EPPARD, BRIAN HAMMOND
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading ____
7. Weather: Wind 5 - 10 MPH, Precipitation 0", Air Temperature 35°F
8. FEL No.'s Cond. ____, pH ____, Temp. ____, Redox ____
9. Sampling Depth 1012
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB06-001-57
15. Comments METAL SAMPLE
16. Reviewed by: AKP Date/Time 2/13/95 1640

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 3/13/95 09:30 Sample No. SB06-002-45
2. Location LARC
3. Previous Sample N/A
4. Sampler SAB
5. Others WJL
6. Organic Vapor Detector FEL No. Mem Tip, Reading 0ppm
7. Weather: Wind 0, Precipitation 0, Air Temperature 55°F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 4-5 feet BGL
10. Sampling Method (ss, tr, (au)) _____
11. Presampling sampler decon method (lab/(field)) ~~ER06-SB~~
12. Presample Equipment Blank taken ((y)/n) ER06-SB-031395
13. Equipment blank no. _____
14. Sample type (composite/voc) both
15. Comments Damp SAnd

16. Reviewed by: AWD Date/Time 3/15/95 1400

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 3/13/95 09:45 Sample No. SB06-002-89
2. Location LARC
3. Previous Sample SB06-002-45
4. Sampler SAB
5. Others WSL
6. Organic Vapor Detector FEL No. Micro Tip, Reading 0 ppm
7. Weather: Wind 0, Precipitation 0, Air Temperature 55°F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth B-9 feet BGL
10. Sampling Method (ss, tr, (au)) _____
11. Presampling sampler decon method (lab/(field)) _____
12. Presample Equipment Blank taken ((y)/n) _____
13. Equipment blank no. N/A
14. Sample type (composite/voc) ~~Both~~
15. Comments Wet Sand
16. Reviewed by: AKP Date/Time 3/15/95 1400

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 16, 1995 / 14-10 Sample No. SB06-003-57
2. Location FORT STOREY - LARC SITE
3. Previous Sample SB06-001-1012
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 16.1
7. Weather: Wind 10 MPH, Precipitation 0", Air Temperature 35°F
8. FEL No.'s Cond. ——, pH ——, Temp. ——, Redox ——
9. Sampling Depth 5-7'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB06-001-57
15. Comments SAMPLE WAS SAND AND GRAVEL, DARK COLOR. ONLY TPH LIGHT AND TCL-VOCS SAMPLE WILL BE SENT FOR ANALYSIS
16. Reviewed by: AHP Date/Time 2/13/95 1640

    Form Complete? [Y or N] Y

    Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SECOND PUSH LOCATION PRODUCED ASPHALT WHICH WAS PUT IN ZIP LOCK BAG LABELED LARC SB-003-57

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 10, 1995 / 1450 Sample No. SBAA-0003-1012
2. Location FORT STORY - LAEC SITE
3. Previous Sample SBAA-0003-57
4. Sampler WTF
5. Others NEAL (W)EHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HC-200, Reading ____
7. Weather: Wind 10 MPH, Precipitation 0", Air Temperature 35°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 10 - 12'
10. Sampling Method (ss), tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SBAA-0001-57
15. Comments SOILS NOT COLLECTED DUE HOLE COLLAPSE.
16. Reviewed by: AMP Date/Time 2/13/95 1640

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/14/95 0815 Sample No. SB06-004-35
2. Location LARC
3. Previous Sample First of day
4. Sampler SABailey
5. Others S. Bishop
6. Organic Vapor Detector FEL No. MicroTip HL-200, Reading 0ppm
7. Weather: Wind 5-10 mph, Precipitation N/A, Air Temperature 30°F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 3 - 5'
10. Sampling Method (ss, tr, au) _____
11. Presampling sampler decon method (lab/field) _____
12. Presample Equipment Blank taken (y/n) _____
13. Equipment blank no. _____
14. Sample type (composite/voc) Both
15. Comments Very sandy (dry) w/ gravel. Only 1-foot recovered in spoon. Will push Adjacent hole for balance of sample.
16. Reviewed by: AVP Date/Time 2/14/95 1610

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/14/95 0825 Sample No. SB06-004-79
2. Location LARC
3. Previous Sample SB06-004-35
4. Sampler SABailey
5. Others S. Bishop
6. Organic Vapor Detector FEL No. MTI HL-200, Reading 0ppm
7. Weather: Wind 5-10 mph, Precipitation N/A, Air Temperature 30°F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 7-9'
10. Sampling Method (ss, tr, au) _____
11. Presampling sampler decon method (lab/field) _____
12. Presample Equipment Blank taken (y/n) _____
13. Equipment blank no. _____
14. Sample type (composite/voc) Both
15. Comments _____

16. Reviewed by: AKP Date/Time 2/14/95 1610

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/14/95 0915 Sample No. SB06-400-79
2. Location LARC
3. Previous Sample SB06-004-79
4. Sampler S. Bishop
5. Others S.A. Bailey
6. Organic Vapor Detector FEL No. MTip-200, Reading 0 ppm
7. Weather: Wind 15-20 mph, Precipitation N/A, Air Temperature 30F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 7-9'
10. Sampling Method (ss, tr, au) _____
11. Presampling sampler decon method (lab/field) _____
12. Presample Equipment Blank taken (y/n) SS + composite bowl
13. Equipment blank no. ER06 SB-021495
14. Sample type (composite/voc) Both
15. Comments Dup of 004-79

16. Reviewed by: AKP Date/Time 2/14/95 1610

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/14/95 0915 Sample No. SB06-400A-79
2. Location LARC
3. Previous Sample SB06-004-79
4. Sampler S. Bishop
5. Others S.A. Bailey
6. Organic Vapor Detector FEL No. M.Tip HL-200, Reading 0ppm
7. Weather: Wind 15-20, Precipitation _____, Air Temperature 25F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 7-9'
10. Sampling Method (ss, tr, au) _____
11. Presampling sampler decon method (lab/field) _____
12. Presample Equipment Blank taken (y/n) SS + composite bowl
13. Equipment blank no. ER06-SB-021495
14. Sample type (composite/voc) Both
15. Comments Dupe of 004-79 for USACE lab

16. Reviewed by: AKO Date/Time 2/14/95 1610

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/13/95 1200 Sample No. SB96-005-S7
2. Location LARC
3. Previous Sample N/A
4. Sampler SABailey
5. Others
6. Organic Vapor Detector FEL No. MicroTip, Reading ≈ 20 ppm *
7. Weather: Wind 10 mph, Precipitation N/A, Air Temperature 70°
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 5-7
10. Sampling Method (ss, tr, au)
11. Presampling sampler decon method (lab/field)
12. Presample Equipment Blank taken (y/n)
13. Equipment blank no. N/A
14. Sample type (composite/voc) Both
15. Comments
16. Reviewed by: AKP Date/Time 2/13/95 1720

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

* Machine had trouble w/ calibrating/holding zero today

SOIL SAMPLING FORM

79

1. Date/Time 2/13 1215 - 1300 Sample No. SB06-005-~~57~~ SAB
2. Location LARC
3. Previous Sample SB06-005-57
4. Sampler SABailey
5. Others *
6. Organic Vapor Detector FEL No. MicroTip, Reading 4ppm
7. Weather: Wind As SB06-005 #57, Precipitation _____, Air Temperature _____
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 9-11'
10. Sampling Method (ss, tr, au) _____
11. Presampling sampler decon method (lab/field) _____
12. Presample Equipment Blank taken (y/n) _____
13. Equipment blank no. _____
14. Sample type (composite/voc) Both
15. Comments 9-11 too wet Almost no recovery. Will redry At 7-9. Only 1.5 feet of spoon recovery at 7-9.
16. Reviewed by: AKP Date/Time 2/13/95 1720

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

PID was difficult to calibrate probably due to cold. 7 to 9 interval collected from 3 adjacent holes as recovery was not above 1.5' in 2.0' spoon.

SOIL SAMPLING FORM

1. Date/Time 3/17/95 11:40 Sample No. SB06-006(600)-95
2. Location LARC Pad
3. Previous Sample ~~SB~~ SB06-006-01
4. Sampler WJL
5. Others SAB
6. Organic Vapor Detector FEL No. Micro Tip, Reading 0ppm
7. Weather: Wind 5-10mph W, Precipitation 0, Air Temperature 60°F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 4-5 feet below concrete pad gravel base
10. Sampling Method (ss, tr, (au)) _____
11. Presampling sampler decon method (lab/(field)) _____
12. Presample Equipment Blank taken (y/(n)) _____
13. Equipment blank no. N/A
14. Sample type (composite/voc) ~~Both~~
15. Comments _____

16. Reviewed by: AKP Date/Time 3/15/95 1600

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 3/15/95 09:15 Sample No. SB06-007(007A)-45
2. Location LARC pad
3. Previous Sample N/A First of day
4. Sampler BJL
5. Others SAB
6. Organic Vapor Detector FEL No. Inoperable, Reading ____
7. Weather: Wind Calm, Precipitation 0, Air Temperature 50F
8. FEL No.'s Cond. ____, pH ____, Temp. ____, Redox ____
9. Sampling Depth 4-5 feet into sand under slab
10. Sampling Method (ss, tr, (au)) ____
11. Presampling sampler decon method (lab/(field)) ____
12. Presample Equipment Blank taken ((y)/n) ____
13. Equipment blank no. N/A
14. Sample type (composite/voc) both
15. Comments Sample had petroleum odor and standing water with sheen in top of casing.
16. Reviewed by: AKP Date/Time 3/15/95 1400

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 3/13/95 14:10 Sample No. SB06-03B-45
2. Location LARC Pad
3. Previous Sample ~~SB~~ SS06-00B-01
4. Sampler WJL
5. Others SAB
6. Organic Vapor Detector FEL No. Micro Tip, Reading 0ppm
7. Weather: Wind 10 mph E, Precipitation 0, Air Temperature 60°F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 4-5 feet in sand below pad
10. Sampling Method (ss, tr, (au)) _____
11. Presampling sampler decon method (lab/(field)) _____
12. Presample Equipment Blank taken (y/(n)) _____
13. Equipment blank no. N/A
14. Sample type (composite/voc) both
15. Comments _____

16. Reviewed by: AKP Date/Time 3/15/95 1400

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 3/13/95 14:40 Sample No. SB06-009-45
2. Location LARC Pad
3. Previous Sample SB06-009-01
4. Sampler BJL
5. Others SAB
6. Organic Vapor Detector FEL No. Micro Tip, Reading 0 ppm
7. Weather: Wind 10-15 E, Precipitation 0, Air Temperature 70F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 4-5' of sand below concrete pad
10. Sampling Method (ss, tr, (au)) _____
11. Presampling sampler decon method (lab/(field)) _____
12. Presample Equipment Blank taken (y/(n)) _____
13. Equipment blank no. N/A
14. Sample type (composite/voc) both
15. Comments _____

16. Reviewed by: AKP Date/Time 3/15/95 1400

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 3/13/95 15:40 Sample No. SB06-010-45
2. Location LARC Pad
3. Previous Sample SS06-010-01
4. Sampler BJL
5. Others SAB
6. Organic Vapor Detector FEL No. Micro Tip, Reading 0 ppm
7. Weather: Wind 10 mph E, Precipitation 0, Air Temperature 70°F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 4-5 feet of sand below concrete pad
10. Sampling Method (ss, tr, (au)) _____
11. Presampling sampler decon method (lab/(field)) _____
12. Presample Equipment Blank taken ((y)/n) _____
13. Equipment blank no. N/A
14. Sample type (composite/voc), both
15. Comments petroleum odor but 0 ppm VOC on micro-tip

16. Reviewed by: AKP Date/Time 3/15/95 1400.

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 3/14/95 08:00 Sample No. SB06-011-45
2. Location LARE Sandbox
3. Previous Sample N/A First of Day
4. Sampler BJL
5. Others SAB
6. Organic Vapor Detector FEL No. MicroTip, Reading 0/124
7. Weather: Wind E 10mph, Precipitation 0, Air Temperature 60°F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 4-5 feet BGL
10. Sampling Method (ss, tr, (au)) _____
11. Presampling sampler decon method (lab/(field)) _____
12. Presample Equipment Blank taken (y/(n)) _____
13. Equipment blank no. N/A
14. Sample type (composite/voc) both
15. Comments _____

16. Reviewed by: AKP Date/Time 3/15/95 1400

    Form Complete? [Y or N] Y

    Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 3/14/95 09:35 Sample No. SB06-012(210) -45
2. Location LARC Sandbox
3. Previous Sample SB06-011-45
4. Sampler BJL
5. Others SAB
6. Organic Vapor Detector FEL No. MicroTip, Reading 0 ppm
7. Weather: Wind 10mph E, Precipitation 0, Air Temperature 60°F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 4-5 feet BGL
10. Sampling Method (ss, tr, (au)) _____
11. Presampling sampler decon method (lab/(field)) _____
12. Presample Equipment Blank taken ((y)/n) _____
13. Equipment blank no. N/A
14. Sample type (composite/voc) Both
15. Comments first hole timber at 4' BGL. 2nd hole was sampled. Wood at 5' BGL. If pressure treated or creosote, could skew SVOC TPH-Heavy.
16. Reviewed by: AKD Date/Time 3/15/95 1400

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 3/14/95 09:05 Sample No. SB06-013-45
2. Location LARC
3. Previous Sample SB06-012-45
4. Sampler BJL
5. Others SAB
6. Organic Vapor Detector FEL No. Micro-Tip, Reading 0 ppm
7. Weather: Wind CA/m, Precipitation 0, Air Temperature 65°F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 4-5 feet BGL
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/field) D
12. Presample Equipment Blank taken (y/n) n
13. Equipment blank no. N/A
14. Sample type (composite/voc) both
15. Comments _____

16. Reviewed by: AKP Date/Time 3/15/95 1400

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 3/14/95 11:00 Sample No. SB06-014-45
2. Location LARC Sandbox
3. Previous Sample SB06-015-45
4. Sampler BJL
5. Others SAB
6. Organic Vapor Detector FEL No. Micro Tip, Reading 0 ppm
7. Weather: Wind E 15mph, Precipitation 0, Air Temperature 70°F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 4-5 feet BGL
10. Sampling Method (ss, tr, (au)) _____
11. Presampling sampler decon method (lab/(field)) _____
12. Presample Equipment Blank taken (y/(n)) _____
13. Equipment blank no. N/A
14. Sample type (composite/voc) both
15. Comments _____

16. Reviewed by: AMD Date/Time 3/15/95 1400

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 3/14/95 10:25 Sample No. SB06-015-45
2. Location LARC Sand box
3. Previous Sample SB06-016-45
4. Sampler BJL
5. Others SAB
6. Organic Vapor Detector FEL No. MicroTip, Reading 0 ppm
7. Weather: Wind E 10mph, Precipitation 0, Air Temperature 70°F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 4-5 feet BGL
10. Sampling Method (ss, tr, (au)) _____
11. Presampling sampler decon method (lab/(field)) _____
12. Presample Equipment Blank taken ((y)/n) _____
13. Equipment blank no. N/A
14. Sample type (composite/voc) both
15. Comments _____

16. Reviewed by: AKP Date/Time 3/15/95 1400

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 3/14/95 10:00 Sample No. SB06-016-45
2. Location LARC
3. Previous Sample SB06-016-45
4. Sampler BJL
5. Others SAB
6. Organic Vapor Detector FEL No. Micro Tip, Reading 0 ppm
7. Weather: Wind 10 mph E, Precipitation _____, Air Temperature 70°F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 4-5 feet BGL
10. Sampling Method (ss, tr, (au)) _____
11. Presampling sampler decon method (lab/(field)) _____
12. Presample Equipment Blank taken ((X)/N) _____
13. Equipment blank no. N/A
14. Sample type (composite/(voc)) both
15. Comments weathered petroleum odor. Hit groundwater At 5' BGL.
16. Reviewed by: AKP Date/Time 3/15/95 1400

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 3/14/95 13:00 Sample No. SB06-017-45
2. Location LARC Sandbox
3. Previous Sample SB06-014-45
4. Sampler BJL
5. Others SAB
6. Organic Vapor Detector FEL No. Microtip, Reading 0 ppm
7. Weather: Wind E 10 mph, Precipitation 0, Air Temperature 70°F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 4-5 feet BGL
10. Sampling Method (ss, tr, au) (au)
11. Presampling sampler decon method (lab/field) (field)
12. Presample Equipment Blank taken (y/n) (n)
13. Equipment blank no. N/A
14. Sample type (composite/voc) both
15. Comments _____

16. Reviewed by: AKP Date/Time 3/15/95 1400

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 3/14/95 13:30 Sample No. SB06-018-45
2. Location LARC Sandbox
3. Previous Sample SB06-017-45
4. Sampler BJL
5. Others SAB
6. Organic Vapor Detector FEL No. MicroTip, Reading 0ppm
7. Weather: Wind E 10mph, Precipitation 0, Air Temperature 70°F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 4-5 feet BGL
10. Sampling Method (ss, tr, (au)) _____
11. Presampling sampler decon method (lab/(field)) _____
12. Presample Equipment Blank taken ((y)/n) _____
13. Equipment blank no. N/A
14. Sample type (composite/voc) both
15. Comments _____

16. Reviewed by: AKP Date/Time 3/15/95 1400

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 3/14/95 13:50 Sample No. SB06-019-45
2. Location LARC Sand box
3. Previous Sample SB06-018-45
4. Sampler BJL
5. Others SAB
6. Organic Vapor Detector FEL No. Micro-Tip, Reading 0 ppm
7. Weather: Wind E 10mph, Precipitation 0, Air Temperature 70°F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 4-5 feet BGL
10. Sampling Method (ss, tr, (au)) _____
11. Presampling sampler decon method (lab/(field)) _____
12. Presample Equipment Blank taken ((y)/n) _____
13. Equipment blank no. N/A
14. Sample type (composite/voc) both
15. Comments _____
16. Reviewed by: AKP Date/Time 3/15/95

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 3/15/95 09:50 Sample No. SB06-020(020A)-45
2. Location LARC Sand box
3. Previous Sample SB06-007(007A)-45
4. Sampler BSL
5. Others SAB
6. Organic Vapor Detector FEL No. Inoperable, Reading ____
7. Weather: Wind Calm, Precipitation 0, Air Temperature 60°F
8. FEL No.'s Cond. ____, pH ____, Temp. ____, Redox ____
9. Sampling Depth 4-5' DGL
10. Sampling Method (ss, tr, (au)) ____
11. Presampling sampler decon method (lab/(field)) ____
12. Presample Equipment Blank taken ((y)/n) ____
13. Equipment blank no. N/A
14. Sample type (composite/voc) both
15. Comments ____

16. Reviewed by: AVP Date/Time 3/15/95 1400

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 3/14/95 15:30 Sample No. SB06-021-34
2. Location LARC
3. Previous Sample SB06-021-01
4. Sampler BJL
5. Others SAB
6. Organic Vapor Detector FEL No. MicroTip, Reading 0ppm
7. Weather: Wind Calm, Precipitation 0, Air Temperature 70°F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 3-4' BGL
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/field) field
12. Presample Equipment Blank taken (y/n) n
13. Equipment blank no. N/A
14. Sample type (composite/voc) both
15. Comments groundwater at 4' BGL. Auger not advanced further.
16. Reviewed by: AKP Date/Time 3/15/95 1400

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 3/14/95 14:20 Sample No. SS06-022-45
2. Location LARC
3. Previous Sample SS06-022-01
4. Sampler BJL
5. Others SAB
6. Organic Vapor Detector, FEL No. Microtip, Reading 0ppm
7. Weather: Wind calm, Precipitation 0, Air Temperature 70°F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 4-5 feet BGL
10. Sampling Method (ss, tr, (au)) _____
11. Presampling sampler decon method (lab/(field)) _____
12. Presample Equipment Blank taken (y/(n)) _____
13. Equipment blank no. N/A
14. Sample type (composite/voc) both
15. Comments _____

16. Reviewed by: ~~AES~~ AKP Date/Time 3/16/95 1400

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 3/14/95 14:50 Sample No. SB06-023-23
2. Location LARC
3. Previous Sample SB06-023-01
4. Sampler BJL
5. Others SAB
6. Organic Vapor Detector FEL No. MicroTip, Reading 0ppm
7. Weather: Wind Calm, Precipitation 0, Air Temperature 70F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 2-3' BGL
10. Sampling Method (ss, tr, (au)) _____
11. Presampling sampler decon method (lab/(field)) _____
12. Presample Equipment Blank taken (y/(n)) _____
13. Equipment blank no. N/A
14. Sample type (composite/voc) both
15. Comments groundwater encountered 3' BGL. Auger not advanced further
16. Reviewed by: AKP Date/Time 3/15/95 1400

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SURFACE WATER/SEDIMENT SAMPLING FORM

1. Date/Time 2/1/95 11:45 am Sample No. SD06-001-01
2. Location Drainage ditch north of LAPC 60 sandbox
3. Sampler Anthony Pace
4. Others Present Scott Bailey
5. Organic Vapor Detector FEL No. —, Reading —
6. Weather: Wind 5-10 mph, Precipitation None, Air Temperature 50°F
7. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
8. Cond. µmhos/cm pH Temp. Redox mv
   Sample _____ _____ _____ _____
9. Dissolved Oxygen: (Circle One) Winkler or Meter (If Winkler, Show all Work)
10. Filtered Sample? _____ Membrane Filter Size _____
11. Flow No flow Method Grab with scoop
12. Depth 2 feet Bottom Type Sand
13. Riparian Vegetation _____
14. Other Observations (Algae, Blooms, Etc.) Algae and petroleum sheen present on water
15. [Y or N] Turbid? Y
16. Floating Solids or Liquids? Leaves / twigs
17. Sample Type: Water _____, Sediment ✓
    Depth of Sample: 0 to 6"
    Comments: _____
18. Reviewed by: AKP Date/Time 2/1/95 1600
    Form Complete? [Y or N] Y
    Decon Complete [Y or N] Y

SURFACE WATER/SEDIMENT SAMPLING FORM

SD06-002MS-01

1. Date/Time 2/1/95 12:45 Sample No. SD06-002-01
2. Location Drainage ditch north of LARC 60 sandbox
3. Sampler Anthony Pace
4. Others Present Scott Bailey
5. Organic Vapor Detector FEL No. _____, Reading _____
6. Weather: Wind 5 to 10 mph, Precipitation None, Air Temperature 50°F
7. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
8. Cond. µmhos/cm pH Temp. Redox mv
   Sample _____ _____ _____ _____
9. Dissolved Oxygen: (Circle One) Winkler or Meter (If Winkler, Show all Work)

10. Filtered Sample? _____ Membrane Filter Size _____
11. Flow No flow Method Grab with Scoop
12. Depth 21 feet Bottom Type Sand
13. Riparian Vegetation _____
14. Other Observations (Algae, Blooms, Etc.) _____
15. [Y or N] Turbid? Y
16. Floating Solids or Liquids? Leaves
17. Sample Type: Water _____, Sediment ✓
    Depth of Sample: 0 to 6"
    Comments: _____
18. Reviewed by: AMP Date/Time 2/1/95 1600
    Form Complete? [Y or N] Y
    Decon Complete [Y or N] Y

SURFACE WATER/SEDIMENT SAMPLING FORM

1. Date/Time 2/1/95 11:25 am Sample No. SW06-001
2. Location Drainage ditch north of LARC 60 sandbox
3. Sampler Anthony Pace
4. Others Present Scott Bailey
5. Organic Vapor Detector FEL No. — , Reading —
6. Weather: Wind 5-10 mph , Precipitation None , Air Temperature 50°F
7. FEL No.'s Cond. _____ , pH _____ , Temp. _____ , Redox _____
8.

	Cond. µmhos/cm	pH	Temp.	Redox mv
Sample	600	6.8	10°C	—

9. Dissolved Oxygen: (Circle One) Winkler or Meter (If Winkler, Show all Work)

10. Filtered Sample? No Membrane Filter Size —
11. Flow No flow Method Grab
12. Depth 2 feet Bottom Type Sand
13. Riparian Vegetation
14. Other Observations (Algae, Blooms, Etc.) Algae present, small petroleum sheen present
15. [Y or N] Turbid? Y
16. Floating Solids or Liquids? Leaves / twigs
17. Sample Type: Water ✓ , Sediment
    Depth of Sample: Surface
    Comments:
18. Reviewed by: AKP Date/Time 2/1/95 1600
    Form Complete? [Y or N] Y
    Decon Complete [Y or N] Y

SURFACE WATER/SEDIMENT SAMPLING FORM

1. Date/Time 2/1/95 12:40 Sample No. SW06-002
2. Location Drainage ditch north of LARC 60 Sandbox
3. Sampler Anthony Pace
4. Others Present Scott Bailey
5. Organic Vapor Detector FEL No. _____, Reading _____
6. Weather: Wind 5 to 10 mph, Precipitation None, Air Temperature 50°F
7. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
8.

	Cond. µmhos/cm	pH	Temp.	Redox mv
Sample	400	6.8	12°C	—

9. Dissolved Oxygen: (Circle One) Winkler or Meter (If Winkler, Show all Work)

10. Filtered Sample? NO Membrane Filter Size _____
11. Flow No flow Method Grab
12. Depth 1 foot Bottom Type Sand
13. Riparian Vegetation _____
14. Other Observations (Algae, Blooms, Etc.) Algae present
15. [Y or N] Turbid? Y
16. Floating Solids or Liquids? leaves / twigs
17. Sample Type: Water ✓, Sediment _____
    Depth of Sample: Surface
    Comments: _____
18. Reviewed by: AMP Date/Time 2/1/95 1600
    Form Complete? [Y or N] Y
    Decon Complete [Y or N] Y

AUTO CRAFT SAMPLING FORMS

GROUNDWATER SAMPLING FORM

1. Date 4/13/95 Sample No. 7MW-2
   Time 1432
2. Location FT STORY - AUTO CRAFT
3. Well No. 7MW-2 Sketch on Back (Y or N) No
4. Total Depth 13.70 Number of Screened Interval(s) 10
5. Depth to Screen/Length(s) 4'
6. (Y or N) Well Secure? Yes Comments

7. Sampler WJF Other present AKP, SAB
8. Organic Vapor Detector FEL No. NA, Reading NA
9. Weather: Wind 10mph Precipitation 0, Air Temperature 65
10. Water Level Measurement: FEL No. 8.60
11. Sampler WJF
12. Previous Well Sampled MW-12~~0~~
    Decon Method (Lab/Field) DISPOSABLE
13. Equipment Blank Taken (Y or N) No
14. Casing Type SCHED 40 PVC, I.D. 2", Gal/Ft. .163 (1)
15. Total Depth 13.70 - Depth to Water 8.60 = Ht. 5.1
16. Well Volume .83 = Ht. 5.1 X Gal/Ft. .163 (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge 2.5 GALLONS
18. Purge Water Containerized No
19. FEL No.'s Cond. YSI 33 pH HACH 1 Temperature HACH 1 ~~Redox~~ TURBIDITY HACH 2100P
20.

	mS ~~µmhos/cm~~	pH	Temp.	Redox mv	TURBIDITY (NTU)
Cond. Initial	.30	6.74	16.1		41.2
(Purged Cycle)	.30	6.56	15.9		72.2
	.30	6.69	16.2		55.7
	.30	6.65	16.3		52.9
Sample	.30	6.81	16.4		55.9

21. Turbid (Y or N) SLIGHTLY
22. Color LT BROWN
23. Sample Filtered No, Filter Size N/A
24. Reviewed By WJF Date/Time 4/26/95 1400

GROUNDWATER SAMPLING FORM

1. Date 4/13/95 Sample No. 7MW-3
   Time 1050 (1210)
2. Location Ft Story - Auto Craft
3. Well No. 7MW-3 Sketch on Back (Y or N) No
4. Total Depth 39.60 Number of Screened Interval(s) 10'
5. Depth to Screen/Length(s) 29.6'
6. (Y or N) Well Secure? YES Comments
7. Sampler WJF Other present AKP, SAB
8. Organic Vapor Detector FEL No. N/A, Reading N/A
9. Weather: Wind 0-5', Precipitation 0, Air Temperature 65
10. Water Level Measurement: FEL No. 8.05
11. Sampler WJF
12. Previous Well Sampled MW-119
    Decon Method (Lab/Field) DISPOSABLE
13. Equipment Blank Taken (Y or N) No
14. Casing Type Sched 40 PVC, I.D. 2", Gal/Ft. .163 (1)
15. Total Depth 39.60 - Depth to Water 8.05 = Ht. 31.55
16. Well Volume 5.14 = Ht. 31.55 X Gal/Ft. .163 (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge 17.5
18. Purge Water Containerized No
19. FEL No.'s Cond. YSI 33 pH HACH 1 Temperature HACH 1 ~~Redox~~ TURBIDITY HACH 2100P
20.

	mS ~~µmhos/cm~~	pH	Temp.	~~Redox mv~~	TURBIDITY
Cond. Initial	.1	6.86	18.9		38.2
(Purged Cycle)	.1	6.96	19.6		28.9
	.1	6.75	19.6		12.9
	.1	6.93	19.7		18.4
Sample					

21. Turbid (Y or N) No
22. Color LT BROWN TO CLEAR
23. Sample Filtered Yes (METALS) Filter Size .45µm
24. Reviewed By WJF Date/Time 4/26/95 1400

GROUNDWATER SAMPLING FORM

1. Date 4/13/95 Sample No. MW-119
   Time 1050 (1210)
2. Location Ft Story - Auto Craft
3. Well No. MW-119 Sketch on Back (Y or N) No
4. Total Depth 12.16 Number of Screened Interval(s) ____
5. Depth to Screen/Length(s) ____
6. (Y or N) Well Secure? Yes Comments ____
7. Sampler WJF Other present ~~WJF~~ AKP, SAB
8. Organic Vapor Detector FEL No. N/A, Reading N/A
9. Weather: Wind 0-5, Precipitation 0, Air Temperature 65
10. Water Level Measurement: FEL No. 8.12
11. Sampler WJF
12. Previous Well Sampled MW-113A
    Decon Method (Lab/Field) DISPOSABLE
13. Equipment Blank Taken (Y or N) No
14. Casing Type SCHED 40 PVC, I.D. 2", Gal/Ft. .163 (1)
15. Total Depth 12.16 - Depth to Water 8.12 = Ht. 4.04
16. Well Volume .66 GAL = Ht. 4.04 X Gal/Ft. .163 (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge 3
18. Purge Water Containerized No
19. FEL No.'s Cond. YSI 33 pH HACH 1 Temperature HACH 1 ~~Redox~~ Turbidity HACH 2100P
20.

	mS ~~µmhos/cm~~	pH	Temp.	~~Redox mv~~	TURBIDITY
Cond. Initial	.1	6.19	19.0		15.9
(Purged Cycle)	.1	6.41	16.5		27.6
	.1	6.58	16.8		35.3
	.1	6.65	16.9		33.5
Sample	.1	6.65	17.0		31.2

21. Turbid (Y or N) No
22. Color Clear
23. Sample Filtered Yes, Filter Size .45 µm
24. Reviewed By WJF Date/Time 4/26/95 1400

GROUNDWATER SAMPLING FORM

1. Date 4/13/95 Sample No. MW-120
   Time 13:50
2. Location FT STORY - AUTO CRAFT
3. Well No. MW-120 Sketch on Back (Y or N) No
4. Total Depth 16.30 Number of Screened Interval(s) ____
5. Depth to Screen/Length(s) ____
6. (Y or N) Well Secure? YES Comments ____
7. Sampler WJF Other present AKP, SAB
8. Organic Vapor Detector FEL No. N/A, Reading N/A
9. Weather: Wind 10°, Precipitation 0, Air Temperature 70°
10. Water Level Measurement: FEL No. 10.80
11. Sampler WJF
12. Previous Well Sampled 7 MW-3
    Decon Method (Lab/Field) DISPOSABLE
13. Equipment Blank Taken (Y or N) No
14. Casing Type SCHED 40 PVC, I.D. 2", Gal/Ft. .163 (1)
15. Total Depth 16.30 - Depth to Water 10.80 = Ht. 5.5
16. Well Volume .90 = Ht. 5.5 X Gal/Ft. .163 (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge 4 GALLONS
18. Purge Water Containerized No
19. FEL No.'s Cond. YSI 33 pH HACH 1 Temperature HACH 1 ~~Redox~~ Turbidity HACH 2100P
20.

	~~µmhos/cm~~ mS	pH	Temp.	~~Redox mv~~	Turbidity (NTU)
Cond. Initial	.2	7.27	18.1		34.2
(Purged Cycle)	.1	6.98	17.5		119
	.1	7.11	17.3		142
	.1	7.16	17.5		92.5
Sample	.1	6.50	17.8		72.7

21. Turbid (Y or N) SLIGHTLY
22. Color CLEAR
23. Sample Filtered No, Filter Size N/A
24. Reviewed By WJF Date/Time 4/26/95 1400

3. GROUNDWATER SAMPLING FORM

GW07-001 MS/MSD

1. Date 2/27/95 Sample No. GW07-001
   Time 0915
2. Location Parking lot south of former AC bldg.
3. Well No. DPT PT. 001 Sketch on Back (Y or N) N
4. Total Depth 15' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 14'/1'
6. (Y or N) Well Secure? N/A Comments
   Sulfurous odor
7. Sampler SCOTT BAILEY Other present TONY PACE
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading
9. Weather: Wind 10 mph, Precipitation NONE, Air Temperature 40 °F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW07-004 (from 2/24/95)
    Decon Method (Lab/(Field))
13. Equipment Blank Taken (Y or (N))
14. Casing Type , I.D. , Gal/Ft. (1)
15. Total Depth 15' - Depth to Water 11' = Ht. 4'
16. Well Volume = Ht. X Gal/Ft. (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI 33 pH ORION 290A Temperature YSI 33 Redox -
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	200	7.0	8°C	-

21. Turbid (Y or N) Y
22. Color Light tan
23. Sample Filtered No, Filter Size
24. Reviewed By AKP Date/Time 2/27/95 0935

3. GROUNDWATER SAMPLING FORM

1. Date 2/24/95 Sample No. GW07-002 (GW07-200)
   Time 0915
2. Location DPT Pt. 002 West of former AC bldg.
3. Well No. ↓ Sketch on Back (Y or N) N
4. Total Depth 13.5' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 12.5' / 1'
6. (Y or N) Well Secure? N/A Comments
   Sulfurous odor in samples.
7. Sampler Scott Bailey Other present
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 15 mph, Precipitation None, Air Temperature 40°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW04-002 (taken 2/23/95)
    Decon Method (Lab/~~Field~~)
13. Equipment Blank Taken ~~(Y)~~ or (N) ~~ER07-GW-022495~~
14. Casing Type _____, I.D. _____, Gal/Ft. _____ (1)
15. Total Depth 13.5' - Depth to Water 9.5' = Ht. 4'
16. Well Volume _____ = Ht. ____ X Gal/Ft. _____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI 33 pH ORION 290A Temperature YSI 33 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	210	6.6	12°C	—

21. Turbid (Y or N) Y
22. Color tan
23. Sample Filtered No, Filter Size
24. Reviewed By AKP Date/Time 2/24/95 1000

3. GROUNDWATER SAMPLING FORM

1. Date 2/24/95 Sample No. GW07-003
   Time 1430
2. Location North of former AC bldg.
3. Well No. DPT PT. 003 Sketch on Back (Y or N) N
4. Total Depth 14.5' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 13.5' / 1'
6. (Y or N) Well Secure? N/A Comments _____
7. Sampler Scott Bailey Other present _____
8. Organic Vapor Detector FEL No. MICROTIP HL-200A, Reading 0 ppm
9. Weather: Wind 20 mph, Precipitation None, Air Temperature 45°F
10. Water Level Measurement: FEL No. _____
11. Sampler _____
12. Previous Well Sampled GW07-005
    Decon Method (Lab/(Field)) _____
13. Equipment Blank Taken (Y or (N)) _____
14. Casing Type _____, I.D. _____, Gal/Ft. _____ (1)
15. Total Depth 14.5' - Depth to Water 8.5' = Ht. 6'
16. Well Volume _____ = Ht. _____ X Gal/Ft. _____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge _____
18. Purge Water Containerized _____
19. FEL No.'s Cond. YSI 33 pH ORION 290A Temperature YSI 33 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	130	6.6	13°C	—

21. Turbid (Y or N) 4
22. Color tan
23. Sample Filtered NO, Filter Size _____
24. Reviewed By AKP Date/Time 2/24/95 1510

3. GROUNDWATER SAMPLING FORM

1. Date 2/24/95 Sample No. GW07 - 004
   Time 1600
2. Location Northwest of former AC bldg
3. Well No. DPT Pt. 004 Sketch on Back (Y or N) N
4. Total Depth 14' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 13' / 1'
6. (Y or N) Well Secure? N/A Comments
7. Sampler Scott Bailey Other present
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 20 mph, Precipitation None, Air Temperature 50 °F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW07 - 003
    Decon Method (Lab/Field)
13. Equipment Blank Taken (Y or (N))
14. Casing Type _____, I.D. _____, Gal/Ft. _____ (1)
15. Total Depth 14' - Depth to Water 8' = Ht. 6'
16. Well Volume _____ = Ht. ____ X Gal/Ft. _____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI 33 pH below 2 pH Temperature YSI 33 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	280	7.0	12 °C	—

21. Turbid (Y or N) Y
22. Color tan
23. Sample Filtered No, Filter Size
24. Reviewed By AKP Date/Time 2/24/95 1640

3. GROUNDWATER SAMPLING FORM

GW07 - 500A

1. Date 2/24/95 Sample No. GW07 - 005
   Time 1145
2. Location North of former AC bldg
3. Well No. DPT PT. 005 Sketch on Back (Y or N) N
4. Total Depth 12' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 11' / 1'
6. (Y or N) Well Secure? N/A Comments

7. Sampler Scott Bailey Other present
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 20 mph, Precipitation None, Air Temperature 40°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW07 - 002
    Decon Method (Lab/(Field))
13. Equipment Blank Taken ((Y)) or N) ER07 - GW - 022495
14. Casing Type _____, I.D. _____, Gal/Ft. _____ (1)
15. Total Depth 12' - Depth to Water 7.5' = Ht. 4.5'
16. Well Volume _____ = Ht. _____ X Gal/Ft. _____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI 33 pH ORION 250A Temperature YSI 33 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	190	6.6	13°C	—

21. Turbid (Y or N) Y
22. Color tan
23. Sample Filtered NO, Filter Size
24. Reviewed By AKP Date/Time 2/24/95 1205

GROUNDWATER SAMPLING FORM

1. Date 3/7/95 Sample No. GW07-006
   Time 1240
2. Location North of former Auto Craft bldg.
3. Well No. DPT Pt. 006 Sketch on Back (Y or N) N
4. Total Depth 15.0' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 14.0' / 1.0'
6. (Y or N) Well Secure? N/A Comments

7. Sampler Scott Bailey Other present Tony Pace
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 10 mph, Precipitation None, Air Temperature 60 °F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW06-017
    Decon Method (Lab/(Field))
13. Equipment Blank Taken ((Y)) or N) ERD7-GW-030795
14. Casing Type _____, I.D. _____, Gal/Ft. _____ (1)
15. Total Depth 15' - Depth to Water 8.5' = Ht. 6.5'
16. Well Volume _____ = Ht. ____ X Gal/Ft. _____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. 451 pH ORION 290A Temperature 451 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	330	6.7	17°C	—

21. Turbid (Y or N) Y
22. Color brown
23. Sample Filtered No, Filter Size
24. Reviewed By AKP Date/Time 3/7/95 1330

SOIL SAMPLING FORM

1. Date/Time 2/7/95 1350 Sample No. SS07-002-01
2. Location West of Auto Craft Bldg.
3. Previous Sample SS07-003-01
4. Sampler Tony Pace
5. Others Scott Bailey
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 10 mph, Precipitation —, Air Temperature 35°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/field) Same as SS07-005-01
12. Presample Equipment Blank taken (y/n)
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS07-005-01
15. Comments Topsoil / sand mix to 12"
16. Reviewed by: [redacted] AKP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/7/95 1340 Sample No. SS07-003-01
2. Location North of Auto Craft Bldg
3. Previous Sample SS07-006-01
4. Sampler Tony Pace
5. Others Scott Bailey
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 10 mph, Precipitation —, Air Temperature 35°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/(field)) Same as SS07-005-01
12. Presample Equipment Blank taken (y/(n))
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS07-005-01
15. Comments TAN sand

16. Reviewed by: AKP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/7/95 1330 Sample No. SS07-004-01
2. Location North of Auto Craft Bldg.
3. Previous Sample SS07-006-01
4. Sampler Tony Pace
5. Others Scott Bailey
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 5 to 10 mph, Precipitation —, Air Temperature 35°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) tr
11. Presampling sampler decon method (lab/(field)) Same as SS07-005-01 Plus nitric acid rinse
12. Presample Equipment Blank taken (y/(n))
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS07-005-01
15. Comments 6" of top soil with cobbles, 6" of brown/tan sand
16. Reviewed by: AKP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/7/95 1310 Sample No. SS07-005-01
2. Location North of Auto Craft Bldg
3. Previous Sample SS04-009-01
4. Sampler Tony Pace
5. Others Scott Baily
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 5 mph, Precipitation —, Air Temperature 35 °F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/field) Alconox wash, tap water rinse, methanol rinse, DI rinse
12. Presample Equipment Blank taken (y/n)
13. Equipment blank no.
14. Sample type (composite/voc) VOCs / TPH light samples taken from bowl to bottles, others homogenized
15. Comments Brown top soil to 4", brown to tan sand to 8" tan sand 8 to 12"
16. Reviewed by: AKP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/7/95 1335 Sample No. SS07-006-01
2. Location North of Auto Craft Bldg.
3. Previous Sample SS07-004-01
4. Sampler Tony Pace
5. Others Scott Bailey
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 10 mph, Precipitation —, Air Temperature 35°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/(field)) Same as SS07-005-01
12. Presample Equipment Blank taken (y/(n))
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS07-005-01
15. Comments Dark tan sand
16. Reviewed by: AKP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 9 1995/ 1035 Sample No. SB07-001-57
2. Location FORT STORY - AUTO CRAFT SITE
3. Previous Sample SB07-005-68
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EDDARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200 Reading 0.0
7. Weather: Wind 10-20 MPH, Precipitation 0", Air Temperature 30°F
8. FEL No.'s Cond. ——, pH ——, Temp. ——, Redox ——
9. Sampling Depth 5-7'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB07-005-24
15. Comments

16. Reviewed by: AKP Date/Time 2/13/95 1640

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 9, 1995 / 1035 Sample No. SB07-100A-57
2. Location FORT STORY - AUTO CRAFT SITE
3. Previous Sample SB07-005-68
4. Sampler WJF
5. Others NEAL WOMGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0.0
7. Weather: Wind 10-20 MPH, Precipitation 0", Air Temperature 30°F
8. FEL No.'s Cond. ——, pH ——, Temp. ——, Redox ——
9. Sampling Depth 5-7'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB07-005-2
15. Comments DUPLICATE TPH LIGHT, TPH HEAVY, TCL-SVOCs AND TCL-VOCs FOR SB07-001-57
16. Reviewed by: AVP Date/Time 2/13/95 1640

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 9 1995/ 1045 Sample No. SB07-001-911
2. Location FORT STORY - AUTO CRAFT SITE
3. Previous Sample SB07-001-57
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0.0
7. Weather: Wind 10-20 MPH, Precipitation 0", Air Temperature 30°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 9-11
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB07-005-24
15. Comments METAL SAMPLE
16. Reviewed by: AKP Date/Time 2/13/95 1640

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 8, 1995 / 1200 Sample No. SB07-002-24
2. Location FORT STORY - AUTO CRAFT SITE
3. Previous Sample SB04-005-68 (FIRST SAMPLE AT AUTOCRAFT SITE)
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading N/A
7. Weather: Wind 15-25 MPH, Precipitation 0", Air Temperature 30°F
8. FEL No.'s Cond. ——, pH ——, Temp. ——, Redox ——
9. Sampling Depth 2-4
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-004-24
15. Comments PID BATTERY IS DEAD

16. Reviewed by: AKP Date/Time 2/8/95 1710

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 8, 1995 / 1200 Sample No. SB07200-24
2. Location FORT STORY - AUTO CRAFT SITE
3. Previous Sample SB04-005-68
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading N/A
7. Weather: Wind 15-25 MPH, Precipitation 0", Air Temperature 30°F
8. FEL No.'s Cond. ——, pH ——, Temp. ——, Redox ——
9. Sampling Depth 2-4'
10. Sampling Method (ss), tr, au) SS
11. Presampling sampler decon method (lab/(field)) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/(n)) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-004-24
15. Comments DUPLICATE OF TCL w/t VOCs AND TPH-LIGHT FROM SB07-002-24
16. Reviewed by: AKP Date/Time 2/8/95 1710

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 8 1995 / 1420 Sample No. SB07-006-0911
2. Location FORT STORY - AUTO CRAFT SITE
3. Previous Sample SB07-006-24
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading N/A
7. Weather: Wind 15-25 MPH, Precipitation 0", Air Temperature 30° F
8. FEL No.'s Cond. ——, pH ——, Temp. ——, Redox ——
9. Sampling Depth 9-11'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-004-24
15. Comments PID BATTERY IS DEAD
16. Reviewed by: AKP Date/Time 2/8/95 1760

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 8, 1995 / 1410 Sample No. SB07-006-24
2. Location FORT STORY - AUTO CRAFT SITE
3. Previous Sample SB07-004-6E
4. Sampler WJF
5. Others NEAL WOHLGAMUTH
6. Organic Vapor Detector FEL No. MICROTIP HL-200 Reading N/A
7. Weather: Wind 15-25 MPH, Precipitation 0", Air Temperature 30°F
8. FEL No.'s Cond. ———, pH ———, Temp. ———, Redox ———
9. Sampling Depth 2-4'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-004-24
15. Comments PID BATTERY IS DEAD

16. Reviewed by: AKP Date/Time 2/8/95 1710

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 9, 1995 / 0905 Sample No. SB07-~~006~~ 005-68
2. Location FORT STORY - AUTO CRAFT SITE
3. Previous Sample SB07-005-24
4. Sampler WJF
5. Others NEAL WOMACK/WITH ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading ____
7. Weather: Wind 10-20 MPH, Precipitation 0", Air Temperature 30°F
8. FEL No.'s Cond. ____, pH ____, Temp. ____, Redox ____
9. Sampling Depth 6-8'
10. Sampling Method (~~ss~~, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB07-005-24
15. Comments ____
16. Reviewed by: AKP Date/Time 2/13/95 1640

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 9 1995 / 0900 Sample No. SB07-500-24
2. Location FORT STORY - AUTO CRAFT SITE
3. Previous Sample FIRST OF THE DAY
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0.0
7. Weather: Wind 10-20 MPH, Precipitation 0", Air Temperature 30°F
8. FEL No.'s Cond. ———, pH ———, Temp. ———, Redox ———
9. Sampling Depth 2-4'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB07-005-24
15. Comments DUPLICATE METAL SAMPLE OF SB07-005-24

16. Reviewed by: AKP Date/Time 2/13/95 1640

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 9, 1995 / 0900 Sample No. SB07-~~006~~ 005-24
2. Location FORT STORY - AUTO CRAFT SITE
3. Previous Sample FIRST OF THE DAY
4. Sampler WTF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading ____
7. Weather: Wind 10-20 MPH, Precipitation 0", Air Temperature 30°F
8. FEL No.'s Cond. ____, pH ____, Temp. ____, Redox ____
9. Sampling Depth 2-4'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) IMMEDIATELY PLACE SOIL INTO TCL-VOCS AND TPH LIGHT CONTAINERS. HOMOGENIZE REST OF SOIL AND PLACE INTO TPH-HEAVY AND TCL-SVOCS (AND METALS IF COLL
15. Comments METAL SAMPLE

16. Reviewed by: AKP Date/Time 2/8/95 1710

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 8, 1995 / 1300 Sample No. SB07-004-68
2. Location FORT STORY - AUTO CRAFT SITE
3. Previous Sample SB07-004-24
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading N/A
7. Weather: Wind 15-25 MPH, Precipitation 0", Air Temperature 30°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 6-8
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-004-24
15. Comments METAL SAMPLE

16. Reviewed by: AKP Date/Time 2/8/95 1710

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 8, 1995 / 1250 Sample No. SB07-400A-24
2. Location FORT STORY -
3. Previous Sample SB07-002-6E
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading N/A
7. Weather: Wind 15-25 MPH, Precipitation 0", Air Temperature 30°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 2-4'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-004-24
15. Comments DUPPLICATE OF METALS SAMPLE SB07-004-24
    PID BATTERY IS DEAD
16. Reviewed by: AVP Date/Time 2/8/95 1710

    Form Complete? [Y or N] Y

    Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 8, 1995 1250 Sample No. SB07-004-24
2. Location FORT STORY - AUTO CRAFT SITE
3. Previous Sample SB07-002-68
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading N/A
7. Weather: Wind 15-25 MPH, Precipitation 0", Air Temperature 30°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 2-4'
10. Sampling Method (ss) tr, au) SS
11. Presampling sampler decon method (lab/(field)) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/(n)) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-004-24
15. Comments PID BATTERY IS DEAD

16. Reviewed by: AKP Date/Time 2/8/95 1710

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 8, 1995 1500 Sample No. SB07-003-911
2. Location FORT STORY - AUTO CRAFT SITE
3. Previous Sample SB07-003-57
4. Sampler CWJF
5. Others NEAL WOMGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading ____
7. Weather: Wind 15-25 MPH, Precipitation 0", Air Temperature 30°F
8. FEL No.'s Cond. ____, pH ____, Temp. ____, Redox ____
9. Sampling Depth 9 - 11'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) ____
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-004-24
15. Comments PID BATTERY DEAD
16. Reviewed by: AKP Date/Time 2/8/95 1710

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 8, 1995 1450 Sample No. SB07-3000-57
2. Location FORT STORY - AUTO CRAFT SITE
3. Previous Sample SB07-0006-911
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EDPARO
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading N/A
7. Weather: Wind 15-25 MPH, Precipitation 0", Air Temperature 30° F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 5-7
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-0004-24
15. Comments TPH-HEAVY AND TCL-SVOC DUPLICATE OF SB07-0003-57
    PID BATTERY IS DEAD
16. Reviewed by: AKP Date/Time 2/8/95 1710

    Form Complete? [Y or N] Y

    Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 8, 1995/1450 Sample No. SB07-003-57
2. Location FORT STORY - AUTO CRAFT SITE
3. Previous Sample SB07-006-911
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EDWARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading N/A
7. Weather: Wind 15-25 MPH, Precipitation 0", Air Temperature 30°F
8. FEL No.'s Cond. ———, pH ———, Temp. ———, Redox ———
9. Sampling Depth 5-7'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LAB BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-004-24
15. Comments PID NOT WORKING. BATTERY DEAD

16. Reviewed by: AKP Date/Time 2/8/95 1710

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 8 1995 / 1205 Sample No. SB07-002-68
2. Location FORT STORY - AUTO CRAFT SITE
3. Previous Sample SB07-002-24
4. Sampler CWJF
5. Others NEAL WOHLGAMUTH, ANTHONY EDARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading N/A
7. Weather: Wind 15-25 MPH, Precipitation 0", Air Temperature 30°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 6-8'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-004-24
15. Comments PID BATTERY IS DEAD

16. Reviewed by: AKP Date/Time 2/8/95 1710

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 3, 1995 / 0935 Sample No. SB04-015-24
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-017-68
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0.0/0.0
7. Weather: Wind 5-10 MPH, Precipitation 0", Air Temperature ~40°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox
9. Sampling Depth 2-4'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-016-24
15. Comments REPOSITION RIG 4 TIMES
16. Reviewed by: AKP Date/Time 2/3/95 1630

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 3, 1995 / 0935 Sample No. SB04-510-24
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-017-68
4. Sampler WTF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0.0, 0.0
7. Weather: Wind 5-10 MPH, Precipitation 0", Air Temperature ~40°F
8. FEL No.'s Cond. ——, pH ——, Temp. ——, Redox ——
9. Sampling Depth 2-4'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-016-24
15. Comments REPOSITION RIG 4 TIMES

16. Reviewed by: AWP Date/Time 2/3/95 1630

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 3 1995 / 0945 Sample No. SB04-015-68
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-017-68
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0.0, 0.0
7. Weather: Wind 5-10 MPH, Precipitation 0", Air Temperature ~40°F
8. FEL No.'s Cond. ———, pH ———, Temp. ———, Redox ———
9. Sampling Depth 6-8'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-016-24
15. Comments
16. Reviewed by: AKP Date/Time 2/3/95 1630

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 3, 1995 / 0745 Sample No. SB04-016-24
2. Location FORT STORY - FTA SITE
3. Previous Sample FIRST OF DAY
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EDPACO
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0.0, 0.0
7. Weather: Wind 5-10 MPH, Precipitation 0", Air Temperature ~40°F
8. FEL No.'s Cond. ——, pH ——, Temp. ——, Redox ——
9. Sampling Depth 2-4'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) IMMEDIATELY PLACE SOILS IN TCL-VOCs AND TPH LIGHT CONTAINERS. HOMOGENIZE REST OF SOIL AND PLACE IN TCL-SVOC AND TPH HEAVY
15. Comments ——

16. Reviewed by: AHP Date/Time 2/3/95 1630

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 3, 1995 / 0755 Sample No. SB04-016-68
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-016-24
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL 200, Reading _____
7. Weather: Wind 5-10 MPH, Precipitation wet & C", Air Temperature 40°F
8. FEL No.'s Cond. ——, pH ——, Temp. ——, Redox ——
9. Sampling Depth 6 - 8'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) _____
13. Equipment blank no. _____
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-016-24
15. Comments _____
16. Reviewed by: AVP Date/Time 2/3/95 1630

    Form Complete? [Y or N] Y

    Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 3, 1995 / 0840 Sample No. SB04-017-24
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-016-68
4. Sampler WJF
5. Others NEAL WOLHGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0.0, 0.0
7. Weather: Wind _____, Precipitation _____, Air Temperature _____
8. FEL No.'s Cond. ——, pH ——, Temp. ——, Redox ——
9. Sampling Depth 2-4'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/(field)) SEE FIELD LOGBOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-016-24
15. Comments _____

16. Reviewed by: AKP Date/Time 2/3/95 1630

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 3, 1995 / 0845 WJF Sample No. SB04-017-68
2. Location FORT STORY - ETA SITE
3. Previous Sample SB04-017-24
4. Sampler WJF
5. Others NEAL WALHGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0.0/0.0
7. Weather: Wind _____, Precipitation _____, Air Temperature _____
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 6-8'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-016-24
15. Comments REPOSITIONED RIG 4 TIMES
16. Reviewed by: AWP Date/Time 2/3/95 1630

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 2, 1995/1430 Sample No. SB04-018-24
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-019
4. Sampler WJF
5. Others NEAL WOMACMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 10.8* 5.1**
7. Weather: Wind 5-10, Precipitation <.1", Air Temperature ~40°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 2-4
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SAMPLING FORM SB04-021-24
15. Comments

16. Reviewed by: AM Date/Time 2/2/95 1600

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

* BACKGROUND 2.1 ppm

** BACKGROUND AT 0.0 ppm

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 2, 1995 / 1438 Sample No. SB04-018-68
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-019
4. Sampler WJF
5. Others NEAL NOHLGAMUTH, ANTHONY EDDARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 10.0*, 5.7**
7. Weather: Wind 5-10 MPH, Precipitation <.1", Air Temperature ~40°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 6-8'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/(field)) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SAMPLE FOR SB04-021-24
15. Comments

16. Reviewed by: AKP Date/Time 2/2/95 1600

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

* BACKGROUND AT 2.0 ppm

** BACKGROUND AT 0.0 ppm

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 2, 1995 / 1343 Sample No. SBG4-019-24
2. Location FORT STORY - FTA SITE
3. Previous Sample SBG4-020
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 10.3* 12.0*
7. Weather: Wind 5-10 MPH, Precipitation <.1", Air Temperature ~40°F
8. FEL No.'s Cond. ——, pH ——, Temp. ——, Redox ——
9. Sampling Depth 2-4'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/~~field~~) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SAMPLE FORM SBG4-021-24
15. Comments ——
16. Reviewed by: AMP Date/Time 2/2/95 1600

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

* BACKGROUND IS AT 4.8ppm. PID IS VARYING POSSIBLY BECAUSE OF ~~PG~~ VEHICULAR ACTIVITY AT LOADING RAMP

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 2 1995 / 1350 Sample No. SB04-019-68
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-020
4. Sampler CJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. _____, Reading 13.1* 13.2
7. Weather: Wind 5-10 MPH, Precipitation <.1", Air Temperature ~40°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 6-8'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/(field)) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SAMPLE FORM SB04-021-24
15. Comments _____
16. Reviewed by: AMP Date/Time 2/2/95 1600

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

* BACKGROUND AT 4.9 PPM

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 2, 1995 / 1155 Sample No. SB04-020-24
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-021
4. Sampler WTF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 5.1*
7. Weather: Wind 5-10 MPH, Precipitation <.1", Air Temperature ~40°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 2-4'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/~~field~~) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SAMPLE FORM SB04-021-24
15. Comments METALS (CD, HG) COLLECTED AT 2-4' INTERVAL
    REPOSITIONED RIG 3 TIMES
16. Reviewed by: AVP Date/Time 2/2/95 1600

    Form Complete? [Y or N] Y

    Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

* BACKGROUND AT 2.2 ppm.

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 2 1995 1210 Sample No. SB04-021-68
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-021-68
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. _____, Reading 6.3*, 24.6
7. Weather: Wind 5-10 MPH, Precipitation <.1", Air Temperature ~40°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 6-8'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SAMPLE FORM SB04-021-24
15. Comments REDISTICKED RIG 3 TIMES
16. Reviewed by: AWP Date/Time 2/3/95 1600

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

* BACKGROUND AT 1.2 PPM

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 2, 1995 / 1100 Sample No. SB04-021-24
2. Location FORT STORY - FTA
3. Previous Sample NONE
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 3.0*, 3.6
7. Weather: Wind ~5 MPH, Precipitation <.1", Air Temperature ~45°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 2-4'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) HOMOGENIZE REST OF SOIL FOR TCL-SVOCs AND TPH-HEAVY IMMEDIATELY PLACE SOILS IN TCL-VOCs AND TPH LIGHT CONTAINERS.
15. Comments REPOSITIONED RIG 2 TIMES
16. Reviewed by: AKP Date/Time 2/2/95 1600

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

* PID BACKGROUND WAS AT 3.0. RECALIBRATED

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 2 1995 / 1110 Sample No. SB04-021-68
2. Location FORT STORY - FIRE TRAINING AREA
3. Previous Sample ~~NONE~~ WJF SB04-021-24
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 2.7, 3.1
7. Weather: Wind ~5 MPH, Precipitation <.1", Air Temperature ~45°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 6-8'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab (field)) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SAMPLE FORM SB04-021-24
15. Comments REPOSITIONED RIG 2 TIMES
16. Reviewed by: AVP Date/Time 2/2/95 1600

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 2, 1995 / 1540 Sample No. SB04-022-24
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-018
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARO
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 29.7*, 12.2**
7. Weather: Wind 5-10 MPH, Precipitation <1", Air Temperature ~ 40°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 2-4'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) _____
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SAMPLING FORM SB04-021-24
15. Comments REPOSITIONED RIG 4 TIMES
16. Reviewed by: AWP Date/Time 1600 2/2/95

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

* BACKGROUND AT 4.9 PPM

** BACKGROUND AT 5.0 PPM

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 2, 1995 / 1540 Sample No. SB04-220-24
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-018
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 29.7*, 12.2**
7. Weather: Wind 5-10 MPH, Precipitation <.1", Air Temperature ~40°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 2-4'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SAMPLE FORM SB04-021-24
15. Comments DUPLICATE SAMPLE OF SB04-022-24
    REPOSITIONED RIG 4 TIMES
16. Reviewed by: AVP Date/Time 2/3/95 1600
    Form Complete? [Y or N] Y
    Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

* BACKGROUND AT 4.9 PPM

** BACKGROUND AT 5.0 PPM

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 2, 1995 / 1553 Sample No. SB04-022-68
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-022-24
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 16.4* 5.0**
7. Weather: Wind 5-10 MPH, Precipitation <.1", Air Temperature ~40°F
8. FEL No.'s Cond. ——, pH ——, Temp. ——, Redox ——
9. Sampling Depth 6-8'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/(field)) SEE FLECO LOG BOOK
12. Presample Equipment Blank taken (y/(n)) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SAMPLING FORM SB04-021-24
15. Comments REPOSITIONED RIG 4 TIMES
16. Reviewed by: AVP Date/Time 2/2/95 1615

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

* BACKGROUND AT 4.4 ppm

** BACKGROUND AT 5.1 ppm

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 2, 1995 / 1553 Sample No. SB04-220-68
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-022-24
4. Sampler WJF
5. Others ~~ANTH~~ WJF NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HC-200, Reading 16.4*, 15.0**
7. Weather: Wind 5-10 MPH, Precipitation <.1", Air Temperature ~40°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 6-8'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LAB BOOK
12. Presample Equipment Blank taken (y/n) NC
13. Equipment blank no. N/A
14. Sample type (composite/voc)
15. Comments DUPLICATE OF SB04-022-68
    REPOSITIONED RIG 4 TIMES
16. Reviewed by: AMP Date/Time 2/2/95 1615
    Form Complete? [Y or N] Y
    Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

* BACKGROUND AT 4.4 PPM

** BACKGROUND AT 5.1 PPM

SURFACE WATER/SEDIMENT SAMPLING FORM

1. Date/Time 2/2/95 8:00 Sample No. SD04-001-01 SD04-100-01 (Dup)
2. Location Drainage / wetland area south of FTA
3. Sampler Scott Bailey
4. Others Present Tony Pace
5. Organic Vapor Detector FEL No. —, Reading —
6. Weather: Wind 5 to 10 mph, Precipitation NONE, Air Temperature 50°F
7. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
8. Cond. µmhos/cm pH Temp. Redox mv
   Sample — — — —
9. Dissolved Oxygen: (Circle One) Winkler or Meter (If Winkler, Show all Work)
10. Filtered Sample? _____ Membrane Filter Size _____
11. Flow No flow Method Hand auger
12. Depth — Bottom Type ~~Sandy~~ / top soil
13. Riparian Vegetation _____
14. Other Observations (Algae, Blooms, Etc.) Top soil present for ave 12" of sample, brown soil
15. [Y or N] Turbid? _____
16. Floating Solids or Liquids? _____
17. Sample Type: Water _____, Sediment X
    Depth of Sample: 0 to 12"
    Comments: _____
18. Reviewed by: AMP Date/Time 2/2/95 1600
    Form Complete? [Y or N] Y
    Decon Complete [Y or N] Y

SURFACE WATER/SEDIMENT SAMPLING FORM

1. Date/Time 2-2-95 8:30 Sample No. SD 04-002-01
2. Location Drainage / wetland area south of site (FTA)
3. Sampler Scott Bailey
4. Others Present Tony Pace
5. Organic Vapor Detector FEL No. —, Reading —
6. Weather: Wind 5 to 10 mph, Precipitation None, Air Temperature 50°F
7. FEL No.'s Cond. —, pH —, Temp. —, Redox —
8.

	Cond. µmhos/cm	pH	Temp.	Redox mv
Sample	—	—	—	—

9. Dissolved Oxygen: (Circle One) Winkler or Meter (If Winkler, Show all Work)
10. Filtered Sample? — Membrane Filter Size —
11. Flow No flow Method Hand auger
12. Depth — Bottom Type Top soil / Sand
13. Riparian Vegetation
14. Other Observations (Algae, Blooms, Etc.) Top soil present to 6" depth, wet sand at depth 6" to 12"
15. [Y or N] Turbid?
16. Floating Solids or Liquids?
17. Sample Type: Water , Sediment X
    Depth of Sample: 0 to 12"
    Comments:
18. Reviewed by: AMP Date/Time 2/2/95
    Form Complete? [Y or N] Y
    Decon Complete [Y or N] Y

SURFACE WATER/SEDIMENT SAMPLING FORM

1. Date/Time 2/2/95 9:00 Sample No. SD04-003-01
2. Location Drainage / wetland area south of FLA
3. Sampler Scott Bailey
4. Others Present Tony Pace
5. Organic Vapor Detector FEL No. —, Reading —
6. Weather: Wind 5 to 10 mph Precipitation None, Air Temperature 50°F
7. FEL No.'s Cond. —, pH —, Temp. —, Redox —
8. Cond. µmhos/cm pH Temp. Redox mv
   Sample — — — —
9. Dissolved Oxygen: (Circle One) Winkler or Meter (If Winkler, Show all Work)
10. Filtered Sample? Membrane Filter Size
11. Flow No flow Method Hand auger
12. Depth — Bottom Type Sand
13. Riparian Vegetation
14. Other Observations (Algae, Blooms, Etc.) Dark sand present at a depth of 0 to 3", tan sand present 3" to 12"
15. [Y or N] Turbid?
16. Floating Solids or Liquids?
17. Sample Type: Water , Sediment X
    Depth of Sample: 0 to 12"
    Comments:
18. Reviewed by: AVP Date/Time 2/2/95 1600
    Form Complete? [Y or N] Y
    Decon Complete [Y or N] Y

SURFACE WATER/SEDIMENT SAMPLING FORM

1. Date/Time 2-2-95 9:15 Sample No. SD04-004-01
2. Location Drainage / wetland area south of FTA
3. Sampler Scott Bailey
4. Others Present Tony Pace
5. Organic Vapor Detector FEL No. —, Reading —
6. Weather: Wind 5 to 10 mph, Precipitation None, Air Temperature 50°F
7. FEL No.'s Cond. —, pH —, Temp. —, Redox —
8. Cond. µmhos/cm pH Temp. Redox mv
   Sample — — — —
9. Dissolved Oxygen: (Circle One) Winkler or Meter (If Winkler, Show all Work)

10. Filtered Sample? — Membrane Filter Size —
11. Flow No flow Method Hand auger
12. Depth — Bottom Type Sand
13. Riparian Vegetation —
14. Other Observations (Algae, Blooms, Etc.) Dark sand present 0 to 6", dark tan sand present 6 to 12"
15. [Y or N] Turbid?
16. Floating Solids or Liquids?
17. Sample Type: Water —, Sediment X
    Depth of Sample: 0 to 12"
    Comments:
18. Reviewed by: AKP Date/Time 2/2/95 1600
    Form Complete? [Y or N] Y
    Decon Complete [Y or N] Y

LARC 60 SAMPLING FORMS

MALCOLM PIRNIE

11832 Rock Landing Drive, Suite 400, Newport News, VA 23606

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-783-200

DATE: 3/23/00

PROJECT NAME: Remedial Investigation

SAMPLERS: Shelly Kolb / Chris Pianta

SITE LOCATION: Fort Story, Virginia

SAMPLE COLLECTION INFORMATION

SITE CONTACT:

WEATHER CONDITIONS: Ptly Cloudy ~50°f windy

WELL IDENTIFICATION NUMBER: MW-118

WELL HEADSPACE READING: NA

PID MODEL/LAMP: N/A

DEPTH TO WATER: 5.91 FT FROM TOC

WELL DEPTH 10.3 FT FROM TOC

HEIGHT OF WATER IN WELL: 4.39 FT FROM TOC

WELL VOLUME: .72 GAL

PURGE VOLUME: 2.16 GAL

PURGE START TIME: 0948

PURGE FINISH TIME: 1010

WELL EVACUATION DEVICE: well wizard

" "

SAMPLE COLLECTION DEVICE:

SAMPLING START TIME: 1010

SAMPLING FINISH TIME: 1015

SAMPLE APPEARANCE: CLEAR

FIELD PARAMETERS	FIRST	SECOND	THIRD	FOURTH	FIFTH
temperature (degrees C)	15.0	15.3	15.2	15.2	15.2
specific conductivity (umhos/cm)	0.168	0.079	.081	.085	.088
pH (SU)	4.32	5.34	5.67	5.79	5.81
dissolved oxygen (mg/l)	9.11	9.09	9.07	9.02	9.02
volume purged (gallons)	0.2	1.0	1.5	2.25	3.0

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: VOC / TSS/TDS/ TOT + D.SS METALS / PEST PCBS

LABORATORY: SAVANNAH

CONTACT: L. WOLFE

NOTES:

Casing Diameter (in)	Casing Volume (Gal per Ft)
2.0	0.1632
4.0	0.6528
6.0	1.4687

MALCOLM PIRNIE

11832 Rock Landing Drive, Suite 400, Newport News, VA 23606

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-783-200

DATE: 3/23/00

PROJECT NAME: Remedial Investigation

SAMPLERS: Shelly Kolb / Chris Pianta

SITE LOCATION: Fort Story, Virginia

SAMPLE COLLECTION INFORMATION

SITE CONTACT:

WEATHER CONDITIONS: SUNNY ~50°F

WELL IDENTIFICATION NUMBER: MW-117

WIND:

WELL HEADSPACE READING: NA

PID MODEL/LAMP: NA

DEPTH TO WATER: 8.95 FT FROM TOC

WELL DEPTH 11.66 FT FROM TOC

HEIGHT OF WATER IN WELL: 2.71 FT FROM TOC

WELL VOLUME: .44 GAL

PURGE VOLUME: 1.32 GAL

PURGE START TIME: 1023

PURGE FINISH TIME: 1045

WELL EVACUATION DEVICE: well wizard

SAMPLE COLLECTION DEVICE: " "

SAMPLING START TIME: 1045

SAMPLING FINISH TIME: 1058

SAMPLE APPEARANCE: SOME PET. ODOR - BLACK solid floating in water (NEAR ~~former~~ UST SITE)

FIELD PARAMETERS	FIRST	SECOND	THIRD	FOURTH	FIFTH
temperature (degrees C)	14.5	14.6	14.2	14.2	14.4
specific conductivity (umhos/cm)	.181	.201	.210	.210	.212
pH (SU)	5.96	6.04	6.05	6.03	6.05
dissolved oxygen (mg/l)	9.62	9.27	9.24	9.02	9.08
volume purged (gallons)	0.1	0.5	0.8	1.1	1.6

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: VOC / PEST / PCB / TOT + DISS METALS / TSS / TDS

LABORATORY: SAVANNAH

CONTACT: L. WOLFE

NOTES:

Casing Diameter (in)	Casing Volume (Gal per Ft)
2.0	0.1632
4.0	0.6528
6.0	1.4687

MALCOLM PIRNIE

11832 Rock Landing Drive, Suite 400, Newport News, VA 23606

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-783-200

DATE: 3/23/00

PROJECT NAME: Remedial Investigation

SAMPLERS: Shelly Kolb / Chris Pianta

SITE LOCATION: Fort Story, Virginia

SAMPLE COLLECTION INFORMATION

SITE CONTACT:

WEATHER CONDITIONS: Sunny windy ~50°f

WELL IDENTIFICATION NUMBER: MW-115

WELL HEADSPACE READING:

PID MODEL/LAMP:

DEPTH TO WATER: 3.82 FT FROM TOC

WELL DEPTH 7.89 FT FROM TOC

HEIGHT OF WATER IN WELL: ~~3.82~~ 4.07 FT FROM TOC

WELL VOLUME: .66 GAL

PURGE VOLUME: .99 GAL

PURGE START TIME: 1113

PURGE FINISH TIME: 1135

WELL EVACUATION DEVICE: well wiz

SAMPLE COLLECTION DEVICE: "

SAMPLING START TIME: 1135

SAMPLING FINISH TIME: 1140

SAMPLE APPEARANCE: CLEAR

FIELD PARAMETERS	FIRST	SECOND	THIRD	FOURTH	FIFTH
temperature (degrees C)	13.2	13.5	13.6	13.5	13.5
specific conductivity (umhos/cm)	0.156	0.157	0.154	0.155	0.154
pH (SU)	5.89	6.02	6.20	6.32	6.34
dissolved oxygen (mg/l)	10.48	10.40	10.44	10.21	10.22
volume purged (gallons)	0.1	0.7	1.5	2.0	2.5

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: VOC / PEST / PCB / TSS / TDS / TOT + DISS METALS

LABORATORY: SAVANNAH

CONTACT: L. WOLFE

NOTES:

Casing Diameter (in)	Casing Volume (Gal per Ft)
2.0	0.1632
4.0	0.6528
6.0	1.4687

MALCOLM PIRNIE

11832 Rock Landing Drive, Suite 400, Newport News, VA 23606

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-783-200

DATE: 3/23/00

PROJECT NAME: Remedial Investigation

SAMPLERS: Shelly Kolb / Chris Pianta

SITE LOCATION: Fort Story, Virginia

SAMPLE COLLECTION INFORMATION

SITE CONTACT:

WEATHER CONDITIONS: Sunny ~ 50°F Windy

WELL IDENTIFICATION NUMBER: MW-106

WELL HEADSPACE READING: NA

PID MODEL/LAMP: NA

DEPTH TO WATER: 5.76 FT FROM TOC

WELL DEPTH 5.76 FT FROM TOC

HEIGHT OF WATER IN WELL: 5.00 FT FROM TOC

WELL VOLUME: .815 GAL

PURGE VOLUME: 2.45 GAL

PURGE START TIME: 1324

PURGE FINISH TIME: 1340

WELL EVACUATION DEVICE: well wizard

SAMPLE COLLECTION DEVICE: " "

SAMPLING START TIME: 1340

SAMPLING FINISH TIME: 1345

SAMPLE APPEARANCE:

FIELD PARAMETERS	FIRST	SECOND	THIRD	FOURTH	FIFTH
temperature (degrees C)	11.3	11.3	11.4	11.2	11.2
specific conductivity (umhos/cm)	.090	.076	0.071	0.071	0.072
pH (SU)	6.13	5.32	5.21	5.09	5.03
dissolved oxygen (mg/l)	11.34	11.33	11.40	11.40	11.32
volume purged (gallons)	.25	1.0	1.5	2.0	2.5

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: VOC / PEST / PCB / TOT + Diss Metals / TSS / TDS

LABORATORY: SAVANNAH

CONTACT: L. WOLFE

NOTES:

Casing Diameter (in)	Casing Volume (Gal per Ft)
2.0	0.1632
4.0	0.6528
6.0	1.4687

MALCOLM PIRNIE

11832 Rock Landing Drive, Suite 400, Newport News, VA 23606

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-783-200

DATE: 3/23/00

PROJECT NAME: Remedial Investigation

SAMPLERS: Shelly Kolb / Chris Pianta

SITE LOCATION: Fort Story, Virginia

SAMPLE COLLECTION INFORMATION

SITE CONTACT:

WEATHER CONDITIONS: Sunny ~50°F Breezy

WELL IDENTIFICATION NUMBER: GMW-1

WELL HEADSPACE READING: NA

PID MODEL/LAMP: NA

DEPTH TO WATER: 5.72 FT FROM TOC

WELL DEPTH 8.78 FT FROM TOC

HEIGHT OF WATER IN WELL: 3.06 FT FROM TOC

WELL VOLUME: .50 GAL

PURGE VOLUME: 1.50 GAL

PURGE START TIME: 1401

PURGE FINISH TIME: 1415

WELL EVACUATION DEVICE: well wiz

SAMPLE COLLECTION DEVICE: "

SAMPLING START TIME: 1415

SAMPLING FINISH TIME: 1419

SAMPLE APPEARANCE: clear

FIELD PARAMETERS	FIRST	SECOND	THIRD	FOURTH	FIFTH
temperature (degrees C)	15.8	15.4	15.1	15.4	15.3
specific conductivity (umhos/cm)	.094	.101	.103	.103	.104
pH (SU)	5.75	5.67	5.85	5.91	5.93
dissolved oxygen (mg/l)	9.19	9.21	9.30	9.41	9.52
volume purged (gallons)	.12	.5	1.0	1.4	1.7

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: VOC / PEST / PCB / TDS / TSS / TOT+D. >5 Metals

LABORATORY: SAVANNAH

CONTACT: L. WOLFE

NOTES:

Casing Diameter (in)	Casing Volume (Gal per Ft)
2.0	0.1632
4.0	0.6528
6.0	1.4687

MALCOLM PIRNIE

11832 Rock Landing Drive, Suite 400, Newport News, VA 23606

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-783-200

DATE: 3/23/00

PROJECT NAME: Remedial Investigation

SAMPLERS: Shelly Kolb / Chris Pianta

SITE LOCATION: Fort Story, Virginia

SAMPLE COLLECTION INFORMATION

SITE CONTACT:

WEATHER CONDITIONS: Pt ly Cloudy ~ 50° F Breezy

WELL IDENTIFICATION NUMBER: 6MW-35 +3SD

WELL HEADSPACE READING: NA

PID MODEL/LAMP: NA

DEPTH TO WATER: 4.19 FT FROM TOC

WELL DEPTH 9.30 FT FROM TOC

HEIGHT OF WATER IN WELL: ~~5~~ 5.11 FT FROM TOC

WELL VOLUME: .83 GAL

PURGE VOLUME: ~~2~~ 2.49 GAL

PURGE START TIME: 1435

PURGE FINISH TIME: 1450

WELL EVACUATION DEVICE: well wtg 1.

SAMPLE COLLECTION DEVICE: 1.

SAMPLING START TIME: 1450

SAMPLING FINISH TIME: 1506

SAMPLE APPEARANCE:

FIELD PARAMETERS	FIRST	SECOND	THIRD	FOURTH	FIFTH
temperature (degrees C)	15.7	15.9	15.9	16.0	15.9
specific conductivity (umhos/cm)	0.215	0.191	0.185	0.183	0.184
pH (SU)	6.09	6.21	6.24	6.24	6.30
dissolved oxygen (mg/l)	9.40	9.21	9.18	9.09	9.02
volume purged (gallons)	0.1	0.5	1.0	1.75	2.5

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED:

LABORATORY:

CONTACT:

NOTES: Duplicate collected

Casing Diameter (in)	Casing Volume (Gal per Ft)
2.0	0.1632
4.0	0.6528
6.0	1.4687

MALCOLM PIRNIE

11832 Rock Landing Drive, Suite 400, Newport News, VA 23606

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-783-200

DATE: 3/23/00

PROJECT NAME: Remedial Investigation

SAMPLERS: Shelly Kolb / Chris Pianta

SITE LOCATION: Fort Story, Virginia

SAMPLE COLLECTION INFORMATION

SITE CONTACT:

WEATHER CONDITIONS: Ptly Sunny ~50°F Breezy

WELL IDENTIFICATION NUMBER: GMW-4

WELL HEADSPACE READING: NA

PID MODEL/LAMP: NA

DEPTH TO WATER: 2.22 FT FROM TOC

WELL DEPTH 10.42 FT FROM TOC

HEIGHT OF WATER IN WELL: 8.20 FT FROM TOC

WELL VOLUME: 1.34 GAL

PURGE VOLUME: 4.02 GAL

PURGE START TIME: 1525

PURGE FINISH TIME: 1545

WELL EVACUATION DEVICE: well wizz

SAMPLE COLLECTION DEVICE: " "

SAMPLING START TIME: 1545

SAMPLING FINISH TIME: 1551

SAMPLE APPEARANCE:

FIELD PARAMETERS	FIRST	SECOND	THIRD	FOURTH	FIFTH
temperature (degrees C)	14.4	15.0	14.9	14.8	14.8
specific conductivity (umhos/cm)	.552	.510	.484	.472	.464
pH (SU)	~~6.25~~ 6.25	6.17	6.16	6.18	6.18
dissolved oxygen (mg/l)	9.16	9.39	9.40	9.40	9.40
volume purged (gallons)	.12	1.0	2.0	3.0	4.0

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED:

LABORATORY:

CONTACT:

NOTES:

Casing Diameter (in)	Casing Volume (Gal per Ft)
2.0	0.1632
4.0	0.6528
6.0	1.4687

GROUNDWATER SAMPLING FORM

1. Date 4/14/95 Sample No. GMW-1
   Time 0725
2. Location FT STORY - LARC 60
3. Well No. GMW-1 Sketch on Back (Y or N) No
4. Total Depth 13.8 Number of Screened Interval(s) 10'
5. Depth to Screen/Length(s) _____
6. (Y or N) Well Secure? YES Comments SULFUR ODOR

7. Sampler WJF Other present AKP
8. Organic Vapor Detector FEL No. N/A, Reading N/A
9. Weather: Wind 0, Precipitation 0, Air Temperature 65
10. Water Level Measurement: FEL No. 6.40
11. Sampler WJF
12. Previous Well Sampled FIRST OF DAY
    Decon Method (Lab/Field) DISPOSABLE
13. Equipment Blank Taken (Y or N) No
14. Casing Type SCHED 40 PVC, I.D. 2", Gal/Ft. .163 (1)
15. Total Depth 13.8 - Depth to Water 6.40 = Ht. 7.4
16. Well Volume 1.21 = Ht. 7.4 X Gal/Ft. .163 (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge 4 GALLONS
18. Purge Water Containerized No
19. FEL No.'s Cond. YSI 33 pH HACH 1 Temperature HACH 1 ~~Redox~~ Turbidity HACH 2100P
20.

	mS ~~µmhos/cm~~	pH	Temp.	~~Redox mv~~	TURBIDITY (NTU)
Cond. Initial	.20	6.29	15.8		40.0
(Purged Cycle)	.10	6.33	16.1		159
	.10	6.32	16.0		309
	.10	6.34	15.8		243
Sample	.10	6.26	15.8		168

21. Turbid (Y or N) YES
22. Color BROWN
23. Sample Filtered No, Filter Size N/A
24. Reviewed By WJF Date/Time 4/26/95 1400

GROUNDWATER SAMPLING FORM

1. Date 4/13/95 Sample No. 6MW-3D
   Time 1605
2. Location Ft Story - LARC 60
3. Well No. 6MW-2 Sketch on Back (Y or N) No
4. Total Depth 39.4 Number of Screened Interval(s) 10
5. Depth to Screen/Length(s) 29
6. (Y or N) Well Secure? YES Comments

7. Sampler WJF Other present AKP, SAB
8. Organic Vapor Detector FEL No. N/A, Reading N/A
9. Weather: Wind 5, Precipitation 0, Air Temperature 70
10. Water Level Measurement: FEL No. 7.40
11. Sampler WJF
12. Previous Well Sampled 6 MW-3D
    Decon Method (Lab/Field) DISPOSABLE
13. Equipment Blank Taken (Y or N) No
14. Casing Type SCHED 40 PVC, I.D. 2", Gal/Ft. .163 (1)
15. Total Depth 39.4 - Depth to Water 7.40 = Ht. 32
16. Well Volume 5.22 = Ht. 32 X Gal/Ft. .163 (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge 20 GALLONS
18. Purge Water Containerized No
19. FEL No.'s Cond. YSI 33 pH HACH 1 Temperature HACH 1 ~~Redox~~ TURBIDITY HACH 2100P
20.

	mS ~~microsiem~~	pH	Temp.	~~Redox mv~~	TURBIDITY CNTU'S
Cond. Initial	.10	6.94	18.2		47.8
(Purged Cycle)	.10	6.37	19.2		33.1
	.10	6.34	19.2		30.9
	.10	6.40	19.2		29.8
Sample	.1	6.46	19.8		29.5

21. Turbid (Y or N) No
22. Color CLEAR TO LT BROWN
23. Sample Filtered YES (METALS) Filter Size .45 µm
24. Reviewed By WJF Date/Time 4/26/95 1400

GROUNDWATER SAMPLING FORM

1. Date 4/14/95 Sample No. 6MW-35
   Time 0955
2. Location Ft. Story - LARC 60
3. Well No. 6MW-35 Sketch on Back (Y or N) _____
4. Total Depth 13.72 Number of Screened Interval(s) _____
5. Depth to Screen/Length(s) _____
6. (Y or N) Well Secure? YES Comments PETROLEUM ODOR AND SHEEN
7. Sampler WJF Other present AKP
8. Organic Vapor Detector FEL No. N/A, Reading WJF
9. Weather: Wind O, Precipitation O, Air Temperature 65°
10. Water Level Measurement: FEL No. 4.94'
11. Sampler WJF
12. Previous Well Sampled MW-117
    Decon Method (Lab/Field) DISPOSABLE
13. Equipment Blank Taken (Y or N) No
14. Casing Type SCHED 40 PVC, I.D. 2", Gal/Ft. .163 (1)
15. Total Depth 13.72 - Depth to Water 4.94 = Ht. 8.78
16. Well Volume 1.43 = Ht. 8.78 X Gal/Ft. .163 (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge 5 GALLONS
18. Purge Water Containerized No
19. FEL No.'s Cond. YSI 33 pH HACH 1 Temperature HACH 1 ~~Redox~~ TURBIDITY HACH 2100P
20.

	~~mS/cm~~ mS	pH	Temp.	~~Redox mV~~	TURBIDITY (NTU)
Cond. Initial	.60	6.64	16.3		19.3
(Purged Cycle)	.50	6.84	16.4		271
	.50	6.94	16.5		249
	.50	7.02	16.5		233
Sample	.40	7.25	16.6		173

21. Turbid (Y or N) YES
22. Color LT BROWN TO BROWN
23. Sample Filtered YES, Filter Size .45 um
24. Reviewed By WJF Date/Time 4/26/95 1400

GROUNDWATER SAMPLING FORM

1. Date 4/13/95 Sample No. 6MW-3D
   Time 1525
2. Location Ft Story - LARC 60
3. Well No. 6MW-3D Sketch on Back (Y or N) No
4. Total Depth 38.5 Number of Screened Interval(s) 10
5. Depth to Screen/Length(s) 28'
6. (Y or N) Well Secure? YES Comments

7. Sampler WJF Other present AKP, SAB
8. Organic Vapor Detector FEL No. NA, Reading NA
9. Weather: Wind ____, Precipitation ____, Air Temperature ____
10. Water Level Measurement: FEL No. 5.10
11. Sampler WJF
12. Previous Well Sampled 7MW-2
    Decon Method (Lab/Field)
13. Equipment Blank Taken (Y or N) No
14. Casing Type ____, I.D. 2", Gal/Ft. ____ (1)
15. Total Depth 38.50 - Depth to Water 5.10 = Ht. 33.4
16. Well Volume 5.44 = Ht. 33.4 X Gal/Ft. .163 (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge 20 GALLONS
18. Purge Water Containerized No
19. FEL No.'s Cond. YSI 33 pH HACH 1 Temperature HACH 1 ~~Redox~~ Turbidity HACH 2100P
20.

	~~µmhos/cm~~ mS	pH	Temp.	~~Redox mv~~	Turbidity (NTU)
Cond. Initial	.1	7.63	18.3		35.2
(Purged Cycle)	.1	7.65	19.8		30.3
	.1	7.40	19.6		10.2
	.1	7.20	19.5		9.9
Sample	.1	7.22	19.7		11.1

21. Turbid (Y or N) No
22. Color Clear
23. Sample Filtered No, Filter Size N/A
24. Reviewed By WJF Date/Time 4/26/95 1400

GROUNDWATER SAMPLING FORM

1. Date 4/14/95 Sample No. 6MW-4
   Time 1220
2. Location FT STORY - LARC 60
3. Well No. 6MW-4 Sketch on Back (Y or N) No
4. Total Depth 13.8 Number of Screened Interval(s) 10'
5. Depth to Screen/Length(s) 4'
6. (Y or N) Well Secure? YES Comments SULFUR ODOR
7. Sampler WJF Other present AKP
8. Organic Vapor Detector FEL No. N/A, Reading N/A
9. Weather: Wind 0, Precipitation 0", Air Temperature 65°F
10. Water Level Measurement: FEL No. 3.0
11. Sampler WJF
12. Previous Well Sampled MW-115
    Decon Method (Lab/Field) DISPOSABLE
13. Equipment Blank Taken (Y or N) No
14. Casing Type SCHED 40 PVC, I.D. 2", Gal/Ft. .163 (1)
15. Total Depth 13.8 - Depth to Water 3.0 = Ht. 10.8
16. Well Volume 1.76 = Ht. 10.8 X Gal/Ft. .163 (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge 6 GALLONS
18. Purge Water Containerized No
19. FEL No.'s Cond. YSI 33 pH HACH 1 Temperature HACH 1 ~~Redox~~ TURBIDITY HACH 2100P
20.

	mS ~~µmhos/cm~~	pH	Temp.	~~Redox mV~~	TURBIDITY (NTU)
Cond. Initial	.20	7.67	14.7		26.3
(Purged Cycle)	.20	7.69	14.8		37.8
	.20	7.54	15.1		44.9
	.20	7.58	15.3		45.6
Sample	.2	7.51	15.5		50.3

21. Turbid (Y or N) No
22. Color CLEAR TO LT. BROWN
23. Sample Filtered No, Filter Size N/A
24. Reviewed By WJF Date/Time 4/26/95 1400

GROUNDWATER SAMPLING FORM

1. Date 4/14/95 Sample No. MW-115
   Time 1140
2. Location Ft. Story - LARC 60
3. Well No. MW-115 Sketch on Back (Y or N) No
4. Total Depth 11.70 Number of Screened Interval(s) ____
5. Depth to Screen/Length(s) ____
6. (Y or N) Well Secure? Yes Comments Sulfur odor
7. Sampler WJF Other present AKP
8. Organic Vapor Detector FEL No. N/A, Reading N/A
9. Weather: Wind 0, Precipitation 0, Air Temperature 65°
10. Water Level Measurement: FEL No. 4.44
11. Sampler WJF
12. Previous Well Sampled 4MW-3S
    Decon Method (Lab/Field) Disposable
13. Equipment Blank Taken (Y or N) No
14. Casing Type Sched 40 PVC, I.D. 2", Gal/Ft. .163 (1)
15. Total Depth 11.70 - Depth to Water 4.44 = Ht. 7.26
16. Well Volume 1.18 = Ht. 7.26 X Gal/Ft. .163 (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge 4 GALLONS
18. Purge Water Containerized No
19. FEL No.'s Cond. YSI 33 pH HACH 1 Temperature HACH 1 ~~Redox~~ Turbidity HACH 2100P
20.

	mS ~~µmhos/cm~~	pH	Temp.	Redox mv	Turbidity (NTU)
Cond. Initial	.30	7.81	15.3		39.3
(Purged Cycle)	.30	7.57	14.3		28.5
	.30	7.47	14.4		26.0
	.30	7.41	14.5		25.5
Sample	.30	7.31	14.8		36.1

21. Turbid (Y or N) No
22. Color Lt Brown
23. Sample Filtered No, Filter Size N/A
24. Reviewed By WJF Date/Time 4/26/95 1400

GROUNDWATER SAMPLING FORM

1. Date 4/14/95 Sample No. MW-117
   Time 0845
2. Location Ft Story - LARC 60
3. Well No. MW-117 Sketch on Back (Y or N) No
4. Total Depth 16.15 BTOC Number of Screened Interval(s) _____
5. Depth to Screen/Length(s) _____
6. (Y or N) Well Secure? YES Comments SULFUR & PETROLEUM ODOR
7. Sampler WJF Other present AKP
8. Organic Vapor Detector FEL No. N/A, Reading N/A
9. Weather: Wind 0, Precipitation 0, Air Temperature 65°
10. Water Level Measurement: FEL No. 9.98
11. Sampler WJF
12. Previous Well Sampled MW-118
    Decon Method (Lab/Field) DISPOSABLE
13. Equipment Blank Taken (Y or N) No
14. Casing Type SCHED 40 PVC, I.D. 2", Gal/Ft. .163 (1)
15. Total Depth 16.15 - Depth to Water 16.15 = Ht. 6.17
16. Well Volume 1.01 = Ht. 6.17 X Gal/Ft. .163 (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge 4 GALLONS
18. Purge Water Containerized No
19. FEL No.'s Cond. YSI 33 pH HACH 1 Temperature HACH 1 ~~Redox~~ TURBIDITY HACH 2100P
20.

	mS ~~µmhos/cm~~	pH	Temp.	~~Redox mv~~	TURBIDITY (NTU)
Cond. Initial	.10	6.38	15.1		46.0
(Purged Cycle)	.10	6.34	15.0		35.7
	.10	6.32	14.9		51.0
	.10	6.43	15.1		45.3
Sample	.10	6.34	14.8		27.0

21. Turbid (Y or N) No
22. Color CLEAR TO LT BROWN
23. Sample Filtered YES, Filter Size .45 µm
24. Reviewed By ~~4/26~~ WJF Date/Time 4/26/95 1400

GROUNDWATER SAMPLING FORM

1. Date 4/14/95 Sample No. MW-118
   Time 0800
2. Location FT STORY CAMP 60
3. Well No. MW-118 Sketch on Back (Y or N) N/A
4. Total Depth 14.3 Number of Screened Interval(s) ____
5. Depth to Screen/Length(s) ____
6. (Y or N) Well Secure? YES Comments ____
7. Sampler WJF Other present AKP
8. Organic Vapor Detector FEL No. ____, Reading ____
9. Weather: Wind 0, Precipitation 6", Air Temperature 65°
10. Water Level Measurement: FEL No. 7.0
11. Sampler WJF
12. Previous Well Sampled 6MW-1
    Decon Method (Lab/Field) DISPOSABLE
13. Equipment Blank Taken (Y or N) No
14. Casing Type SCHED 40 PVC, I.D. 2", Gal/Ft. .163 (1)
15. Total Depth 14.3 - Depth to Water 7.0 = Ht. 7.3
16. Well Volume 1.19 = Ht. ____ X Gal/Ft. ____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge 4 GAL
18. Purge Water Containerized No
19. FEL No.'s Cond. YSI 33 pH HACH 1 Temperature HACH 1 ~~Redox~~ TURBIDITY HACH 2100P
20.

	Cond. ~~µmhos/cm~~ mS	pH	Temp.	~~Redox mv~~	TURBIDITY (NTU)
Cond. Initial	.2	6.30	16.2		96.6
(Purged Cycle)	.2	6.35	15.8		136
	.2	6.38	16.1		168
	.2	6.31	16.0		175
Sample	.2	6.80	15.8		93.0

21. Turbid (Y or N) YES
22. Color BROWN
23. Sample Filtered YES (METALS) Filter Size .45 µm
24. Reviewed By WJF Date/Time 4/26/95 1400

GROUNDWATER SAMPLING FORM

1. Date 3/1/95 Sample No. GW06-001
   Time 1500
2. Location Southern end of LARC 60 area
3. Well No. DPT Pt. 001 Sketch on Back (Y or N) N
4. Total Depth 13 ft. Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 12'/1'
6. (Y or N) Well Secure? N/A Comments

7. Sampler Scott Bailey Other present Tony Pace
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 10 mph, Precipitation light rain, Air Temperature 45°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW06-002
    Decon Method (Lab/(Field)
13. Equipment Blank Taken (Y or (N))
14. Casing Type , I.D. , Gal/Ft. (1)
15. Total Depth 13' - Depth to Water 7.5' = Ht. 5.5'
16. Well Volume = Ht. X Gal/Ft. (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI 33 pH ORION 250A Temperature YSI 33 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	170	6.4	12°C	—

21. Turbid (Y or N) Y
22. Color brown
23. Sample Filtered NO, Filter Size
24. Reviewed By AVP Date/Time 3/3/95 1500

3. GROUNDWATER SAMPLING FORM

1. Date 3/1/95 Sample No. GW06 - 200 GW06 - 002
   Time 1345
2. Location North of former UST
3. Well No. DPT Pt. 002 Sketch on Back (Y or N) N
4. Total Depth 13' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 12' / 1'
6. (Y or N) Well Secure? N/A Comments

7. Sampler Scott Bailey Other present Tony Pace
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 10 mph, Precipitation light rain, Air Temperature 45°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW06 - 003
    Decon Method (Lab/(Field))
13. Equipment Blank Taken (Y) or N) ER06-GW-030195
14. Casing Type _____, I.D. _____, Gal/Ft. _____ (1)
15. Total Depth 13' - Depth to Water 7' = Ht. 6'
16. Well Volume _____ = Ht. _____ X Gal/Ft. _____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI 33 pH ORION 290A Temperature YSI 33 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	190	6.4	12°C	—

21. Turbid (Y or N) Y
22. Color tan
23. Sample Filtered NO, Filter Size
24. Reviewed By AWP Date/Time 3/3/95 1500

3. GROUNDWATER SAMPLING FORM

1. Date 3/1/95 Sample No. GW06 - 003
   Time 1015
2. Location South of OIW separatn & UAEC 60 site
3. Well No. DPT Pt. 003 Sketch on Back (Y or N) N
4. Total Depth 9.5' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) /1'
6. (Y or N) Well Secure? N/A Comments

7. Sampler Scott Bailey Other present
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 10 mph, Precipitation Light rain, Air Temperature 45°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW04 - 023
    Decon Method (Lab/(Field)
13. Equipment Blank Taken (Y or (N))
14. Casing Type , I.D. , Gal/Ft. (1)
15. Total Depth 9.5' - Depth to Water 7' = Ht. 2.5'
16. Well Volume = Ht. X Gal/Ft. (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI 33 pH ORION 290A Temperature YSI 33 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	220	6.8	12°C	—

21. Turbid (Y or N) Y
22. Color tan
23. Sample Filtered No, Filter Size
24. Reviewed By AVP Date/Time 3/3/95 1500

GROUNDWATER SAMPLING FORM

GW06-004MSD
GW06-004MS

1. Date 3/6/95 Sample No. GW06-004
   Time 0930
2. Location Concrete area west of O/W separator
3. Well No. ~~14.5~~ OPT Pt. 004 Sketch on Back (Y or N) N
4. Total Depth 14.5' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 13.5'/1.0'
6. (Y or N) Well Secure? NA Comments
7. Sampler Scott Bailey Other present Tony Pau
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 10 mph, Precipitation Light rain, Air Temperature 45°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW06-024 (3/3/95)
    Decon Method (Lab/(Field))
13. Equipment Blank Taken (Y) or N) EB06-GW-030695
14. Casing Type _____, I.D. _____, Gal/Ft. _____ (1)
15. Total Depth 14.5' - Depth to Water 11.0' = Ht. 3.5'
16. Well Volume _____ = Ht. ____ X Gal/Ft. _____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI pH Orion Temperature YSI Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	70	6.7	13°C	—

21. Turbid (Y or N) Y
22. Color brown
23. Sample Filtered NO, Filter Size
24. Reviewed By AVP Date/Time 3/6/95 1600

GROUNDWATER SAMPLING FORM

1. Date 3/1/95 Sample No. GW06-005
   Time 1630
2. Location North of farm UST
3. Well No. DPT Pt. 005 Sketch on Back (Y or N) N
4. Total Depth 9' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 8'/1'
6. (Y or N) Well Secure? N/A Comments _____

7. Sampler Scott Bailey Other present _____
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 10 mph, Precipitation Light rain, Air Temperature 50°F
10. Water Level Measurement: FEL No. _____
11. Sampler _____
12. Previous Well Sampled GW06-001
    Decon Method (Lab/(Field)) _____
13. Equipment Blank Taken (Y or (N)) _____
14. Casing Type _____, I.D. _____, Gal/Ft. _____ (1)
15. Total Depth 9 - Depth to Water 7.5' = Ht. 1.5'
16. Well Volume _____ = Ht. ____ X Gal/Ft. _____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge _____
18. Purge Water Containerized _____
19. FEL No.'s Cond. 451 pH ORION 290A Temperature 451 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	130	6.7	8°C	—

21. Turbid (Y or N) Y
22. Color brown
23. Sample Filtered No, Filter Size _____
24. Reviewed By AVP Date/Time 3/3/95 1500

GROUNDWATER SAMPLING FORM

1. Date 3/2/95 Sample No. GW06-006
   Time 1345
2. Location Northeast corner of sandbox
3. Well No. DPT Pt. 006 Sketch on Back (Y or N) N
4. Total Depth 9' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 8' / 1'
6. (Y or N) Well Secure? N/A Comments
7. Sampler Scott Bailey Other present Tony Pace
8. Organic Vapor Detector FEL No. MICROTIP HL-300, Reading 0 ppm
9. Weather: Wind 15 mph, Precipitation None, Air Temperature 40°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW06-008
    Decon Method (Lab/Field)
13. Equipment Blank Taken (Y or N)
14. Casing Type , I.D. , Gal/Ft. (1)
15. Total Depth 9' - Depth to Water 6' = Ht. 3'
16. Well Volume = Ht. X Gal/Ft. (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. 451 pH ORION 250A Temperature 451 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	750	7.8	13°C	—

21. Turbid (Y or N) Y
22. Color brown
23. Sample Filtered no, Filter Size
24. Reviewed By AKP Date/Time 3/3/95 1500

GROUNDWATER SAMPLING FORM

1. Date 3/2/95 Sample No. GW06-700 GW06-007
   Time 0830
2. Location West side of sandbox
3. Well No. DPT Pt. 007 Sketch on Back (Y or N) N
4. Total Depth 9.5' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 8.5'/1'
6. (Y or N) Well Secure? NA Comments Sulfurous odor
7. Sampler Scott Bailey Other present
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 15 mph, Precipitation None, Air Temperature 35°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW06-005 (3/1/95)
    Decon Method (Lab/(Field)
13. Equipment Blank Taken (Y or (N))
14. Casing Type _____, I.D. _____, Gal/Ft. _____ (1)
15. Total Depth 9.5' - Depth to Water 5' = Ht. 4.5'
16. Well Volume _____ = Ht. ____ X Gal/Ft. _____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. 451 pH ORION 250A Temperature 451 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	100	6.7	11°C	—

21. Turbid (Y or N) Y
22. Color brown
23. Sample Filtered NO, Filter Size
24. Reviewed By AKP Date/Time 3/3/95 1500

GROUNDWATER SAMPLING FORM

1. Date 3/2/95 Sample No. GW06-008
   Time 1015
2. Location East side of sandbox
3. Well No. DPT Pt. 008 Sketch on Back (Y or N) N
4. Total Depth 9.5' Number of Screened Interval(s) ____
5. Depth to Screen/Length(s) 8.5' / 1'
6. (Y or N) Well Secure? N/A Comments
   Diesel odor
7. Sampler Scott Bailey Other present Tony Pace
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 15 mph, Precipitation None, Air Temperature 35°F
10. Water Level Measurement: FEL No. ____
11. Sampler ____
12. Previous Well Sampled GW06-007
    Decon Method (Lab/(Field)) ____
13. Equipment Blank Taken (Y or (N)) ____
14. Casing Type ____, I.D. ____, Gal/Ft. ____ (1)
15. Total Depth 9.5' - Depth to Water 5.5' = Ht. 4.0'
16. Well Volume ____ = Ht. ____ X Gal/Ft. ____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge ____
18. Purge Water Containerized ____
19. FEL No.'s Cond. YSI pH ORION 290A Temperature YSI Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	300	6.4	11°C	—

21. Turbid (Y or N) N
22. Color brown
23. Sample Filtered no, Filter Size ____
24. Reviewed By AKP Date/Time 3/3/95 1500

GROUNDWATER SAMPLING FORM

1. Date 3/3/95 Sample No. GW06-009
   Time 0930
2. Location Center of sandbox
3. Well No. DPT. Pt. 009 Sketch on Back (Y or N) N
4. Total Depth 10.0' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 9.0'/1.0'
6. (Y or N) Well Secure? N/A Comments

7. Sampler Scott Bailey Other present Tony Pace
8. Organic Vapor Detector FEL No. MICROTIP HL-300, Reading 0 ppm
9. Weather: Wind 10 mph, Precipitation None, Air Temperature 40°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW06-020
    Decon Method (Lab/(Field))
13. Equipment Blank Taken (Y or (N))
14. Casing Type , I.D. , Gal/Ft. (1)
15. Total Depth 10.0' - Depth to Water 4.0' = Ht. 6.0'
16. Well Volume = Ht. X Gal/Ft. (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI pH ORION Temperature YSI Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	750	6.7	13°C	—

21. Turbid (Y or N) Y
22. Color brown
23. Sample Filtered NO, Filter Size
24. Reviewed By AWP Date/Time 3/3/95 1500

GROUNDWATER SAMPLING FORM

1. Date 3/2/95 Sample No. GW06-010
   Time 1630
2. Location Northwest corner of sandbox
3. Well No. DPT Pt. 010 Sketch on Back (Y or N) N
4. Total Depth 5.0' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 4.0'/1.0'
6. (Y or N) Well Secure? N/A Comments Refusal at 5.0'
7. Sampler Scott Bailey Other present Tony Pace
8. Organic Vapor Detector FEL No. MICROTIP HL-300, Reading 0 ppm
9. Weather: Wind 5 mph, Precipitation None, Air Temperature 40°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW06-019
    Decon Method (Lab/Field)
13. Equipment Blank Taken (Y or N)
14. Casing Type _____, I.D. _____, Gal/Ft. _____ (1)
15. Total Depth 5.0 - Depth to Water 4.5' = Ht. 0.5'
16. Well Volume _____ = Ht. _____ X Gal/Ft. _____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. 451 pH ORION Temperature 451 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	130	6.9	11°C	—

21. Turbid (Y or N) Y
22. Color brown
23. Sample Filtered No, Filter Size
24. Reviewed By AVP Date/Time 3/3/95 1500

GROUNDWATER SAMPLING FORM

1. Date 3/6/95 Sample No. GW06-011 (GW06-110A)
   Time 1120
2. Location Concrete area north of O/W separata
3. Well No. DPT Pt. 011 Sketch on Back (Y or N) N
4. Total Depth 14.0' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 13.0'/1.0'
6. (Y or N) Well Secure? N/A Comments _____
7. Sampler Scott Bailey Other present Tony Pace
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 10 mph, Precipitation Light Rain, Air Temperature 45°F
10. Water Level Measurement: FEL No. _____
11. Sampler _____
12. Previous Well Sampled GW06-004
    Decon Method (Lab/(Field)) _____
13. Equipment Blank Taken (Y or (N)) _____
14. Casing Type _____, I.D. _____, Gal/Ft. _____ (1)
15. Total Depth 14.0' - Depth to Water 5.5' = Ht. 8.5'
16. Well Volume _____ = Ht. ____ X Gal/Ft. _____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge _____
18. Purge Water Containerized _____
19. FEL No.'s Cond. YSI pH ORION Temperature YSI Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	210	7.0	12°C	—

21. Turbid (Y or N) Y
22. Color brown
23. Sample Filtered NO, Filter Size _____
24. Reviewed By [signature] Date/Time 3/6/95 1600

GROUNDWATER SAMPLING FORM

1. Date 3/6/95 Sample No. GW06-012
   Time 1400
2. Location North of former UST area
3. Well No. ~~DPT~~ DPT Pt. 012 Sketch on Back (Y or N) N
4. Total Depth 14.5' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 13.5'/1.0'
6. (Y or N) Well Secure? N/A Comments
7. Sampler Scott Bailey Other present Tony Pace
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 10 mph, Precipitation Light rain, Air Temperature 45°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW06-011
    Decon Method (Lab/(Field))
13. Equipment Blank Taken (Y or (N))
14. Casing Type _____, I.D. _____, Gal/Ft. _____ (1)
15. Total Depth 14.5' - Depth to Water 7.5' = Ht. 7.0'
16. Well Volume _____ = Ht. ____ X Gal/Ft. _____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI pH Orion Temperature YSI Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	100	6.7	13°C	—

21. Turbid (Y or N) Y
22. Color brown
23. Sample Filtered NO, Filter Size
24. Reviewed By AKP Date/Time 3/6/95 1600

GROUNDWATER SAMPLING FORM

1. Date 3/6/95 Sample No. GW06-013
   Time 1500
2. Location Northwest of former UST area
3. Well No. DPT Pt. 013 Sketch on Back (Y or N) N
4. Total Depth 15.0' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 14.0' / 1.0'
6. (Y or N) Well Secure? N/A Comments Diesel odor
7. Sampler Scott Baily Other present Tony Pace
8. Organic Vapor Detector FEL No. MICRO TIP HL-200, Reading 0 ppm
9. Weather: Wind 10 mph, Precipitation Light rain, Air Temperature 50 °F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW06-012
    Decon Method (Lab/Field)
13. Equipment Blank Taken (Y or N)
14. Casing Type , I.D. , Gal/Ft. (1)
15. Total Depth 15.0' - Depth to Water 5.0' = Ht. 10.0'
16. Well Volume = Ht. X Gal/Ft. (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI pH Orion Temperature YSI Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	200	6.8	13°C	—

21. Turbid (Y or N) Y
22. Color brown
23. Sample Filtered NO, Filter Size
24. Reviewed By AKP Date/Time 3/6/95 1600

GROUNDWATER SAMPLING FORM

1. Date 3/6/95 Sample No. GW06-014
   Time 1610
2. Location Northwest of sandbox (along Lingayan Gulf Road)
3. Well No. OPT Pt. 014 Sketch on Back (Y or N) N
4. Total Depth 14.5' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 13.5'/1.0'
6. (Y or N) Well Secure? N/A Comments
7. Sampler Scott Bailey Other present Tony Pace
8. Organic Vapor Detector FEL No. MICROTIP HL-200A, Reading 0 ppm
9. Weather: Wind 10 mph, Precipitation light rain, Air Temperature 50°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW06-013
    Decon Method (Lab/(Field))
13. Equipment Blank Taken (Y or (N))
14. Casing Type , I.D. , Gal/Ft. (1)
15. Total Depth 14.5' - Depth to Water 3.0' = Ht. 11.5'
16. Well Volume = Ht. X Gal/Ft. (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. 451 pH Orion Temperature 451 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	75	6.7	13°C	—

21. Turbid (Y or N) Y
22. Color tan
23. Sample Filtered No, Filter Size
24. Reviewed By AKP Date/Time 3/6/95 1645

GROUNDWATER SAMPLING FORM

1. Date 3/7/95 Sample No. GW06-015
   Time 0830
2. Location East end of PWC Compound
3. Well No. OPT Pt. 015 Sketch on Back (Y or N) N
4. Total Depth 10' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 9.0'/1.0'
6. (Y or N) Well Secure? NA Comments

7. Sampler Scott Bailey Other present
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 5 mph, Precipitation Fog, Air Temperature 50°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW06-014 (3/6/95)
    Decon Method (Lab/(Field))
13. Equipment Blank Taken (Y or (N))
14. Casing Type , I.D. , Gal/Ft. (1)
15. Total Depth 10.0' - Depth to Water 5.0' = Ht. 5.0'
16. Well Volume = Ht. X Gal/Ft. (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI pH Orion Temperature YSI Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	150	6.7	13°C	—

21. Turbid (Y or N) Y
22. Color brown
23. Sample Filtered NO, Filter Size
24. Reviewed By AMP Date/Time 3/7/95 1715

GROUNDWATER SAMPLING FORM

1. Date 3/7/95 Sample No. GW06-016
   Time 0930
2. Location East side of Moto Pool
3. Well No. DPT Pt. 016 Sketch on Back (Y or N) N
4. Total Depth 10.0' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 9.0' / 1.0'
6. (Y or N) Well Secure? N/A Comments

7. Sampler Scott Bailey Other present
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 5 mph, Precipitation Fog, Air Temperature 50°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW06-015
    Decon Method (Lab/(Field))
13. Equipment Blank Taken (Y or (N))
14. Casing Type _____, I.D. _____, Gal/Ft. _____ (1)
15. Total Depth 10.0' - Depth to Water 7.5' = Ht. 2.5'
16. Well Volume _____ = Ht. ____ X Gal/Ft. _____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI pH Orion Temperature YSI Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	170	6.5	14°C	—

21. Turbid (Y or N) Y
22. Color brown
23. Sample Filtered NO, Filter Size
24. Reviewed By AMP Date/Time 3/7/95 1715

GROUNDWATER SAMPLING FORM

1. Date 3/7/95 Sample No. GW06-017
   Time 1115
2. Location North of UST area, adjacent to DPT Pt. 002
3. Well No. DPT Pt 017 Sketch on Back (Y or N) N
4. Total Depth 39.5' Number of Screened Interval(s) ____
5. Depth to Screen/Length(s) 38.5'/1.0'
6. (Y or N) Well Secure? N/A Comments ____
7. Sampler Scott Bailey Other present ____
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 5 mph, Precipitation None, Air Temperature 55°F
10. Water Level Measurement: FEL No. ____
11. Sampler ____
12. Previous Well Sampled GW06-016
    Decon Method (Lab/(Field)) ____
13. Equipment Blank Taken (Y or (N)) ____
14. Casing Type ____, I.D. ____, Gal/Ft. ____ (1)
15. Total Depth 39.5' - Depth to Water 6.5' = Ht. 33.0'
16. Well Volume ____ = Ht. ____ X Gal/Ft. ____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge ____
18. Purge Water Containerized ____
19. FEL No.'s Cond. 451 pH Orion Temperature 451 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	100	6.5	12°C	—

21. Turbid (Y or N) ____
22. Color ____
23. Sample Filtered ____, Filter Size ____
24. Reviewed By AWP Date/Time 3/7/95 1715

GROUNDWATER SAMPLING FORM

1. Date 3/3/95 Sample No. GW06-018 (VOCs/TPH Light)
   Time 1220
2. Location Inside PWC compound, downgradient (north) of site
3. Well No. DPT. Pt. 018 Sketch on Back (Y or N) N
4. Total Depth 9.5' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 8.5'/1.0'
6. (Y or N) Well Secure? N/A Comments

7. Sampler Scott Bailey Other present Tony Pace
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 10 mph, Precipitation None, Air Temperature 45°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW06-009
    Decon Method (Lab/(Field))
13. Equipment Blank Taken (Y or (N))
14. Casing Type , I.D. , Gal/Ft. (1)
15. Total Depth 9.5' - Depth to Water 2.0' = Ht. 7.5'
16. Well Volume = Ht. X Gal/Ft. (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. 451 pH ORION Temperature 451 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	800	7.8	12°C	—

21. Turbid (Y or N) Y
22. Color tan
23. Sample Filtered NO, Filter Size
24. Reviewed By AKP Date/Time 3/3/95 1500

GROUNDWATER SAMPLING FORM

1. Date 3/2/95 Sample No. GW06-019 (ON-SITE VOC/TPH ANALYSIS ONLY)
   Time 1515
2. Location North Central part of sandbox
3. Well No. DPT Pt. 019 Sketch on Back (Y or N) N
4. Total Depth 5.5' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 5.4'/0.1'
6. (Y or N) Well Secure? N/A Comments Refusal at 5.5', screen exposed for 0.1 foot only
7. Sampler Scott Bailey Other present Tony Pace
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 15 mph, Precipitation None, Air Temperature 40°F
10. Water Level Measurement: FEL No. _____
11. Sampler _____
12. Previous Well Sampled GW06-006
    Decon Method (Lab/Field) _____
13. Equipment Blank Taken (Y or N) _____
14. Casing Type _____, I.D. _____, Gal/Ft. _____ (1)
15. Total Depth 5.5' - Depth to Water 5.4' = Ht. 0.10'
16. Well Volume _____ = Ht. ____ X Gal/Ft. _____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge _____
18. Purge Water Containerized _____
19. FEL No.'s Cond. 451 pH ORION 290 Temperature 451 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	—	—	—	—

21. Turbid (Y or N) Y
22. Color brown
23. Sample Filtered No, Filter Size _____
24. Reviewed By AMP Date/Time 3/3/95 1500

GROUNDWATER SAMPLING FORM

1. Date 3/3/95 Sample No. GW06-020 (ON-SITE VOC / TPH ANALYSIS ONLY)
   Time 0815
2. Location Northwest corner of Sandbox
3. Well No. DPT. Pt. 020 Sketch on Back (Y or N) N
4. Total Depth 9.0' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 8.0'/1.0'
6. (Y or N) Well Secure? N/A Comments

7. Sampler Scott Bailey Other present Tony Pace
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 10 mph, Precipitation None, Air Temperature 40°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW06-010 (3/2/95)
    Decon Method (Lab/Field)
13. Equipment Blank Taken (Y or N)
14. Casing Type , I.D. , Gal/Ft. (1)
15. Total Depth 9.0' - Depth to Water 4.0' = Ht. 5.0'
16. Well Volume = Ht. X Gal/Ft. (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. pH Temperature Redox
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample				

21. Turbid (Y or N) Y
22. Color brown
23. Sample Filtered NO, Filter Size
24. Reviewed By AVP Date/Time 3/3/95 1500

GROUNDWATER SAMPLING FORM

1. Date 3/3/95 Sample No. GW06 - 021 (VOC/TPH light only)
   Time 1315
2. Location Northeast of sandbox (inside PWC compound)
3. Well No. DPT Pt. 021 Sketch on Back (Y or N) N
4. Total Depth 9.5' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 8.5'/1.0'
6. (Y or N) Well Secure? NA Comments _____

7. Sampler Scott Bailey Other present Tony Pace
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 10 mph, Precipitation None, Air Temperature 50°F
10. Water Level Measurement: FEL No. _____
11. Sampler _____
12. Previous Well Sampled GW06-018
    Decon Method (Lab/(Field)) _____
13. Equipment Blank Taken (Y or (N)) _____
14. Casing Type _____, I.D. _____, Gal/Ft. _____ (1)
15. Total Depth 9.5' - Depth to Water 8.0' = Ht. 1.5'
16. Well Volume _____ = Ht. ____ X Gal/Ft. _____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge _____
18. Purge Water Containerized _____
19. FEL No.'s Cond. YSI pH ORION Temperature YSI Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	100	7.2	10°C	—

21. Turbid (Y or N) Y
22. Color tan
23. Sample Filtered NO, Filter Size _____
24. Reviewed By AMP Date/Time 3/3/95 1500

GROUNDWATER SAMPLING FORM

1. Date 3/3/95 Sample No. GW06-022 (VOC/TPH light mg)
   Time 1350
2. Location Inside PWC compound, downgradient of site
3. Well No. DPT Pt. 022 Sketch on Back (Y or N) N
4. Total Depth 9.5' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 8.5'/1.0'
6. (Y or N) Well Secure? N/A Comments _____

7. Sampler Scott Bailey Other present Tony Pace
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 10 mph, Precipitation None, Air Temperature 50 °F
10. Water Level Measurement: FEL No. _____
11. Sampler _____
12. Previous Well Sampled GW06-021
    Decon Method (Lab/(Field)) _____
13. Equipment Blank Taken (Y or (N)) _____
14. Casing Type _____, I.D. _____, Gal/Ft. _____ (1)
15. Total Depth 9.5' - Depth to Water 2.0' = Ht. 7.5'
16. Well Volume _____ = Ht. ____ X Gal/Ft. _____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge _____
18. Purge Water Containerized _____
19. FEL No.'s Cond. YSI pH ORION Temperature YSI Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	140	6.6	11°C	—

21. Turbid (Y or N) Y
22. Color TAN
23. Sample Filtered NO, Filter Size _____
24. Reviewed By AVP Date/Time 3/3/95 1500

GROUNDWATER SAMPLING FORM

1. Date 3/3/95 Sample No. GW06-023 (VOC / TPH on-site analysis only)
   Time 1450
2. Location Inside PWC Compound (northeast corner)
3. Well No. DPT Pt. 023 Sketch on Back (Y or N) N
4. Total Depth 9.0' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 8.0' / 1.0'
6. (Y or N) Well Secure? N/A Comments

7. Sampler Scott Baily Other present Tony Pace
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 10 mph, Precipitation None, Air Temperature 50 °F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW06-022
    Decon Method (Lab/Field)
13. Equipment Blank Taken (Y) or N) ER06-GW-030395
14. Casing Type , I.D. , Gal/Ft. (1)
15. Total Depth 9.0' - Depth to Water 7.0' = Ht. 2.0'
16. Well Volume = Ht. X Gal/Ft. (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI pH Orion Temperature YSI Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	145	6.7	9°C	—

21. Turbid (Y or N) Y
22. Color tan
23. Sample Filtered NO, Filter Size
24. Reviewed By 3/3/95 AMP Date/Time 3/3/95 1515

GROUNDWATER SAMPLING FORM

1. Date 3/3/95 Sample No. GW06-024 (ON-SITE VOC/T ANALYSIS ONLY)
   Time 1530
2. Location East side of LARC 60 Mota Pool
3. Well No. DPT Pt. 024 Sketch on Back (Y or N) N
4. Total Depth 9.5' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 8.5'/1.0'
6. (Y or N) Well Secure? NA Comments

7. Sampler Scott Bailey Other present Tony Pace
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 10 mph, Precipitation None, Air Temperature 50°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW06-023
    Decon Method (Lab/(Field))
13. Equipment Blank Taken (Y or (N))
14. Casing Type , I.D. , Gal/Ft. (1)
15. Total Depth 9.5' - Depth to Water 8.0' = Ht. 1.5'
16. Well Volume = Ht. X Gal/Ft. (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. 451 pH Orion Temperature 451 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	205	6.7	8°C	—

21. Turbid (Y or N) Y
22. Color brown
23. Sample Filtered NO, Filter Size
24. Reviewed By AVP Date/Time 3/3/95 1600

SOIL SAMPLING FORM

1. Date/Time 2/8/95 1050 Sample No. SS06-001-01
2. Location LARC - Near former UST
3. Previous Sample 1st of Day
4. Sampler Tony Pace
5. Others Scott Bailey
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 10 to 20 mph, Precipitation —, Air Temperature 30 °F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/(field)) Alconox wash, tap water rinse, Methanol rinse, DI rinse, nitric acid rinse, DI rinse
12. Presample Equipment Blank taken (y/(n))
13. Equipment blank no.
14. Sample type (composite/voc) VOC's / TPH Light taken from bowl, others homogenized before sampled
15. Comments Tan sand

16. Reviewed by: AKP Date/Time 2/9/95 1100

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/8/95 1100 Sample No. SS06-002 MS-01 SS06-002-01
2. Location LARC - Nlw former UST
3. Previous Sample SS06-001-01
4. Sampler Tony Pace
5. Others Scott Bailey
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 10 to 20 mph, Precipitation —, Air Temperature 30°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/field) Same as SS06-001-01 minus the nitric acid rinse
12. Presample Equipment Blank taken (y/n)
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS06-001-01
15. Comments Tan Sand
16. Reviewed by: AKP Date/Time 2/9/95 1100

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

SS06-300A-01 (DUPL)
SS06-300-01 (DUPL)

1. Date/Time 2/8/95 1110 Sample No. SS06-003-01
2. Location LARC - Near former UST area
3. Previous Sample SS06-002-01
4. Sampler Tony Pace
5. Others Scott Bailey
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 10 to 20 mph, Precipitation —, Air Temperature 30 °F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/field) Same as SS06-002-01
12. Presample Equipment Blank taken (y/n)
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS06-001-01
15. Comments Tan sand
16. Reviewed by: AKP Date/Time 2/9/95 1100

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/13/95 1030 Sample No. 5506-004-01
2. Location South of O/W Separator
3. Previous Sample First of DAY
4. Sampler Tony Pace
5. Others Stephanie Bishop
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 10 mph, Precipitation —, Air Temperature 28°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/field) Alconox wash, tap water rinse, methanol rinse, DI rinse
12. Presample Equipment Blank taken (y/n)
13. Equipment blank no.
14. Sample type (composite/voc) VOCs/TPH Light transferred from bowl to bottle, others homogenized
15. Comments Tan sand

16. Reviewed by: AVP Date/Time 2/13/95 1720

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/13/95 1035 Sample No. SS06-005-01
2. Location W/S of O/W Separator
3. Previous Sample SS06-004-01
4. Sampler Tony Pace
5. Others Stephanie Bishop
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 10 mph, Precipitation —, Air Temperature 28 °F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/field) Same as SS06-004-01 plus nitric acid rinse
12. Presample Equipment Blank taken (y/n)
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS06-005-01
15. Comments Tan Sand
16. Reviewed by: AVP Date/Time 2/13/95 1720

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 3/13/95 11:20 Sample No. SS06-006-01
2. Location LARC Pad
3. Previous Sample SS06-002-39
4. Sampler WJF
5. Others SAB
6. Organic Vapor Detector FEL No. Micro - Tip, Reading 0ppm
7. Weather: Wind 0-10mph W, Precipitation 0, Air Temperature 60°F
8. FEL No.'s Cond. _____, pH _____, Temp. _____, Redox _____
9. Sampling Depth 0-1 foot BGL
10. Sampling Method (ss, tr, (au)) _____
11. Presampling sampler decon method (lab/(field)) _____
12. Presample Equipment Blank taken (y/(n)) _____
13. Equipment blank no. N/A
14. Sample type (composite/voc) Both
15. Comments collected from first foot of sand underneath LARC Pad
16. Reviewed by: AVP Date/Time 3/15/95 1400

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/3/95 0950 Sample No. SS04-004-01
2. Location Central part of FTA
3. Previous Sample SS04-005-01
4. Sampler Tony Pace
5. Others Scott Bailey
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 15 to 20 mph, Precipitation —, Air Temperature 45°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/(field)) Same as SS04-022-01
12. Presample Equipment Blank taken (y/(n))
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS04-022-01
15. Comments Dark sand

16. Reviewed by: AKP Date/Time 2/3/95 1630

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/3/95 0940 Sample No. SS04-005-01
2. Location Central part of FTA
3. Previous Sample SS04-006-01
4. Sampler Tom Pace
5. Others Scott Bailey
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 15 to 20 mph, Precipitation —, Air Temperature 40 °F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/(field)) Same as SS04-002-01
12. Presample Equipment Blank taken (y/(n))
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS04-002-01
15. Comments Dark brown sand, wood chips/boards in subsurface at 6 to 12"
16. Reviewed by: AKP Date/Time 2/3/95 1630

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

SS04-600A-01
SS04-600-01

1. Date/Time 2/3/95 0915 Sample No. SS04-006-01
2. Location Center of FTA
3. Previous Sample SS04-007-01
4. Sampler Tony Pace
5. Others Scott Bailey
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 15 to 20 mph, Precipitation —, Air Temperature 35°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/field) Same as SS04-022-01
12. Presample Equipment Blank taken (y/n)
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS04-022-01
15. Comments Brown sand at 0 to 6", tan sand at 6 to 12"
16. Reviewed by: AKP Date/Time 2/3/95 1630

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/3/95 0835 Sample No. SS04-007-01
2. Location FTA – North of Fire Pit
3. Previous Sample SS04-010-01
4. Sampler Tony Pace
5. Others Scott Bailey
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 10 to 20 mph, Precipitation None, Air Temperature 35°F
8. FEL No.'s Cond. ✓, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/(field)) Same as SS04-022-01
12. Presample Equipment Blank taken (y/(n))
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS04-022-01
15. Comments Brown Sand
16. Reviewed by: AKP Date/Time 2/3/95 1630

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/7/95 1120 Sample No. SS04-008-01
2. Location South of Fire Pit
3. Previous Sample SS04-025-01
4. Sampler Tony Pace
5. Others Scott Bailey
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 5 to 10 mph, Precipitation —, Air Temperature 25 to 30°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) tr
11. Presampling sampler decon method (lab/(field)) Same as SS04-022-01
12. Presample Equipment Blank taken (y/n)
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS04-022-01
15. Comments Brown Sand
16. Reviewed by: AKP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/7/95 1130 Sample No. SS04-009-01
2. Location South of the Fire Pit
3. Previous Sample SS04-008-01
4. Sampler Tony Pace
5. Others Scott Bailey
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 5 to 10 mph, Precipitation None, Air Temperature 25 to 30 °F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) tr
11. Presampling sampler decon method (lab/~~field~~) Same as SS04-022-01
12. Presample Equipment Blank taken (y/(n))
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS04-022-01
15. Comments Brown sand
16. Reviewed by: AKP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/3/95 0810 Sample No. SS04-010-01
2. Location FTA - South of Fire Pit
3. Previous Sample SS04-011-01 (Collected 2/2/95)
4. Sampler Tony Pace
5. Others Scott Bailey
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 10 to 20 mph, Precipitation None, Air Temperature 35 °F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/(field)) Same as SS04-022-01 plus nitric acid rinse
12. Presample Equipment Blank taken (y/(n))
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS04-022-01
15. Comments Brown sand
16. Reviewed by: AVP Date/Time 2/3/95 1630

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/2/95 1510 Sample No. SS04-011-01
2. Location FTA - East of Fire Pit
3. Previous Sample SS04-012-01
4. Sampler Scott Bailey
5. Others Tony Pace
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 10 mph, Precipitation None, Air Temperature 55° F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/(field)) Same as SS04-022-01
12. Presample Equipment Blank taken (y/(n))
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS04-022-01
15. Comments Brown sand
16. Reviewed by: AKP Date/Time 2/2/95 1730

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/2/95 1440 Sample No. SS04-012-01
2. Location FTA - North of Fire Pit
3. Previous Sample SS04-013-01
4. Sampler Scott Bailey
5. Others Tony Pace
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 10 mph, Precipitation None, Air Temperature 55°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/field) Same as SS04-012-01
12. Presample Equipment Blank taken (y/n) _____
13. Equipment blank no. _____
14. Sample type (composite/voc) Same as SS04-022-01
15. Comments Brown sand

16. Reviewed by: AHP Date/Time 2/2/95 1730

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/2/95 1425 Sample No. SS04-013-01
2. Location FTA - South of Fire Pit
3. Previous Sample SS04-014-01
4. Sampler Scott Bailey
5. Others Tony Pace
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 10 mph, Precipitation —, Air Temperature 55°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/field) Same as SS04-025-01
12. Presample Equipment Blank taken (y/n)
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS04-022-01
15. Comments Brown sand
16. Reviewed by: AKP Date/Time 2/2/95 1730

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/2/95 1405 Sample No. SS04-014-01
2. Location South west Corner of FTA - West of Fire Rt
3. Previous Sample SS04-015-01
4. Sampler Scott Baily
5. Others Tony Pace
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 10 mph, Precipitation None, Air Temperature 55°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/field) Same as SS04-022-01
12. Presample Equipment Blank taken (y/n)
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS04-022-01
15. Comments Brown sand
16. Reviewed by: AWP Date/Time 2/2/95 1730

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/2/95 1350 Sample No. SS04-015-01
2. Location SE Corner of FTA
3. Previous Sample SS04-016-01
4. Sampler Scott Baily
5. Others Tony Pace
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 10 mph, Precipitation Nil, Air Temperature 55°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/(field)) Same as SS04-022-01 plus nitric acid rinse
12. Presample Equipment Blank taken (y/(n))
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS04-022-01
15. Comments
16. Reviewed by: AHP Date/Time 2/2/95 1730

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

SS04-610A-01
SS04-610-01

1. Date/Time 2/2/95 1330 Sample No. SS04-016-01
2. Location FTA - SE Corner of site
3. Previous Sample SS04-017-01
4. Sampler Scott Bailey
5. Others Tony Pace
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 10 mph, Precipitation None, Air Temperature 55°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12" (12 struck through)
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/(field)) Same as SS04-022-01
12. Presample Equipment Blank taken (y/(n))
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS04-022-01
15. Comments Brown sand to 12"
16. Reviewed by: AKP Date/Time 2/3/95 1730

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/2/95 1155 Sample No. SS04-017-01
2. Location FTA - SE corner of site
3. Previous Sample SS04-018-01
4. Sampler Scott Bailey
5. Others Tony Pace
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 5 to 10, Precipitation Nae, Air Temperature 55°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/(field)) Same as SS04-022-01
12. Presample Equipment Blank taken (y/(n))
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS04-022-01
15. Comments Brown sand to 12"
16. Reviewed by: AMP Date/Time 2/2/95 1730

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/2/95 1145 Sample No. SS04-018-01
2. Location FTA - SE Corner of Site
3. Previous Sample SS04-~~050~~ 059-01
4. Sampler Scott Bailey
5. Others Tony Pace
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 5 to 10, Precipitation None, Air Temperature 55°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/(field)) Same as SS04-022-01
12. Presample Equipment Blank taken (y/(n))
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS04-022-01
15. Comments

16. Reviewed by: AKP Date/Time 2/2/95 1730

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

SS04-019MS-01

1. Date/Time 2/2/95 1125 Sample No. SS04-019-01
2. Location FTA - SE Corner of site
3. Previous Sample SS04-020-01
4. Sampler Scott Baily
5. Others Tony Pace
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 5 to 10, Precipitation None, Air Temperature 55°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/field) Same as SS04-022-01
12. Presample Equipment Blank taken (y/n)
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS04-022-01
15. Comments Brown sand to 10", tan sand 10 to 12"

16. Reviewed by: AVP Date/Time 2/2/95 1730

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/2/95 Sample No. SS04-020-01
2. Location FTA - SE corner of site
3. Previous Sample SS04-021-01
4. Sampler Scott Bailey
5. Others Tony Pace
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 5 to 10, Precipitation None, Air Temperature 50 to 55
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/field) Same as SS04-022-01 plus nitric acid rinse
12. Presample Equipment Blank taken (y/n)
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS04-022-01
15. Comments Brown sand to 12"
16. Reviewed by: AKP Date/Time 2/2/95 1730

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/2/95 1055 Sample No. SS04-021-01
2. Location FTA - Southeast corner of site
3. Previous Sample SS04-022-01
4. Sampler Scott Bailey
5. Others Tony Pace
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 5 to 10 mph, Precipitation None, Air Temperature 50 to 55 °F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/(field)) Same as SS04-022-01
12. Presample Equipment Blank taken (y/(n))
13. Equipment blank no. —
14. Sample type (composite/voc) Same as SS04-022-01
15. Comments Brown to tan sand

16. Reviewed by: AKP Date/Time 2/2/95 1730

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/2/95 10:45 Sample No. 5504-022-01
2. Location FTA, southern end of site
3. Previous Sample
4. Sampler Scott Bailey
5. Others Tony Pace
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 5 to 10 mph, Precipitation None, Air Temperature 50 to 55 °F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/(field)) Alconox wash, tap water rinse, methanol rinse, DI rinse
12. Presample Equipment Blank taken (y/(n))
13. Equipment blank no.
14. Sample type (composite/voc) VOC/TPH-L transferred from bowl to bottles. Other samples collected after soil homogenized
15. Comments Brown to tan sand
16. Reviewed by: AVP Date/Time 3/3/95 1730

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/7/95 1045 Sample No. SS04-023-01
2. Location Northern area of FTA
3. Previous Sample SS04-024-01
4. Sampler Tony Pace
5. Others Scott Bailey
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 5 mph, Precipitation —, Air Temperature 25°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) tr
11. Presampling sampler decon method (lab/field) Same as SS04-022-01
12. Presample Equipment Blank taken (y/n) —
13. Equipment blank no. —
14. Sample type (composite/voc) Same as SS04-022-01
15. Comments Dark brown sand
16. Reviewed by: AKP Date/Time 2/7/95 1200

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

SS04-024MS-01

1. Date/Time 2/7/95 1020 Sample No. SS04-024-01
2. Location Northern area of FTA
3. Previous Sample SS04-002-01
4. Sampler Tony Pace
5. Others Scott Baily
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 5 mph, Precipitation —, Air Temperature 25°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) tr
11. Presampling sampler decon method (lab/~~field~~) Same as SS04-002-01
12. Presample Equipment Blank taken (y/(n))
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS04-002-01
15. Comments Dark brown sand

16. Reviewed by: AKP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/7/95 1105 Sample No. SS04-025-01
2. Location Northern area of FTA
3. Previous Sample SS04-023-01
4. Sampler Tony Pace
5. Others Scott Bailey
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 5 to 10 mph, Precipitation —, Air Temperature 25°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) tr
11. Presampling sampler decon method (lab/(field)) Same as SS04-022-01
12. Presample Equipment Blank taken (y/(n))
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS04-022-01
15. Comments Brown sand
16. Reviewed by: AVP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/3/95 1020 Sample No. SS04-026-01
2. Location Central part of FTA
3. Previous Sample SS04-027-01
4. Sampler Tony Pace
5. Others Scott Bailey
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 15 to 20mph, Precipitation —, Air Temperature 45°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/field) Same as SS04-022-01
12. Presample Equipment Blank taken (y/n)
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS04-022-01
15. Comments Dark sand 0 to 8", tan sand 8 to 12"
16. Reviewed by: AHP Date/Time 2/3/95 1630

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/3/95 1010 Sample No. SS04-027-01
2. Location Central part of FTA
3. Previous Sample SS04-028-01
4. Sampler Tony Pace
5. Others Scott Bailey
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 15 to 20 mph, Precipitation —, Air Temperature 45°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/(field)) Same as SS04-022-01
12. Presample Equipment Blank taken (y/(n))
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS04-022-01
15. Comments Dark brown sand to 10", tan sand 10 to 12"
16. Reviewed by: AKP Date/Time 2/3/95 1630

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/3/95 1000 Sample No. SS04-028-01
2. Location Central part of FTA
3. Previous Sample SS04-004-01
4. Sampler Tony Pace
5. Others Scott Bailey
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 15 to 20 mph, Precipitation —, Air Temperature 45°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) au
11. Presampling sampler decon method (lab/field) Same as SS04-~~028~~ 022-01
12. Presample Equipment Blank taken (y/n)
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS04-~~028~~ 022-01
15. Comments Brown sand
16. Reviewed by: AMP Date/Time 2/3/95 1630

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 7 1995 / 1135 Sample No. SB04-001-24
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-003-68
4. Sampler WJF
5. Others NEAL WOLLCAMUTH ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-2000, Reading N/A
7. Weather: Wind C MPH, Precipitation 0", Air Temperature 35°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 2-4'
10. Sampling Method (ss) tr, au) SS
11. Presampling sampler decon method (lab/(field)) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) YES
13. Equipment blank no. ER04-SB-02 0795
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-003-24
15. Comments PID NOT FUNCTIONING PROPERLY

16. Reviewed by: AVP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 7 1995 / 1140 Sample No. SB04-001-GB
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-001-24
4. Sampler WTF
5. Others NEAL WOOLCAMOTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-2000, Reading N/A
7. Weather: Wind 0 MPH, Precipitation 0", Air Temperature 35°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 6-8'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) YES
13. Equipment blank no. ER04-SB-020795
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-003-24
15. Comments PID NOT FUNCTIONING PROPERLY. SAMPLE SATURATED
16. Reviewed by: AVP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 6, 1995 / 1600 Sample No. SB04-002-24
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-014-68
4. Sampler CWJF
5. Others NEAL WOMACKMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-2000, Reading 37.7
7. Weather: Wind 10-20 MPH, Precipitation 0", Air Temperature 30°F
8. FEL No.'s Cond. ———, pH ———, Temp. ———, Redox ———
9. Sampling Depth 2-4
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-011-24
15. Comments

16. Reviewed by: AKP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 6, 1995 / 1605 Sample No. SB04-002-6E
2. Location FORT STORY - FTH SITE
3. Previous Sample SB04-002-~~SB~~ 24
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-2000; Reading 0.0
7. Weather: Wind 10-20 MPH, Precipitation 0", Air Temperature 30°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 6-8'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/~~field~~) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-001-24
15. Comments SAMPLE SATURATED. RIG WAS ~~JEEP~~ POSITIONED 2 TIMES
16. Reviewed by: AMP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 7, 1995 / 1625 Sample No. SB04-0003-24
2. Location FORT STORY - FTA SITE
3. Previous Sample FIRST OF THE DAY
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-2000, Reading N.A
7. Weather: Wind 0 MPH, Precipitation 0", Air Temperature 35° F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 2-4'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) IMMEDIATELY PLACE SAMPLE INTO TCL-VOCs AND TPH LIGHT CONTAINERS. HOMOGENIZE REST OF SAMPLE AND PLACE INTO TPH HEAVY AND TCL-SVOCs (AND METALS IF COLLECTED)
15. Comments PID NOT FUNCTIONING PROPERLY

16. Reviewed by: AKP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 7/1995 / 1035 Sample No. SB04-003-68
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-003-24
4. Sampler CWJF
5. Others NEAL WOOLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-2000, Reading N/A
7. Weather: Wind 0 MPH, Precipitation 0", Air Temperature 35°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 6-8'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-003-24
15. Comments PID NOT FUNCTIONING PROPERLY. SAMPLE SATURATED
16. Reviewed by: AKP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 8 1995 / 0755 Sample No. SB04-004-24
2. Location FORT STORY - FTA SITE
3. Previous Sample FIRST STEP SAMPLE OF DAY
4. Sampler ~~NEAL WOMACKMUTH, ANTHONY EPPARD~~ WJE
5. Others NEAL WOMACKMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0.0
7. Weather: Wind 15-25 MPH, Precipitation SNOW, Air Temperature 30°F
8. FEL No.'s Cond. ———, pH ———, Temp. ———, Redox ———
9. Sampling Depth 2-4'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/~~field~~) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) IMMEDIATELY PLACE SOIL INTO TCL-VOC AND TPH-LIGHT CONTAINERS. HOMOGENIZE REMAINING SOIL AND PLACE INTO TPH-HEAVY AND TCL-SVOCs (AND METALS IF COLLECTED)
15. Comments ———

16. Reviewed by: AKP Date/Time 2/8/95 1710

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 8 1995 / 0805 Sample No. SB04-0004-68
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-0004-24
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0.0
7. Weather: Wind 15-25, Precipitation SNOW, Air Temperature 30F
8. FEL No.'s Cond. ———, pH ———, Temp. ———, Redox ———
9. Sampling Depth 6-8
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-0004-24
15. Comments

16. Reviewed by: AKP Date/Time 2/8/95 1710

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 8, 1995 / 0940 Sample No. SB04-0005-24
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-0006-68
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200 Reading 0.0
7. Weather: Wind 15-25 MPH, Precipitation LIGHT SNOW, Air Temperature 30°F
8. FEL No.'s Cond. ———, pH ———, Temp. ———, Redox ———
9. Sampling Depth 2-4
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-0004-24
15. Comments ———

16. Reviewed by: AHP Date/Time 2/8/95 1710

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 8, 1995 / 0940 Sample No. SB04-500A-24
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-006-68
4. Sampler WTF
5. Others NEAL WOHLGAMOTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0.0
7. Weather: Wind 15-25 MPH, Precipitation LIGHT SNOW, Air Temperature 30°F
8. FEL No.'s Cond. ——, pH ——, Temp. ——, Redox ——
9. Sampling Depth 2-4
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-004-24
15. Comments DUPLICATE OF SB04-005-24

16. Reviewed by: AKP Date/Time 2/8/95 1710

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 8, 1995 / 0950 Sample No. SB04-005-68
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-005-24
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0.0
7. Weather: Wind 15-25 MPH, Precipitation LIGHT SNOW, Air Temperature 30°F
8. FEL No.'s Cond. ——, pH ——, Temp. ——, Redox ——
9. Sampling Depth 6-8'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-004-24
15. Comments

16. Reviewed by: AMP Date/Time 2/8/95 1710

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 8 1995 / 0850 Sample No. SB04-004-24
2. Location FORT STORY
3. Previous Sample SB04-004-68
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HC-200, Reading 0.0
7. Weather: Wind 5-10 MPH, Precipitation 0", Air Temperature 35°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 2-4'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE ~~FIELD~~ WJF SOIL SAMPLING FORM SB04-004-2
15. Comments
16. Reviewed by: AKP Date/Time 2/8/95 1710

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 8, 1995 / 0855 Sample No. SB04-006-68
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-006-24
4. Sampler WJF
5. Others NEAL WOOLGAMOTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0.0
7. Weather: Wind 15-25 MPH, Precipitation SNOW, Air Temperature 30°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 6-8'
10. Sampling Method (ss) tr, au) SS
11. Presampling sampler decon method (lab/(field)) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/(n)) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-004-24
15. Comments

16. Reviewed by: AVP Date/Time 2/8/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 6, 1995 / 1325 Sample No. SB04-007-24
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-012-6E
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading N/A
7. Weather: Wind 10-20 MPH, Precipitation 0", Air Temperature 30°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 2-4'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-011-24
15. Comments PID BATTERY IS DEAD. REPOSITION RIG 3 TIMES

16. Reviewed by: AKP Date/Time 2/7/95 1200

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 6, 1995/ 1325 Sample No. SB04-700-24
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-012-68
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading N/A
7. Weather: Wind 10-20 MPH, Precipitation 0", Air Temperature 30°F
8. FEL No.'s Cond. ——, pH ——, Temp. ——, Redox ——
9. Sampling Depth 2-4'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) ——
13. Equipment blank no. ——
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-011-24
15. Comments PID BATTERY IS DEAD. DUPLICATE SAMPLE OF SB04-007-24. REPOSITION R163 TIMES
16. Reviewed by: AKP Date/Time 2/7/95 1200

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 6, 1995 / 1335 Sample No. SB04-007-68
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-007-24
4. Sampler CNJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading N/A
7. Weather: Wind 10-20 MPH, Precipitation 0", Air Temperature 30°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 6-8'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LAB BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-011-24
15. Comments PID BATTERY IS DEAD. ~~DUPLICATE SAMPLE OF SB04-007~~ REPOSITION RIG 3 TIMES
16. Reviewed by: AVP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 6, 1995 / 1335 Sample No. SB04-007-68
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-007-24 wjt
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading N/A
7. Weather: Wind 10-20 MPH, Precipitation 0", Air Temperature 30°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 6-8'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-011-24
15. Comments PID BATTERY IS DEAD. DUPLICATE SAMPLE OF SB04-007-68. REPOSITION RIG 3 TIMES
16. Reviewed by: AHP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 7 1995 / 1350 Sample No. SB04-008-24
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-001-6E
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-2000, Reading N/A
7. Weather: Wind 0-5MPH, Precipitation 0", Air Temperature ~~WSE 35°F~~ 40°F
8. FEL No.'s Cond. ——, pH ——, Temp. ——, Redox ——
9. Sampling Depth 2-4'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-003-24
15. Comments PID NOT FUNCTIONING PROPERLY
16. Reviewed by: AWP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 7 1995/ 1400 Sample No. SB04-008-68
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-008-24
4. Sampler WJF
5. Others NEAL NOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP 2000, Reading N/A
7. Weather: Wind C-5MPH, Precipitation 0", Air Temperature 40°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 6-8'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-003-24
15. Comments PID NOT FUNCTIONING PROPERLY
16. Reviewed by: AVP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 7, 1995 / 1450 Sample No. SB04-0009-24
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-0008-68
4. Sampler WJF
5. Others NEAL WOHGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HC 2000, Reading N/A
7. Weather: Wind 0-5 MPH, Precipitation 0", Air Temperature 40°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 2-4'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-0003-24
15. Comments PID NOT FUNCTIONING PROPERLY
16. Reviewed by: AKP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 7, 1995 / 1450 Sample No. SB04-900A-24
2. Location FORT STORY – FTA SITE
3. Previous Sample SB04-008-68
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-2000, Reading N/A
7. Weather: Wind 0-5 MPH, Precipitation 0", Air Temperature 40°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 2-4
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-003-24
15. Comments PID IS NOT FUNCTIONING PROPERLY. DUPLICATE SAMPLE OF SB04-009-24
16. Reviewed by: AVP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 7 1995 / 1455 Sample No. SB04-009-68
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-009-24
4. Sampler WJF
5. Others NEAL NOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP 2000, Reading N/A
7. Weather: Wind 0-5 MPH, Precipitation 0", Air Temperature 40°F
8. FEL No.'s Cond. ——, pH ——, Temp. ——, Redox ——
9. Sampling Depth 6-8
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-003-24
15. Comments PID IS NOT FUNCTIONING PROPERLY
16. Reviewed by: AHP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 7 1995/ 1455 Sample No. SB04-900A-68
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04 - 009 - 24
4. Sampler WJF
5. Others NEAL WORCESTER, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-2000, Reading N/A
7. Weather: Wind 0-5 MPH, Precipitation 0", Air Temperature 40°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 6-8'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-009-24
15. Comments PID NOT FUNCTIONING PROPERLY. DUPLICATE SAMPLE OF SB04-009-68.
16. Reviewed by: AKP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 3, 1995 / 1420 Sample No. SB04-016-24
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-013-68
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading NO READING *
7. Weather: Wind 5-10 MPH, Precipitation 0", Air Temperature ~40°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 2-4'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) YES
13. Equipment blank no. ER04-SB-020395
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-016-24
15. Comments * PID BATTERY IS DEAD
16. Reviewed by: AHP Date/Time 2/3/95 1630

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 3, 1995 / 1430 Sample No. SB04-010-68
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-010-6824
4. Sampler WJF
5. Others NEAL WOLCHCAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading NO READING*
7. Weather: Wind 5-10 MPH, Precipitation 0", Air Temperature ~40°F
8. FEL No.'s Cond. ———, pH ———, Temp. ———, Redox ———
9. Sampling Depth 6-8'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) YES
13. Equipment blank no. ER04-SB-020395
14. Sample type (composite/voc) ———
15. Comments * PID BATTERY IS DEAD

16. Reviewed by: AKP Date/Time 2/3/95 1630

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 6, 1995 / 1110 Sample No. SB04-011-24
2. Location FORT STORY - FTA SITE
3. Previous Sample FIRST SAMPLE OF THE DAY
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading N/A
7. Weather: Wind 10-20 MPH, Precipitation 0", Air Temperature 30°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 2-4
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) IMMEDIATELY PLACE SOILS IN TCL-VOCs AND TPH LIGHT CONTAINERS. HOMOGENIZE REST OF SOIL AND PLACE IN TCL-SVOCs AND TPH HEAVY CONTAINERS (AND METAL IF COLLECTING)
15. Comments PID BATTERY IS DEAD. REPOSITION RIG 2 TIMES
16. Reviewed by: AVO Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 6, 1995 / 1120 Sample No. SB04-011-68
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-011-24
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading N/A
7. Weather: Wind 10-20 MPH, Precipitation 0", Air Temperature 30°F
8. FEL No.'s Cond. ———, pH ———, Temp. ———, Redox ———
9. Sampling Depth 6-8'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-011-24
15. Comments PID BATTERY IS DEAD. REPOSITION RIG 2 TIMES

16. Reviewed by: AVP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 6, 1995 / 1240 Sample No. SB04-012-24
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-011-68
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200 Reading N/A
7. Weather: Wind 10-20 MPH, Precipitation 0", Air Temperature 30°F
8. FEL No.'s Cond. ——, pH ——, Temp. ——, Redox ——
9. Sampling Depth 24'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-011-24
15. Comments PID BATTERY IS DEAD. REPOSITION RIG 2 TIMES
16. Reviewed by: AVP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 6, 1995 / 1250 Sample No. SB04-012-68
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-012-24
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200 Reading ____
7. Weather: Wind 10-20 MPH, Precipitation 0", Air Temperature 30°F
8. FEL No.'s Cond. ____, pH ____, Temp. ____, Redox ____
9. Sampling Depth 6-8'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SAMPLING FORM SB04-011-24
15. Comments PID BATTERY IS DEAD. REPOSITION RIG 2 TIMES
16. Reviewed by: AVP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 3, 1995 / 1300 Sample No. SB04-013-24
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-013-168
4. Sampler WJF
5. Others NEAL WOHLGAMOTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 1.9
7. Weather: Wind 5-10 MPH, Precipitation 0", Air Temperature ~40° F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 2-4'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-016-24
15. Comments RECALIBRATED PID, PASSPORT BATTERY IS LOW
    ENTIRE SAMPLE FROM ONE SPLIT SPOON
16. Reviewed by: AMP Date/Time 2/3/95 1630

    Form Complete? [Y or N] Y

    Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 3, 1995 / 1307 Sample No. SB04-013-68
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-013-24
4. Sampler WJF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HC-200, Reading 0.1, 1.0
7. Weather: Wind 5-10 MPH, Precipitation 0", Air Temperature ~40°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 6-8'
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) No
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING ~~LOG~~ WJF FORM SB04-016-24
15. Comments RECALIBRATED PID PASSPORT BATTERY LOW MOVED RIG 2 ~~TIMES~~ WJF TIMES. PORTION OF SAMPLE IS WET
16. Reviewed by: AMP Date/Time 2/3/95 1630

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 6, 1995 / 1435 Sample No. SB04-014-24
2. Location FORT STORY - FTA SITE
3. Previous Sample SB04-007-6E
4. Sampler WJF
5. Others NEAL WHIGGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HC-2000, Reading 57.0
7. Weather: Wind 10-20 MPH, Precipitation 0", Air Temperature 30°F
8. FEL No.'s Cond. ———, pH ———, Temp. ———, Redox ———
9. Sampling Depth _____
10. Sampling Method (ss, tr, au) SS
11. Presampling sampler decon method (lab/field) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) _____
13. Equipment blank no. _____
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM
15. Comments _____

16. Reviewed by: AVP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time FEBRUARY 6, 1995 / 1440 Sample No. SB04-014-68
2. Location FORT STORY - FTA SITE
3. Previous Sample ~~SB04-007~~ SB04-014-24
4. Sampler LWTF
5. Others NEAL WOHLGAMUTH, ANTHONY EPPARD
6. Organic Vapor Detector FEL No. MICROTIP HL-2000, Reading 85.8
7. Weather: Wind 10-20 MPH, Precipitation 0", Air Temperature 30°F
8. FEL No.'s Cond. ——, pH ——, Temp. ——, Redox ——
9. Sampling Depth 6-8'
10. Sampling Method (~~ss~~, tr, au) SS
11. Presampling sampler decon method (lab/~~field~~) SEE FIELD LOG BOOK
12. Presample Equipment Blank taken (y/n) NO
13. Equipment blank no. N/A
14. Sample type (composite/voc) SEE SOIL SAMPLING FORM SB04-011-24
15. Comments ——

16. Reviewed by: AVP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

MALCOLM PIRNIE

11832 Rock Landing Drive, Suite 400, Newport News, VA 23606

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-783-200

DATE: 3/22/00

PROJECT NAME: Remedial Investigation

SAMPLERS: Shelly Kolb / Chris Pianta / PMC

SITE LOCATION: Fort Story, Virginia

SAMPLE COLLECTION INFORMATION

SITE CONTACT:

WEATHER CONDITIONS: ~45° f windy / RAINING

WELL IDENTIFICATION NUMBER: MW 112 (FTA)

WELL HEADSPACE READING: NA

PID MODEL/LAMP: NA

DEPTH TO WATER: 5.02 FT FROM TOC

WELL DEPTH 11.45 FT FROM TOC

HEIGHT OF WATER IN WELL: 6.43 x .0.163 = FT FROM TOC

WELL VOLUME: 1.04 GAL

PURGE VOLUME: 3 x 1.04 3 GAL

PURGE START TIME: 1035

PURGE FINISH TIME: 1120

WELL EVACUATION DEVICE:

SAMPLE COLLECTION DEVICE: well wizard system dedicated

SAMPLING START TIME: 1120

SAMPLING FINISH TIME: 1128

SAMPLE APPEARANCE: Clear

FIELD PARAMETERS	FIRST	SECOND	THIRD	FOURTH	FIFTH Sample
temperature (degrees C)	13.9	14.0	14.1	14.1	13.9
specific conductivity (umhos/cm)	0.217	0.152	0.150	0.151	.149
pH (SU)	4.90	5.77	5.92	5.93	5.93
dissolved oxygen (mg/l)	9.71	9.73	9.79	9.81	9.84
volume purged (gallons)	1.0	2.5	3.5	4.5	5

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: VOC Pest/PCB T+D Met TSS/TDS

LABORATORY: SAVANNAH

CONTACT: L. WOLF

NOTES: No filters - LAB Filter D-METALS

Casing Diameter (in)	Casing Volume (Gal per Ft)
2.0	0.1632
4.0	0.6528
6.0	1.4687

6.43
.163

MALCOLM PIRNIE

11832 Rock Landing Drive, Suite 400, Newport News, VA 23606

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-783-200 DATE: 3/22/00

PROJECT NAME: Remedial Investigation SAMPLERS: Shelly Kolb / Chris Pianta

SITE LOCATION: Fort Story, Virginia

SAMPLE COLLECTION INFORMATION

SITE CONTACT: WEATHER CONDITIONS: ~45°F RAIN

WELL IDENTIFICATION NUMBER: MW-114A HIGH WIND

WELL HEADSPACE READING: NA PID MODEL/LAMP: NA

DEPTH TO WATER: 11.06 FT FROM TOC WELL DEPTH 12.32 FT FROM TOC

HEIGHT OF WATER IN WELL: 1.26 x .163 FT FROM TOC

WELL VOLUME: .21 gal x 3 GAL PURGE VOLUME: .63 GAL

PURGE START TIME: 1158 PURGE FINISH TIME: 1210

WELL EVACUATION DEVICE: well wiz

SAMPLE COLLECTION DEVICE: "

SAMPLING START TIME: 1210 SAMPLING FINISH TIME: 1218

SAMPLE APPEARANCE: clear to reddish

FIELD PARAMETERS	FIRST	SECOND	THIRD	FOURTH	FIFTH
temperature (degrees C)	13.3	13.5	13.6	13.4	13.6
specific conductivity (umhos/cm)	.290	.296	.297	.296	.298
pH (SU)	5.51	5.45	5.41	5.39	5.38
dissolved oxygen (mg/l)	9.69	9.70	9.75	9.83	9.87
volume purged (gallons)	.25 gal	1.0	1.75	2.5	3.0

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: VOC / PEST/PCB / TSS/TDS / Tot + Diss METALS

LABORATORY: SAVANNAH

CONTACT: L. WOLFE

NOTES: NO Filters - SAMPLE marked For LAB Filter

Casing Diameter (in)	Casing Volume (Gal per Ft)
2.0	0.1632
4.0	0.6528
6.0	1.4687

MALCOLM PIRNIE

MS MSD

11832 Rock Landing Drive, Suite 400, Newport News, VA 23606

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-783-200

DATE: 3/22/00

PROJECT NAME: Remedial Investigation

SAMPLERS: Shelly Kolb / Chris Pianta

SITE LOCATION: Fort Story, Virginia

SAMPLE COLLECTION INFORMATION

SITE CONTACT:

WEATHER CONDITIONS: ~45°f RAIN

WELL IDENTIFICATION NUMBER: MW-111

High WIND

WELL HEADSPACE READING: NR

PID MODEL/LAMP: NA

DEPTH TO WATER: 5.02 FT FROM TOC

WELL DEPTH 8.28 FT FROM TOC

HEIGHT OF WATER IN WELL: 3.26 x .163

FT FROM TOC

WELL VOLUME: .53 x 3 GAL

PURGE VOLUME: 1.59 min GAL

PURGE START TIME: 1332

PURGE FINISH TIME: 1400

WELL EVACUATION DEVICE: WELL WIZ DEDICATED SYSTEM

SAMPLE COLLECTION DEVICE: " "

SAMPLING START TIME: 1400

SAMPLING FINISH TIME: 1428

SAMPLE APPEARANCE:

FIELD PARAMETERS	FIRST	SECOND	THIRD	FOURTH	FIFTH
temperature (degrees C)	13.2	13.0	13.2	13.3	13.2
specific conductivity (umhos/cm)	0.111	0.103	0.101	0.100	0.100
pH (SU)	5.67	5.44	5.30	5.30	5.32
dissolved oxygen (mg/l)	10.28	10.37	10.39	10.41	10.47
volume purged (gallons)	0.25	1.25	2.25	3.25	4.00

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: VOC / PCB / PEST / TSS / TDS / TOT + DISS METALS

LABORATORY: SAVANNAH

CONTACT: L. WOLFE

NOTES: MS / MSD Collected

No filters - SAMPLE MARKED FOR LAB FILTER

Casing Diameter (in)	Casing Volume (Gal per Ft)
2.0	0.1632
4.0	0.6528
6.0	1.4687

MALCOLM PIRNIE

11832 Rock Landing Drive, Suite 400, Newport News, VA 23606

GROUNDWATER MONITORING WELL SAMPLE COLLECTION LOGS

PROJECT NUMBER: 0285-783-200

DATE: 3/22/00

PROJECT NAME: Remedial Investigation

SAMPLERS: Shelly Kolb / Chris Pianta

SITE LOCATION: Fort Story, Virginia

SAMPLE COLLECTION INFORMATION

SITE CONTACT:

WEATHER CONDITIONS: ~45°F RAIN HIGH WIND

WELL IDENTIFICATION NUMBER: 4MW-1

WELL HEADSPACE READING: NA

PID MODEL/LAMP: NA

DEPTH TO WATER: 4.06 FT FROM TOC

WELL DEPTH 8.81 FT FROM TOC

HEIGHT OF WATER IN WELL: 4.75 FT FROM TOC

WELL VOLUME: .77 GAL

PURGE VOLUME: 2.31 GAL

PURGE START TIME: 1450

PURGE FINISH TIME: 1515

WELL EVACUATION DEVICE: WELL WIZ - DEDICATED SYSTEM

SAMPLE COLLECTION DEVICE: " " " "

SAMPLING START TIME: 1515

SAMPLING FINISH TIME: 1525

SAMPLE APPEARANCE:

FIELD PARAMETERS	FIRST	SECOND	THIRD	FOURTH	FIFTH
temperature (degrees C)	13.2	13.2	13.2	13.1	13.2
specific conductivity (umhos/cm)	.064	.063	.063	.066	.066
pH (SU)	5.71	5.80	5.79	5.79	5.80
dissolved oxygen (mg/l)	10.73	10.67	10.64	10.58	10.60
volume purged (gallons)	0.2	1.0	2.0	3.0	3.5

SAMPLE ANALYSIS INFORMATION

ANALYSIS REQUIRED: VOC / PEST / PCB / TSS / TDS / TOT + DISS METALS

LABORATORY: SAVANNAH

CONTACT: L. WOLFE

NOTES: DUPLICATE 4MW-1D

NO FILTER - SAMPLE MARKED FOR LAB FILTER

Casing Diameter (in)	Casing Volume (Gal per Ft)
2.0	0.1632
4.0	0.6528
6.0	1.4687

GROUNDWATER SAMPLING FORM

1. Date 4/13/95 Sample No. 4MW-1
   Time 0740
2. Location Ft Story - FTA
3. Well No. 4MW-1 Sketch on Back (Y or N) No
4. Total Depth 13.60 Number of Screened Interval(s) 10'
5. Depth to Screen/Length(s) _____
6. (Y or N) Well Secure? YES Comments _____
7. Sampler WJF Other present AKP, SAB
8. Organic Vapor Detector FEL No. NA, Reading NA
9. Weather: Wind 0, Precipitation .2", Air Temperature 60°
10. Water Level Measurement: FEL No. 5.38
11. Sampler WJF
12. Previous Well Sampled NONE, FIRST OF DAY
    Decon Method (Lab/Field) DISPOSABLE
13. Equipment Blank Taken (Y or N) No
14. Casing Type SCHED 40 PVC, I.D. 2", Gal/Ft. .163 (1)
15. Total Depth 13.60 - Depth to Water 5.38 = Ht. 8.22
16. Well Volume 1.33 = Ht. 8.22 X Gal/Ft. .163 (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge 5 GALLONS
18. Purge Water Containerized No
19. FEL No.'s Cond. YSI 33 pH HACH 1 Temperature HACH 1 ~~Redox~~ TURBIDITY HACH 2100P
20.

	~~µmhos/cm~~	pH	Temp.	~~Redox mv~~	TURBIDITY (NTU)
Cond. Initial	.1	7.35	14.5		14.5
(Purged Cycle)	.1	7.38	14.0		84.3
	.1	7.34	14.1		215
	.1	7.30	14.1		437
Sample	.1	7.35	15.1		548

21. Turbid (Y or N) _____
22. Color CLEAR TO LT BROWN
23. Sample Filtered YES (METALS) Filter Size .45 um
24. Reviewed By WJF Date/Time 4/26/95 1400

GROUNDWATER SAMPLING FORM

1. Date 4/12/95 Sample No. 4MW-2S
   Time 1420 (1450)
2. Location Ft. Story - FTA
3. Well No. 4MW-2S Sketch on Back (Y or N) No
4. Total Depth 14.08 Number of Screened Interval(s) ~~1~~ 10'E
5. Depth to Screen/Length(s) 4' BLS
6. (Y or N) Well Secure? YES Comments

7. Sampler WJF Other present AKP SAB
8. Organic Vapor Detector FEL No. N/A, Reading N/A
9. Weather: Wind 5-10, Precipitation 0, Air Temperature 65
10. Water Level Measurement: FEL No. 5.88
11. Sampler WJF
12. Previous Well Sampled MW-111
    Decon Method (Lab/Field) DISPOSABLE
13. Equipment Blank Taken (Y or N) No
14. Casing Type SCHED 40 PVC, I.D. 2", Gal/Ft. .163 (1)
15. Total Depth 14.08 - Depth to Water ____ = Ht. 8.2
16. Well Volume 1.33 = Ht. 8.2 X Gal/Ft. .163 (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge 5 GALLONS
18. Purge Water Containerized No
19. FEL No.'s Cond. ____ pH ____ Temperature ____ Redox ____
20.

	~~µmhos/cm~~ mS	pH	Temp.	~~Redox mv~~	(NTU) TURBIDITY
Cond. Initial	~~.40~~ .10	6.77	16.2		49.4
(Purged Cycle)	.10	6.62	16.1		142
	.10	6.70	15.4		344
	.10	6.73	16.0		351
	.10	6.71	16.0		348
Sample	.10	6.76	17.4		310

21. Turbid (Y or N) YES
22. Color BROWN
23. Sample Filtered YES, Filter Size .45um (FOR METALS)
24. Reviewed By WJF Date/Time 4/26/95 1400

GROUNDWATER SAMPLING FORM

1. Date 4/12/95 Sample No. 4MW-2D
   Time 1420
2. Location FT STORY - FTA
3. Well No. 4MW-2D Sketch on Back (Y or N) No
4. Total Depth 39.72 Number of Screened Interval(s) 10'
5. Depth to Screen/Length(s) 30' BLS
6. (Y or N) Well Secure? YES Comments PETROLEUM ODOR
7. Sampler WJF Other present AKP, SAB
8. Organic Vapor Detector FEL No. N/A, Reading N/A
9. Weather: Wind 5-10, Precipitation 0, Air Temperature 65
10. Water Level Measurement: FEL No. 5.72 'BTOC
11. Sampler WJF
12. Previous Well Sampled 4MW-2S
    Decon Method (Lab/Field) DISPOSABLE
13. Equipment Blank Taken (Y or N) No
14. Casing Type SCHED 40 PVC, I.D. 2", Gal/Ft. .163 (1)
15. Total Depth 39.72 - Depth to Water 5.72 = Ht. 34.0
16. Well Volume 5.54 = Ht. 34.0 X Gal/Ft. .163 (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge 22 GALLONS
18. Purge Water Containerized No
19. FEL No.'s Cond. YSI 33 pH HACH 1 Temperature HACH 1 ~~Redox~~ TURBIDITY HACH 2100P
20.

	µmhos/cm	pH	Temp.	~~Redox mv~~	TURBIDITY
Cond. Initial	.40	6.26	19.3		377
(Purged Cycle)	.40	6.57	19.1		36.2
	.40	6.45	18.5		6.64
	.40	6.39	18.5		5.73
	.48	6.44	18.7		7.13
Sample	.40	6.78	18.7		223

21. Turbid (Y or N) YES
22. Color LT BROWN
23. Sample Filtered No, Filter Size N/A
24. Reviewed By WJF Date/Time 4/26/95 1400

GROUNDWATER SAMPLING FORM

1. Date 4/12/95 Sample No. 4MW-3
   Time 1320
2. Location Ft Story - FTA
3. Well No. 4MW-3 Sketch on Back (Y or N) No
4. Total Depth 13.76' Number of Screened Interval(s) ____
5. Depth to Screen/Length(s) 4' BLS
6. (Y or N) Well Secure? Yes Comments ____
7. Sampler WJF Other present AKP, SAB
8. Organic Vapor Detector FEL No. N/A, Reading N/A
9. Weather: Wind 0, Precipitation 0, Air Temperature 60
10. Water Level Measurement: FEL No. 6.37
11. Sampler WJF
12. Previous Well Sampled MW-114A
    Decon Method (Lab/Field) ~~Alc~~ DISPOSABLE
13. Equipment Blank Taken (Y or N) No
14. Casing Type Sched 40 PVC, I.D. 2", Gal/Ft. .163 (1)
15. Total Depth 13.76 - Depth to Water 6.37 = Ht. 7.39
16. Well Volume 1.20 = Ht. 7.39 X Gal/Ft. .163 (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge 4 3/8 Gal
18. Purge Water Containerized No
19. FEL No.'s Cond. YSI 33 pH HACH 1 Temperature HACH 1 ~~Redox~~ Turbidity HACH 2100P
20.

	~~µmhos/cm~~ mS	pH	Temp.	~~Redox mv~~	Turbidity (NTU)
Cond. Initial	.1	8.72	15.4		77.8
(Purged Cycle)	.1	8.94	16.0		113
	.1	8.81	14.6		105
	.1	6.03	15.5		106
Sample	.10	6.13	16.3		120

21. Turbid (Y or N) Yes
22. Color Lt Brown
23. Sample Filtered No, Filter Size N/A
24. Reviewed By WJF Date/Time 4/26/95 1400

GROUNDWATER SAMPLING FORM

1. Date 4/13/95 Sample No. 4MW-4
   Time 0925
2. Location Ft. Story - FTA Site
3. Well No. 4MW-4 Sketch on Back (Y or N) No
4. Total Depth 13.72 Number of Screened Interval(s) 10'
5. Depth to Screen/Length(s) 4' BGS.
6. (Y or N) Well Secure? Yes Comments

7. Sampler WTF Other present AKP, SAB
8. Organic Vapor Detector FEL No. N/A, Reading N/A
9. Weather: Wind 0", Precipitation 0", Air Temperature 60°F
10. Water Level Measurement: FEL No. 3.34
11. Sampler WTF
12. Previous Well Sampled 4MW-1
    Decon Method (Lab/Field) DISPOSABLE
13. Equipment Blank Taken (Y or N) No
14. Casing Type Sched 40 PVC I.D. 2", Gal/Ft. .163 (1)
15. Total Depth 13.72 - Depth to Water _____ = Ht. 10.38
16. Well Volume 1.70 = Ht. 10.38 X Gal/Ft. 3.34 (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge 5 GALLONS
18. Purge Water Containerized No
19. FEL No.'s Cond. YSI 33 pH HACH 1 Temperature HACH 1 ~~Redox~~ TURBIDITY HACH 2100P
20.

	mS ~~µmhos/cm~~	pH	Temp.	~~Redox mV~~	TURBIDITY (NTU)
Cond. Initial	.3	7.02	15.0		16.2
(Purged Cycle)	.4	6.73	14.7		959
	.3	6.70	14.4		771
	.4	6.65	14.4		734
Sample	.4	6.25	14.9		644

21. Turbid (Y or N) YES
22. Color Lt Brown
23. Sample Filtered YES, Filter Size .45 µm
24. Reviewed By WTF Date/Time 4/26/95 1405

GROUNDWATER SAMPLING FORM

1. Date 4/12/95 Sample No. 4MW-5
   Time 1000
2. Location Ft Story - FTA Site
3. Well No. 4MW-5 Sketch on Back (Y or N) No
4. Total Depth 38.92' BTOC Number of Screened Interval(s) ____
5. Depth to Screen/Length(s) ____
6. (Y or N) Well Secure? Y Comments ____
7. Sampler WJF/SAB Other present AKP
8. Organic Vapor Detector FEL No. N/A, Reading N/A
9. Weather: Wind 0, Precipitation 0, Air Temperature 60°F
10. Water Level Measurement: FEL No. 5.83' BTOC
11. Sampler WJF
12. Previous Well Sampled MW-112
    Decon Method (Lab/Field) DISPOSABLE
13. Equipment Blank Taken (Y or N) No
14. Casing Type Sched 40 PVC, I.D. 2", Gal/Ft. .163 (1)
15. Total Depth 38.92 - Depth to Water 5.83 = Ht. 33.09
16. Well Volume 5.39 = Ht. 33.09 X Gal/Ft. .163 (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge 25 GALLONS
18. Purge Water Containerized No
19. FEL No.'s Cond. YSI 33 pH HACH 1 Temperature HACH 1 ~~Redox~~ TURBIDITY HACH 2100P
20.

	mS ~~µmhos/cm~~	pH	Temp.	~~Redox mv~~	(NTU) TURBIDITY
Cond. Initial	.20	9.16	17.5		212
(Purged Cycle)	.20	8.32	18.5		196
	.20	8.90	18.6		70.9
	.20	8.45	18.7		52.0
	~~.20~~	8.42	18.5		
~~Sample~~ SAMPLE	.20	8.50	18.6		52.1
	.20	8.56	18.1		50.8
					107

21. Turbid (Y or N) Y
22. Color LT BROWN
23. Sample Filtered No, Filter Size N/A
24. Reviewed By WJF Date/Time 4/26/95 1400

* SULFUR SMELL

2.5 GAL/MIN

GROUNDWATER SAMPLING FORM

1. Date 4/12/95 Sample No. MW-111
   Time 1320 (1345)
2. Location Ft. Story - FTA
3. Well No. MW-111 Sketch on Back (Y or N) No
4. Total Depth 12.22 Number of Screened Interval(s) ____
5. Depth to Screen/Length(s) ____
6. (Y or N) Well Secure? Y Comments ____
7. Sampler WJF Other present AKP, SAB
8. Organic Vapor Detector FEL No. N/A, Reading N/A
9. Weather: Wind 5, Precipitation 0, Air Temperature 65
10. Water Level Measurement: FEL No. 6.25
11. Sampler WJF
12. Previous Well Sampled 4MW-3
    Decon Method (Lab/Field) DISPOSABLE
13. Equipment Blank Taken (Y or N) No
14. Casing Type SCHED 40 PVC, I.D. 2", Gal/Ft. .163 (1)
15. Total Depth 12.22 - Depth to Water 6.25 = Ht. 5.97
16. Well Volume .97 = Ht. 5.97 X Gal/Ft. .163 (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge 3 GALLONS
18. Purge Water Containerized No
19. FEL No.'s Cond. YSI 33 pH HACH 1 Temperature HACH 1 ~~Redox~~ TURBIDITY HACH 2100P
20.

	~~MS/cm~~ ~~µmhos/cm~~	pH	Temp.	~~Redox mv~~	TURBIDITY
Cond. Initial	.1	8.67	15.5		50.4
(Purged Cycle)	.1	8.57	15.3		71.7
	.1	5.63	15.5		56.7
	.1	5.92	15.9		34.3
Sample	.1	5.96	18.7		39.5

21. Turbid (Y or N) Y
22. Color LT BROWN
23. Sample Filtered No, Filter Size NA
24. Reviewed By WJF Date/Time 4/26/95 1400

GROUNDWATER SAMPLING FORM

1. Date 4/12/95 Sample No. MW-112, MW-211 (DUP)
   Time 0830
2. Location FT STORY - FTA SITE
3. Well No. MW-112 Sketch on Back (Y or N) No
4. Total Depth 12.53 Number of Screened Interval(s) ____
5. Depth to Screen/Length(s) ____
6. (Y or N) Well Secure? No Comments LOCKING CAP NOT SECURED
7. Sampler WJF/SAB Other present ____
8. Organic Vapor Detector FEL No. NA, Reading NA
9. Weather: Wind 0, Precipitation 0, Air Temperature 60°F
10. Water Level Measurement: FEL No. 6.07' BTOC
11. Sampler WJF/SAB
12. Previous Well Sampled NONE
    Decon Method (Lab/Field) DISPOSABLE
13. Equipment Blank Taken (Y or N) No
14. Casing Type SCHED 40 PVC, I.D. 2", Gal/Ft. .163 (1)
15. Total Depth 12.53 - Depth to Water 6.07 = Ht. 6.46
16. Well Volume 1.05 = Ht. 6.46 X Gal/Ft. .163 (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge 5 GALLONS
18. Purge Water Containerized No
19. FEL No.'s Cond. YSI 33 pH HACH 1 Temperature HACH 1 ~~Redox~~ TURBIDITY HACH 2100P
20.

	mS ~~µmhos/cm~~	pH	Temp.	~~Redox mv~~	(NTU) TURBIDITY
Cond. Initial	.10	5.56	15.6		39.3
(Purged Cycle)	.20	6.42	15.3		95.6
	.10	6.37	15.4		51.4
	.10	6.44	15.4		55.6
Sample	.10	6.64	15.8		15.3

21. Turbid (Y or N) ____
22. Color LT BROWN
23. Sample Filtered ~~FOR METALS~~, Filter Size .45 µm
24. Reviewed By WJF Date/Time 4/26/95 1400

GROUNDWATER SAMPLING FORM

1. Date 4/13/95 Sample No. MW-113A
   Time 0925
2. Location Ft Story - FTA
3. Well No. MW-113A Sketch on Back (Y or N) No
4. Total Depth 14.70 Number of Screened Interval(s) ____
5. Depth to Screen/Length(s) ____
6. (Y or N) Well Secure? No Comments Locking cap not on tightly
   Bailer in well
7. Sampler WJF Other present SAB
8. Organic Vapor Detector FEL No. NA, Reading NA
9. Weather: Wind 0-5, Precipitation 0, Air Temperature 65'
10. Water Level Measurement: FEL No. 8.28
11. Sampler WJF
12. Previous Well Sampled 4MW-4
    Decon Method (Lab/Field) DISPOSABLE
13. Equipment Blank Taken (Y or N) No
14. Casing Type SCHED 40 PVC, I.D. 2", Gal/Ft. .163 (1)
15. Total Depth 14.70 - Depth to Water 8.28 = Ht. 6.42
16. Well Volume 1.05 = Ht. 6.42 X Gal/Ft. .163 (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge 3.75
18. Purge Water Containerized No
19. FEL No.'s Cond. YSI 33 pH HACH 1 Temperature HACH 1 ~~Redox~~ Turbidity HACH 2100P (NTU)
20.

	Cond. mS ~~umhos/cm~~	pH	Temp.	~~Redox mv~~	Turbidity
Cond. Initial	.2	4.91	13.6		54.8
(Purged Cycle)	.2	4.66	13.3		332
	.2	4.72	13.5		302
	.2	4.66	13.3		290
Sample	.2	4.86	14.3		134

21. Turbid (Y or N) Yes
22. Color Lt Brown
23. Sample Filtered No, Filter Size N/A
24. Reviewed By WJF Date/Time 4/26/95 1400

GROUNDWATER SAMPLING FORM

1. Date 4/12/95 Sample No. MW-114A
   Time 1120
2. Location Ft Story
3. Well No. MW-114A Sketch on Back (Y or N) No
4. Total Depth 17.44 Number of Screened Interval(s) ____
5. Depth to Screen/Length(s) ____
6. (Y or N) Well Secure? No Comments Sulfur Smell
7. Sampler WJF/SAB Other present AKP
8. Organic Vapor Detector FEL No. N/A, Reading N/A
9. Weather: Wind 0-5, Precipitation 0, Air Temperature 65
10. Water Level Measurement: FEL No. 12.00
11. Sampler WJF
12. Previous Well Sampled 4 MW-5
    Decon Method (Lab/Field) Disposable
13. Equipment Blank Taken (Y or N) No
14. Casing Type Sched 40 PVC, I.D. 2", Gal/Ft. .163 (1)
15. Total Depth 17.44 - Depth to Water 12.00 = Ht. 5.44
16. Well Volume .89 = Ht. 5.44 X Gal/Ft. .163 (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge 3 GALLONS
18. Purge Water Containerized No
19. FEL No.'s Cond. YSI 33 pH HACH 1 Temperature HACH 1 ~~Redox~~ TURBIDITY HACH 2100P
20.

	mS ~~µmhos/cm~~	pH	Temp.	~~Redox mv~~	(NTU) TURBIDIT
Cond. Initial	.10	8.34	16.1		31.2
(Purged Cycle)	.10	7.70	16.1		19.1
	.10	7.75	16.0		16.0
	.10	7.85	16.0		13.5
Sample	.10	7.25	16.5		16.7

21. Turbid (Y or N) Y
22. Color Lt Brown
23. Sample Filtered No, Filter Size NA
24. Reviewed By WJF Date/Time 4/26/95 1400

3. GROUNDWATER SAMPLING FORM

1. Date 2/23/95 Sample No. GW04-001
   Time 1300
2. Location Northern area of FTA
3. Well No. DPT PT. 001 Sketch on Back (Y or N) N
4. Total Depth 9' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 8' / 1'
6. (Y or N) Well Secure? NA Comments

7. Sampler TONY PACE Other present
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 20 mph, Precipitation NONE, Air Temperature 55°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW04-003
    Decon Method (Lab/(Field))
13. Equipment Blank Taken (Y or (N))
14. Casing Type _____, I.D. _____, Gal/Ft. _____ (1)
15. Total Depth 9' - Depth to Water 2.5' = Ht. 6.5'
16. Well Volume _____ = Ht. _____ X Gal/Ft. _____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. 451 33 pH ORION 290A Temperature 451 33 Redox
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	80	6.5	14.7°C	—

21. Turbid (Y or N) N
22. Color TAN
23. Sample Filtered YES, Filter Size 0.45 micron
24. Reviewed By AVP Date/Time 2/23/95 1800

3. GROUNDWATER SAMPLING FORM

1. Date 2/23/95 Sample No. GW04-002 GW04-002 MS/MSD
   Time 1415
2. Location Nothern area of FTA
3. Well No. DPT PT. 002 Sketch on Back (Y or N) N
4. Total Depth 9.5' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) / 1'
6. (Y or N) Well Secure? NA Comments
7. Sampler TONY PACE Other present
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 20 MPH, Precipitation NONE, Air Temperature 58°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW04-001
    Decon Method (Lab/Field)
13. Equipment Blank Taken (Y or N)
14. Casing Type , I.D. , Gal/Ft. (1)
15. Total Depth 9.5' - Depth to Water 2' = Ht. 7.5'
16. Well Volume = Ht. X Gal/Ft. (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI 33 pH ORION 290A Temperature YSI 33 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	80	6.2	17.2°C	—

21. Turbid (Y or N) Y
22. Color TAN
23. Sample Filtered NO, Filter Size
24. Reviewed By AVP Date/Time 2/23/95 1800

3. GROUNDWATER SAMPLING FORM

1. Date 2/23/95 Sample No. GW04-003
   Time 1155
2. Location DPT PT. 003 Central part of site
3. Well No. ↓ Sketch on Back (Y or N) N
4. Total Depth 9.5' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 8.5' / 1'
6. (Y or N) Well Secure? NA Comments

7. Sampler TONY PACE Other present
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 20 mph, Precipitation NONE, Air Temperature 50°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW04-004
    Decon Method (Lab/(Field)
13. Equipment Blank Taken (Y or (N))
14. Casing Type , I.D. , Gal/Ft. (1)
15. Total Depth 9.5' - Depth to Water 2.5' = Ht. 7'
16. Well Volume = Ht. X Gal/Ft. (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI 33 pH ORION 290A Temperature YSI 33 Redox
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	60	6.1	15.0°C	—

21. Turbid (Y or N) Y
22. Color tan
23. Sample Filtered No, Filter Size
24. Reviewed By AVP Date/Time 2/23/95 1800

3. GROUNDWATER SAMPLING FORM

1. Date 2/23/95 Sample No. GW04-004
   Time 1045
2. Location Central portion of FTA
3. Well No. DPT POINT 004 Sketch on Back (Y or N) N
4. Total Depth 13.5' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 12.5 / 1'
6. (Y or N) Well Secure? NA Comments

7. Sampler TONY PACE Other present
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 15 MPH, Precipitation NONE, Air Temperature 50°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW04-008
    Decon Method (Lab/(Field))
13. Equipment Blank Taken (Y or (N))
14. Casing Type , I.D. , Gal/Ft. (1)
15. Total Depth 13.5 - Depth to Water 2.5 = Ht. 11
16. Well Volume = Ht. X Gal/Ft. (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI 33 pH ORION 290A Temperature YSI 33 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	80	6.1	14.3°C	—

21. Turbid (Y or N) Y
22. Color tan
23. Sample Filtered No, Filter Size
24. Reviewed By AMP Date/Time 2/23/95 1800

3. GROUNDWATER SAMPLING FORM

1. Date 2/22/95 Sample No. GW04-005
   Time 1545
2. Location North of former fire pit at FTA
3. Well No. DPT Pt. GW04-005 Sketch on Back (Y or N) N
4. Total Depth 13' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 12' / 1'
6. (Y or N) Well Secure? NA Comments

7. Sampler Scott Bailey Other present
8. Organic Vapor Detector FEL No. MICRO TIP HL-200, Reading 0 ppm
9. Weather: Wind 10 mph, Precipitation None, Air Temperature 45°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled First of Day
    Decon Method (Lab/Field)
13. Equipment Blank Taken (Y) or (N) EB04-GW-022295
14. Casing Type , I.D. , Gal/Ft. (1)
15. Total Depth 13' - Depth to Water 7' = Ht. 6'
16. Well Volume = Ht. X Gal/Ft. (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. 451-33 pH ORION 290A Temperature 451-33 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	200	6.1	13.6	—

21. Turbid (Y or N) Y
22. Color TAN
23. Sample Filtered No, Filter Size
24. Reviewed By AMP Date/Time 2/22/95 1745

3. GROUNDWATER SAMPLING FORM

1. Date 2/21/95 Sample No. GW04-006
   Time 1300
2. Location Within former fire pit at FTA
3. Well No. DPT PT. 006 Sketch on Back (Y or N) N
4. Total Depth 13.3' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 12.3' / 1'
6. (Y or N) Well Secure? NA Comments
   Diesel fuel odor
7. Sampler Scott Bailey Other present
8. Organic Vapor Detector FEL No. MICROTIP HL-500A, Reading 10 ppm from sample
9. Weather: Wind 20 mph, Precipitation None, Air Temperature 50°F (0 ppm in breathing zone)
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW04-007
    Decon Method (Lab/Field)
13. Equipment Blank Taken (Y or N)
14. Casing Type , I.D. , Gal/Ft. (1)
15. Total Depth 13.3' - Depth to Water 5.4' = Ht. 7.9'
16. Well Volume = Ht. X Gal/Ft. (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI 33 pH ORION 250A Temperature YSI 33 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	250	6.5	15°C	—

21. Turbid (Y or N) Y
22. Color tan
23. Sample Filtered No, Filter Size
24. Reviewed By AKP Date/Time 2/21/95 1600

3. GROUNDWATER SAMPLING FORM

1. Date 2/21/95 Sample No. GW04-700 GW04-007
   Time 1000
2. Location South of former fire pit at FTA
3. Well No. DPT PT. 007 Sketch on Back (Y or N) N
4. Total Depth 14.3' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 13.3' / 1'
6. (Y or N) Well Secure? NA Comments

7. Sampler Scott Bailey Other present
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 20 mph, Precipitation None, Air Temperature 45°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW04-012
    Decon Method (Lab/Field)
13. Equipment Blank Taken (Y) or (N)
14. Casing Type , I.D. , Gal/Ft. (1)
15. Total Depth 14.3' - Depth to Water 6' = Ht. 7.3'
16. Well Volume = Ht. X Gal/Ft. (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI 33 pH ORION 290A Temperature YSI 33 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	65	6.2	14.2°C	—

21. Turbid (Y or N) Y
22. Color Tan
23. Sample Filtered Yes, Filter Size 0.40 micron
24. Reviewed By AVP Date/Time 2/21/95 1600

3. GROUNDWATER SAMPLING FORM

1. Date 2/23/95 Sample No. GW04-008
   Time 0915
2. Location Near Solvent Plume Area in SE Corner of FTA
3. Well No. DPT PT. 008 Sketch on Back (Y or N) N
4. Total Depth 13' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 12' | 1'
6. (Y or N) Well Secure? NA Comments

7. Sampler TONY PACE Other present
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 15 MPH, Precipitation NONE, Air Temperature 50°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW04-013
    Decon Method (Lab/Field) Same as GW04-013
13. Equipment Blank Taken (Y) or ~~N~~ ER04-GW-022395 (Taken prior to sample collection at this point)
14. Casing Type _____, I.D. _____, Gal/Ft. _____ (1)
15. Total Depth 13' - Depth to Water 6' = Ht. 7'
16. Well Volume _____ = Ht. _____ X Gal/Ft. _____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI 33 pH ORION 290A Temperature YSI 33 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	100	6.1	15.6°C	—

21. Turbid (Y or N) Y
22. Color TAN
23. Sample Filtered YES, Filter Size 0.40 MICRON
24. Reviewed By ~~2/23/95~~ AKP Date/Time 2/23/95 1800

3. GROUNDWATER SAMPLING FORM

1. Date 2/20/95 Sample No. GW04-009
   Time 1500
2. Location Southeast area of FTA
3. Well No. DDT Pt. GW04-009 Sketch on Back (Y or N) N
4. Total Depth 15 feet Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 14 ft / 1 ft
6. (Y or N) Well Secure? N Comments

7. Sampler Tony Pace Other present
8. Organic Vapor Detector FEL No. MICROTIP HL-200A, Reading 0 ppm
9. Weather: Wind 5 mph, Precipitation None, Air Temperature 55°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW04-010
    Decon Method (Lab/~~Field~~) Same as GW04-010
13. Equipment Blank Taken (Y or (N))
14. Casing Type _____, I.D. _____, Gal/Ft. _____ (1)
15. Total Depth _____ - Depth to Water _____ = Ht. _____
16. Well Volume _____ = Ht. _____ X Gal/Ft. _____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI-33 pH ORION 290A Temperature YSI-33 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	70	6.6	17°C	—

21. Turbid (Y or N) Y
22. Color Light tan
23. Sample Filtered No, Filter Size
24. Reviewed By AKP Date/Time 2/20/95 1715

3. GROUNDWATER SAMPLING FORM

1. Date 2/20/95 Sample No. GW04-010
   Time 1330
2. Location South of MW-112
3. Well No. DPT GW04-010 Sketch on Back (Y or N) N
4. Total Depth 14.5 Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 13.5 / 1 foot screen
6. (Y or N) Well Secure? N Comments

7. Sampler Tony Pace Other present
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 5 mph, Precipitation None, Air Temperature 50°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled None today
    Decon Method (Lab/Field) Basin — Alconox wash, DI rinse, methanol rinse, DI rinse
13. Equipment Blank Taken (Y or (N))
14. Casing Type , I.D. , Gal/Ft. (1)
15. Total Depth 14.5 ft - Depth to Water 7.5 ft = Ht. 7.0 ft
16. Well Volume = Ht. X Gal/Ft. (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI-33 pH ORION 290A Temperature YSI-33 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	75	6.4	16°C	—

21. Turbid (Y or N) Y
22. Color TAN
23. Sample Filtered N, Filter Size
24. Reviewed By AMP Date/Time 2/20/95 1715

3. GROUNDWATER SAMPLING FORM

1. Date 2/16/95 ~~1300~~ Sample No. GW04-011 (DPT Point)
   Time 1500
2. Location Southeast corner of FTA
3. Well No. N/a Sketch on Back (Y or (N)) ____
4. Total Depth 13.5 ft. Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 12.5' / 1 ft
6. (Y or (N)) Well Secure? ____ Comments ____
7. Sampler Scott Bailey Other present Stephanie Bishop
8. Organic Vapor Detector FEL No. — , Reading —
9. Weather: Wind 5 mph, Precipitation Light rain, Air Temperature 40°F
10. Water Level Measurement: FEL No. ____
11. Sampler ____
12. Previous Well Sampled None
    Decon Method (Lab/(Field)) Bailer - Alcnox wash, tap water rinse, methanol rinse, DI rinse
13. Equipment Blank Taken (Y or (N)) ____
14. Casing Type ____, I.D. ____, Gal/Ft. ____ (1)
15. Total Depth ____ - Depth to Water ____ = Ht. ____
16. Well Volume ____ = Ht. ____ X Gal/Ft. ____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge NA
18. Purge Water Containerized NA
19. FEL No.'s Cond. ____ pH ____ Temperature ____ Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial	200	6.0	9°C	
(Purged Cycle)				
Sample				

21. Turbid (Y or N) Y
22. Color tan sediment in samples
23. Sample Filtered No, Filter Size ____
24. Reviewed By AKP Date/Time 2/16/95 1515

3. GROUNDWATER SAMPLING FORM

1. Date 2/21/95 Sample No. GW04-210A GW04-012
   Time 0800
2. Location South of former fire pit at FTA
3. Well No. PIT PT. GW04-012 Sketch on Back (Y or N) N
4. Total Depth 14' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 13' / 1'
6. (Y or N) Well Secure? NA Comments
7. Sampler Scott Bailey Other present
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 20 mph, Precipitation None, Air Temperature 45°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled First of Day
    Decon Method (Lab/Field)
13. Equipment Blank Taken (Y or N)
14. Casing Type , I.D. , Gal/Ft. (1)
15. Total Depth 14 - Depth to Water 5.5 = Ht. 8.5
16. Well Volume = Ht. X Gal/Ft. (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI 33 pH ORION 250A Temperature YSI 33 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	80	6.5	10.5°C	

21. Turbid (Y or N) Y
22. Color TAN
23. Sample Filtered No, Filter Size
24. Reviewed By AVP Date/Time 2/21/95 1600

3. GROUNDWATER SAMPLING FORM

1. Date 2/23/95 Sample No. GW04 - ~~00~~ 013
   Time _____
2. Location East of former fire pit at FTA
3. Well No. DPT PT. GW04-013 Sketch on Back (Y or N) N
4. Total Depth 13.1' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 12.1' / 1'
6. (Y or N) Well Secure? N Comments _____
7. Sampler A.K. PACE Other present _____
8. Organic Vapor Detector FEL No. MICRO TIP HL 200, Reading 0 ppm
9. Weather: Wind 10 mph, Precipitation None, Air Temperature 44°F
10. Water Level Measurement: FEL No. _____
11. Sampler _____
12. Previous Well Sampled GW04-005 (PREVIOUS DAY)
    Decon Method (Lab/(Field)) Alconox wash, DI rinse, methanol rinse, DI rinse
13. Equipment Blank Taken (Y or (N)) _____
14. Casing Type _____, I.D. _____, Gal/Ft. _____ (1)
15. Total Depth 13.1' - Depth to Water 5' = Ht. 8.1'
16. Well Volume _____ = Ht. _____ X Gal/Ft. _____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge _____
18. Purge Water Containerized _____
19. FEL No.'s Cond. _____ pH _____ Temperature _____ Redox _____
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	80	6.1	12.9 °C	—

21. Turbid (Y or N) Y
22. Color Light tan
23. Sample Filtered No, Filter Size _____
24. Reviewed By AMP Date/Time 2/23/95 1800

3. GROUNDWATER SAMPLING FORM

1. Date 2/27/95 Sample No. GW04-014
   Time 1220
2. Location Southeast corner of FTA - Adjacent to MW-112
3. Well No. DPT Pt. 014 Sketch on Back (Y or N) N
4. Total Depth 9.5' Number of Screened Interval(s) ____
5. Depth to Screen/Length(s) 8.5'/1'
6. (Y or N) Well Secure? N/A Comments ____

7. Sampler Scott Bailey Other present Tony Pace
8. Organic Vapor Detector FEL No. MICROTIP HL-200A, Reading 0 ppm
9. Weather: Wind 15 mph, Precipitation None, Air Temperature 50°F
10. Water Level Measurement: FEL No. ____
11. Sampler ____
12. Previous Well Sampled ~~GW04~~ GW07-001
    Decon Method (Lab/(Field)) ____
13. Equipment Blank Taken (Y or (N)) ____
14. Casing Type ____, I.D. ____, Gal/Ft. ____ (1)
15. Total Depth 9.5' - Depth to Water 5.5' = Ht. 4'
16. Well Volume ____ = Ht. ____ X Gal/Ft. ____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge ____
18. Purge Water Containerized ____
19. FEL No.'s Cond. YSI 33 pH ORION 290A Temperature YSI 33 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	90	6.4	14°C	—

21. Turbid (Y or N) Y
22. Color tan
23. Sample Filtered No, Filter Size ____
24. Reviewed By AMP Date/Time 2/27/95 1645

3. GROUNDWATER SAMPLING FORM

1. Date 2/27/95 Sample No. GW04-014-20
   Time 1700
2. Location Southeast Corner of FTA - Adjacent to MW-112
3. Well No. DPT Pt. 014 Sketch on Back (Y or N) N
4. Total Depth 20' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 19'/1'
6. (Y or N) Well Secure? N/A Comments

7. Sampler Scott Bailey Other present Tony Pace
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 5mph, Precipitation None, Air Temperature 50°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW04-015
    Decon Method (Lab/(Field))
13. Equipment Blank Taken (Y or (N))
14. Casing Type , I.D. , Gal/Ft. (1)
15. Total Depth 20' - Depth to Water 5.5' = Ht. 14.5'
16. Well Volume = Ht. X Gal/Ft. (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI 33 pH ORION 290A Temperature YSI 33 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	90	6.2	14°C	—

21. Turbid (Y or N) Y
22. Color Brown to tan
23. Sample Filtered ND, Filter Size
24. Reviewed By AKP Date/Time 2/27/95 1710

3. GROUNDWATER SAMPLING FORM

1. Date 2/27/95 Sample No. GW04-015
   Time 1245
2. Location Southeast Corner of FTA
3. Well No. DPT No. 015 Sketch on Back (Y or N) N
4. Total Depth 13.5' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 12.5' / 1'
6. (Y or N) Well Secure? N/A Comments

7. Sampler Scott Bailey Other present
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 15 mph, Precipitation None, Air Temperature 50 °F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW07-001
    Decon Method (Lab/Field)
13. Equipment Blank Taken (Y or N)
14. Casing Type , I.D. , Gal/Ft. (1)
15. Total Depth 13.5' - Depth to Water 7' = Ht. 6.5'
16. Well Volume = Ht. X Gal/Ft. (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI 33 pH ORION 290A Temperature YSI 33 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	130	7.2	13°C	—

21. Turbid (Y or N) Y
22. Color tan
23. Sample Filtered NO, Filter Size
24. Reviewed By AKP Date/Time 2/27/95 1645

3. GROUNDWATER SAMPLING FORM

1. Date 2/28/95 Sample No. GW04-016
   Time 0815
2. Location Southeast corner of site
3. Well No. DPT Pt. 016 Sketch on Back (Y or N) N
4. Total Depth 9.5' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 8.5'/1'
6. (Y or N) Well Secure? N/A Comments Sulfurous odor
7. Sampler Scott Bailey Other present Tony Pace
8. Organic Vapor Detector FEL No. MICROTIP HL-200A, Reading 0 ppm
9. Weather: Wind 5 mph, Precipitation None, Air Temperature 60°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW04-014 (20 foot depth)
    Decon Method (Lab/(Field)
13. Equipment Blank Taken (Y or (N)
14. Casing Type , I.D. , Gal/Ft. (1)
15. Total Depth 9.5' - Depth to Water 5.5' = Ht. 4'
16. Well Volume = Ht. X Gal/Ft. (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI 33 pH ORION 290A Temperature YSI 33 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	90	6.2	15 °C	—

21. Turbid (Y or N) Y
22. Color tan to brown
23. Sample Filtered No, Filter Size
24. Reviewed By AMP Date/Time 2/28/95 1600

3. GROUNDWATER SAMPLING FORM

1. Date 2/28/95 Sample No. GW04-016-22
   Time 1600
2. Location SE corner of FTA
3. Well No. DPT PT. 016 Sketch on Back (Y or N) _____
4. Total Depth 22 ft. Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 21' / 1'
6. (Y or N) Well Secure? NA Comments _____
7. Sampler Scott Bailey Other present Tony Pace
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 5 mph, Precipitation None, Air Temperature 60 °F
10. Water Level Measurement: FEL No. _____
11. Sampler _____
12. Previous Well Sampled GW04-021
    Decon Method (Lab/Field) _____
13. Equipment Blank Taken (Y or (N)) _____
14. Casing Type _____, I.D. _____, Gal/Ft. _____ (1)
15. Total Depth 22' - Depth to Water 5.5' = Ht. 16.5'
16. Well Volume _____ = Ht. _____ X Gal/Ft. _____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge _____
18. Purge Water Containerized _____
19. FEL No.'s Cond. YSI 33 pH ORION 290A Temperature YSI 33 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	170	6.8	17°C	-

21. Turbid (Y or N) Y
22. Color brown
23. Sample Filtered NO, Filter Size _____
24. Reviewed By AMP Date/Time 2/28/95 1615

3. GROUNDWATER SAMPLING FORM

1. Date 2/28/95 Sample No. GW04-017
   Time 0900
2. Location West of former fire pit at FTA
3. Well No. DPT Pt. 017 Sketch on Back (Y or N) N
4. Total Depth 9.5' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 8.5'/1'
6. (Y or N) Well Secure? N/A Comments

7. Sampler Scott Bailey Other present Tony Pace
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 5 mph, Precipitation Light rain, Air Temperature 60°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW04-016
    Decon Method (Lab/Field)
13. Equipment Blank Taken (Y or (N))
14. Casing Type , I.D. , Gal/Ft. (1)
15. Total Depth 9.5' - Depth to Water 5' = Ht. 4.5'
16. Well Volume = Ht. X Gal/Ft. (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI 33 pH ORION 290A Temperature YSI 33 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	140	6.0	14°C	—

21. Turbid (Y or N) Y
22. Color
23. Sample Filtered NO, Filter Size
24. Reviewed By AMP Date/Time 2/28/95 1615

GROUNDWATER SAMPLING FORM

1. Date 3/7/95 Sample No. GW04-018
   Time 1445
2. Location East of former fire pit
3. Well No. DPT Pt. 018 Sketch on Back (Y or N) N
4. Total Depth 10.0' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 9' / 1'
6. (Y or N) Well Secure? N/A Comments

7. Sampler Scott Bailey Other present Tony Pau
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 10 mph, Precipitation None, Air Temperature 60 °F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW06-025
    Decon Method (Lab/Field)
13. Equipment Blank Taken (Y or (N))
14. Casing Type , I.D. , Gal/Ft. (1)
15. Total Depth 10' - Depth to Water 7' = Ht. 3'
16. Well Volume = Ht. X Gal/Ft. (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI pH ORION 250A Temperature YSI Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	190	7.0	15°C	—

21. Turbid (Y or N) Y
22. Color brown
23. Sample Filtered No, Filter Size
24. Reviewed By AM Date/Time 3/7/95 1445

3. GROUNDWATER SAMPLING FORM

1. Date 2/28/95 Sample No. GW04-019 (ON-SITE ANALYSIS ONLY)
   Time 1035
2. Location East of Solvent Plume Area of FTA
3. Well No. DPT DP. 019 Sketch on Back (Y or N) N
4. Total Depth 9.5' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 8.5' / 1'
6. (Y or N) Well Secure? NA Comments _____
7. Sampler Scott Bailey Other present Tony Pace
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 5 mph, Precipitation light rain, Air Temperature 60°F
10. Water Level Measurement: FEL No. _____
11. Sampler _____
12. Previous Well Sampled GW04-017
    Decon Method (Lab/Field) _____
13. Equipment Blank Taken (Y or N) _____
14. Casing Type _____, I.D. _____, Gal/Ft. _____ (1)
15. Total Depth 9.5' - Depth to Water 5.5' = Ht. 4'
16. Well Volume _____ = Ht. ____ X Gal/Ft. _____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge _____
18. Purge Water Containerized _____
19. FEL No.'s Cond. YSI 33 pH ORION 250A Temperature YSI 33 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	70	6.3	15°C	—

21. Turbid (Y or N) Y
22. Color tan
23. Sample Filtered NO, Filter Size _____
24. Reviewed By AVP Date/Time 2/28/95 1615

3. GROUNDWATER SAMPLING FORM

1. Date 2/28/95 Sample No. GW04-020 (ON-SITE ANALYSIS ONLY)
   Time 1135
2. Location Southeast corner of FTA
3. Well No. DPT Pt. 020 Sketch on Back (Y or N) N
4. Total Depth 9.5' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 8.5'/1'
6. (Y or N) Well Secure? N/A Comments
7. Sampler Scott Bailey Other present Tony Pace
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 5 mph, Precipitation light rain, Air Temperature 60 °F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW04-019
    Decon Method (Lab/Field)
13. Equipment Blank Taken (Y or N) N
14. Casing Type , I.D. , Gal/Ft. (1)
15. Total Depth 9.5' - Depth to Water 5.5' = Ht. 4.0'
16. Well Volume = Ht. X Gal/Ft. (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI 33 pH ORION 290A Temperature YSI 33 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	70	6.6	15°C	—

21. Turbid (Y or N) Y
22. Color tan
23. Sample Filtered No, Filter Size
24. Reviewed By AMP Date/Time 2/28/95 1615

3. GROUNDWATER SAMPLING FORM

1. Date 2/28/95 Sample No. GW04-021 (ON-SITE ANALYSIS ONLY)
   Time 1225
2. Location SE of FTA
3. Well No. DPT Pt. 021 Sketch on Back (Y or N) N
4. Total Depth _____ Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) _____ / 1'
6. (Y or N) Well Secure? N/A Comments _____
7. Sampler Scott Bailey Other present Tony Pace
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 5 mph, Precipitation None, Air Temperature 60 °F
10. Water Level Measurement: FEL No. _____
11. Sampler _____
12. Previous Well Sampled GW04-020
    Decon Method (Lab/Field) _____
13. Equipment Blank Taken (Y or N) _____
14. Casing Type _____, I.D. _____, Gal/Ft. _____ (1)
15. Total Depth _____ - Depth to Water _____ = Ht. _____
16. Well Volume _____ = Ht. _____ X Gal/Ft. _____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge _____
18. Purge Water Containerized _____
19. FEL No.'s Cond. YSI 33 pH ORION 290A Temperature YSI 33 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	90	6.6	15°C	—

21. Turbid (Y or N) Y
22. Color tan
23. Sample Filtered NO, Filter Size _____
24. Reviewed By AMP Date/Time 2/28/95 1615

3. GROUNDWATER SAMPLING FORM

1. Date 2/28/95 Sample No. GW04-022
   Time 1700
2. Location Southern end of FTA
3. Well No. DPT Pt. 022 Sketch on Back (Y or N) N
4. Total Depth 10.5' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 9.5'/1'
6. (Y or N) Well Secure? N/A Comments _____
7. Sampler Scott Bailey Other present Tony Pace
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 5 mph, Precipitation Light Rain, Air Temperature 60°F
10. Water Level Measurement: FEL No. _____
11. Sampler _____
12. Previous Well Sampled GW04-016 (22 ft depth)
    Decon Method (Lab/(Field)) _____
13. Equipment Blank Taken (Y or (N)) _____
14. Casing Type _____, I.D. _____, Gal/Ft. _____ (1)
15. Total Depth _____ - Depth to Water _____ = Ht. _____
16. Well Volume _____ = Ht. _____ X Gal/Ft. _____ (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge _____
18. Purge Water Containerized _____
19. FEL No.'s Cond. 45133 pH ORION 290A Temperature 45133 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	80	6.8	17°C	—

21. Turbid (Y or N) Y
22. Color Brown
23. Sample Filtered No, Filter Size _____
24. Reviewed By AMP Date/Time 2/28/95 1705

3. GROUNDWATER SAMPLING FORM

1. Date 3/1/95 Sample No. GW04-023
   Time 0840
2. Location West of former fire pit at FTA
3. Well No. DPT Pt. 023 Sketch on Back (Y or N) N
4. Total Depth 9.5' Number of Screened Interval(s) 1
5. Depth to Screen/Length(s) 8.5'/1'
6. (Y or N) Well Secure? N/A Comments

7. Sampler Scott Bailey Other present Tony Pace
8. Organic Vapor Detector FEL No. MICROTIP HL-200, Reading 0 ppm
9. Weather: Wind 10 mph, Precipitation Light rain, Air Temperature 45°F
10. Water Level Measurement: FEL No.
11. Sampler
12. Previous Well Sampled GW04-022 (2/28/95)
    Decon Method (Lab/(Field))
13. Equipment Blank Taken (Y or (N))
14. Casing Type , I.D. , Gal/Ft. (1)
15. Total Depth 9.5' - Depth to Water 5' = Ht. 4.5'
16. Well Volume = Ht. X Gal/Ft. (1)
17. Required Purge Volume (≥ 3X Well Vol.), Actual Purge
18. Purge Water Containerized
19. FEL No.'s Cond. YSI 33 pH ORION 290A Temperature YSI 33 Redox —
20.

	µmhos/cm	pH	Temp.	Redox mv
Cond. Initial				
(Purged Cycle)				
Sample	130	6.6	11°C	—

21. Turbid (Y or N) Y
22. Color Brown
23. Sample Filtered No, Filter Size
24. Reviewed By AHP Date/Time 3/1/95 1100

SOIL SAMPLING FORM

1. Date/Time 2/7/95 0955 Sample No. SS04-001-01
2. Location Northern area of FTA
3. Previous Sample SS04-003-01
4. Sampler Tom Pace
5. Others Scott Bailey
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 5 mph, Precipitation —, Air Temperature 20°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) ~~au~~ tr
11. Presampling sampler decon method (lab/field) Same as SS04-022-01 plus nitric acid rinse
12. Presample Equipment Blank taken (y/n)
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS04-022-01
15. Comments Dark Brown sand
16. Reviewed by: AKP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/7/95 1005 Sample No. SS04-002-01
2. Location Northern area of FTA
3. Previous Sample SS04-001-01
4. Sampler Tony Pace
5. Others Scott Bailey
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 5 mph, Precipitation —, Air Temperature 30°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) tr
11. Presampling sampler decon method (lab/~~field~~) Same as SS04-022-01
12. Presample Equipment Blank taken (y/~~n~~)
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS04-022-01
15. Comments Dark brown sand
16. Reviewed by: AKP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

SOIL SAMPLING FORM

1. Date/Time 2/7/95 0945 Sample No. SS04-003-01
2. Location Northern area of FTA
3. Previous Sample None - 1st of day
4. Sampler Tony Pace
5. Others Scott Bailey
6. Organic Vapor Detector FEL No. —, Reading —
7. Weather: Wind 5 mph, Precipitation None, Air Temperature 20°F
8. FEL No.'s Cond. —, pH —, Temp. —, Redox —
9. Sampling Depth 0 to 12"
10. Sampling Method (ss, tr, au) ~~au~~ tr
11. Presampling sampler decon method (lab/(field)) Same as SS04-022-01
12. Presample Equipment Blank taken (y/(n))
13. Equipment blank no.
14. Sample type (composite/voc) Same as SS04-022-01
15. Comments Brown sand
16. Reviewed by: AWP Date/Time 2/7/95 1700

Form Complete? [Y or N] Y

Decon Complete? [Y or N] Y

ss - split spoon
tr - trowel
au - auger

TABLE 2-6

BACKGROUND BORINGS
SUMMARY OF SOIL SAMPLING DEPTHS

Boring Number	Total Depth[a] (ft.)	Samples Logged	Samples Analyzed	Depth of Soil Samples[b] (ft.)
SB-134	15	4	2	0,4,9,13
SB-135	42	9	2	0,5,10,15,20,25,30,35,40
SB-136	22	6	2	0,4,9,13,15,20

(a) Total depth relative to ground surface.
(b) An underlined number (e.g., 0) indicates depth at which an analytical sample was collected. Lithologic samples were collected at all depths shown.

values are distributed lognormally between the detection limit and zero. This assumption is probably more accurate than the assumption that the ND values are distributed normally because it weights the distribution of the ND values toward the detection limit. If all the data (above and below the detection limit) is distributed normally, such as in the T-distribution in this case, then the ND values would also be weighted toward the detection limit. By using a value equal to the detection limit divided by the square root of two ($DL/\sqrt{2}$), a more accurate representation of lognormal values below the detection limit can be achieved (Hornung and Reed, 1990). This technique ($DL/\sqrt{2}$) has been used in this *PA/SI*.

Of the parameters analyzed for the Fort Story PA/SI, five metals (chromium, copper, zinc, arsenic and lead) and the pesticide DDT were detected in background soil boring samples. Table 2-7 shows the results of the statistical analysis for these metals. The remaining seven metals (barium, beryllium, cadmium, mercury, nickel, selenium and silver), as well as pesticides (other than DDT), PCBs, VOCs and BNAs were not detected in background borings from Fort Story.

Although DDT was found in two of the seven background soil samples, the use of the statistics developed herein is not recommended because the information provided by Commonwealth of Virginia employees has provided more focused guidance, as discussed at the beginning of this section. The ubiquitous nature of DDT, and its associated metabolites (DDD and DDE), is due to the extensive use of the pesticide in the past to control mosquito population (Personal Communication, Young, Chase, 1991) and is illustrated by the fact that it was found in the surface soil sample collected from a background boring as well as numerous other sampling locations throughout Fort Story.

As a result of this analysis, identification of any particular metal analyte at concentrations greater than the 95 percent confidence interval concentration should not automatically result in a recommendation for further investigation at the given Fort Story PA/SI site. A trigger level has been established for soils that realistically reflects a situation at any given site where anthropogenic activities have most likely resulted in contamination that requires further investigation. As a result of these considerations, the evaluation of the reported metals concentrations is based on the assumption that additional investigation is warranted when any metal analyte exceeds the 95 percent confidence interval for background concentration by an order of magnitude (10 times background) (EPA, 1988a). The EPA's Department of Site Assessment concurred with the use of 10 times background upon discussion with JMM and indicated that this was the best approach to take, given the lack of regulatory guidance (Personal Communication, Grubbs, 1991). This value, therefore, is utilized as the specified trigger level for the given analyte.

Analytes not Detected in Background Samples. The background soil samples were analyzed for pesticides/PCBs, VOCs, BNAs, total metals and EP Toxicity metals. Only DDT, arsenic, chromium, copper, lead and zinc were found in concentrations greater than the Method Reporting Level (MRL). Many analytes not found in the background samples were found in the site samples. Identification of any analyte greater than the MRL should not automatically result in recommendation for further action at any given site. Subsequently, evaluation of these will be based upon a site specific evaluation of all media sampled.

Because some trace metals were not detected in background soil borings, and in order to provide some supporting information to complement background boring analytical data, JMM attempted to determine the native concentrations of trace metals in the area of Fort Story.

Although it is clear that soils are derived from parent geologic materials as a result of physical, chemical and biological weathering processes, the range of natural or background metal

TABLE 2-7

BACKGROUND BORING DATA STATISTICS[a]
PRELIMINARY ASSESSMENT/SITE INVESTIGATION
FORT STORY, VIRGINIA

Analyte	Number of Samples Collected	Samples Above Detection Limit	Detection Limit	Assigned ND[b] Value	Mean	Standard Deviation	Upper 95% Confidence Limit Value
Arsenic	7	1	2.5	1.8	1.9	0.26	2.1
Chromium	7	7	1	0.71	2.2	0.69	2.8
Copper	7	3	1	0.71	1.0	0.46	1.4
Lead	7	6	1	0.71	3.6	3.8	7.1
Zinc	7	4	2	1.4	3.2	2.7	5.7
DDT	7	2	0.004	0.0028	0.0034	0.0011	0.0044

(a) All values given in (mg/kg).
(b) ND = Not detected.

concentrations is extremely large, with the composition of the parent material being the principal factor influencing the concentrations of metals in pristine soils. It was found that while there is some published information about typical ranges of concentrations for the United States as a whole (Shacklett and Boerngen, 1984, Kabata-Pendias and Pendias, 1984), no specific information was found that would help to determine native concentrations. JMM contacted representatives of the United States and Commonwealth of Virginia Departments of Agriculture (Personal Communication, Wenthouse, 1991) and the United States Geological Survey (Personal Communication, McNeil, 1991), along with professors from the Department of Crop and Environmental Sciences, Virginia Polytechnic Institute (Personal Communication, Daniels, Martins, 1991). No specific information was acquired from these contacts. JMM determined that while the background metal concentration levels were within the typical ranges for U.S. soils, a more specific determination could not be made for the Fort Story area.

Recommended Trigger Levels. Table 2-8 presents the MRL, background 95 percent confidence interval concentration levels, and the trigger level for each analyte detected in Fort Story soil samples. The trigger levels, as herein defined, provide conservative guidance for determination of whether further investigative activity is required at a given site.

The trigger levels determined for compounds of concern found at PA/SI and NIKE PA/SI sites are intended as a quantitative indicator whether further investigatory action may be appropriate for the site. The trigger levels are derived based on statistically-significant background concentrations of compounds of concern, or regulatory standards as may be appropriate. The trigger levels do not necessarily constitute applicable or relevant and appropriate requirements (ARARs). ARARs are developed while a project site is undergoing an RI/FS evaluation and the magnitude and extent of environmental contamination is being assessed. ARARs then serve as potential clean-up standards for contaminated site media.

2.1.2.2 Groundwater Trigger Levels. Regulatory maximum contaminant levels (MCLs), along with Commonwealth of Virginia groundwater protection levels (VGWPLs), have been established for most of the analytes present in the water samples analyzed for the PA/SI. MCLs are enforceable standards, promulgated under the Safe Drinking Water Act of 1986 (EPA, 1991 40 CFR Parts 141, 142 and 143) and regulated by the Commonwealth of Virginia State Department of Health, which has primary responsibility for enforcing compliance with all drinking water standards. MCLs are set at levels that are determined to be protective of human health and are as close as feasible to the Maximum Contaminant Level Goals (MCLGs). In addition, MCLs address the use of the best available water treatment technology, treatment cost and other considerations.

The VGWPLs are health-based standards derived from Federal Resource Conservation and Recovery Act (RCRA) groundwater protection standards (EPA, 1990) and Commonwealth of Virginia State Water Control Board Regulations VR 680-21-00 (Commonwealth of Virginia, 1990). The water quality standards are health-based in nature and were developed in the 1970s as standards to protect groundwater quality. They are not considered appropriate as clean-up standards (Personal Communication, Barron, August 1991) and consequently have not been integrated into this report. The VGWPLs are most appropriate as guidelines for groundwater protection associated with existing solid waste management units, such as surface impoundments, landfills or waste piles.

Generally, MCLs are considered relevant and appropriate for groundwater that is a current or potential source of drinking water. The presence of wetlands adjacent to a site, the possibility that a nonpotable aquifer could be used for supplying drinking water in the future, or significant interaction of groundwater with surface waters could prompt MCLs to be used as site clean-up goals. Therefore, based on the nature of the PA/SI and NIKE PA/SI project sites and consideration of these regulatory preferences, JMM considers the MCLs to be more relevant and

TABLE 2-8

SOIL TRIGGER LEVELS
PRELIMINARY ASSESSMENT/SITE INVESTIGATION
FORT STORY, VA

Parameter	Method Reporting Level[a] (mg/kg)	Background 95% Confidence Interval[b] (mg/kg)	Trigger Level[c] (mg/kg)
Pesticides/PCBs			
Chlordane	0.04	ND	-
p,p'DDD	0.02	ND	(d)
p,p'DDE	0.02	ND	(d)
p,p'DDT	0.02	0.0041	(d)
Arochlor 1254	0.02	ND	1[e]
Arochlor 1260	0.02	ND	1[e]
VOCs			
Carbon Disulfide	0.01	ND	-
Chloroform	0.01	ND	-
1,2-Dichlorobenzene	0.01	ND	-
1,3-Dichlorobenzene	0.01	ND	-
1,1-Dichloroethane	0.01	ND	-
1,2-Dichloroethane	0.01	ND	-
1,1-Dichloroethene	0.01	ND	-
cis-1,2-Dichloroethene	0.01	ND	-
Ethylbenzene	0.01	ND	-
Methylene Chloride	0.1	ND	-
Tetrachloroethene	0.01	ND	-
Toluene	0.01	ND	-
1,1,1-Trichloroethane	0.01	ND	-
Vinyl Chloride	0.025	ND	-
m,p-Xylenes	0.01	ND	-
o-Xylene	0.01	ND	-
Total Xylenes	0.01	ND	-
BNAs			
Benzoic Acid	10	ND	-
Di-n-butylphthalate	2	ND	-
Fluorene	1	ND	-
2-Methylnaphthalene	1	ND	-
Naphthalene	1	ND	-
Phenanthrene	1	ND	-
Phenol	1	ND	-
Pyrene	1	ND	-
TFH-L	0.20	ND	100[f]
TFH-H	10	ND	100[f]

TABLE 2-8 (Continued)

SOIL TRIGGER LEVELS
PRELIMINARY ASSESSMENT/SITE INVESTIGATION
FORT STORY, VA

Parameter	Method Reporting Level[a] (mg/kg)	Background 95% Confidence Interval[b] (mg/kg)	Trigger Level[c] (mg/kg)
Inorganics			
Arsenic	2.5	2.1	21
Barium	10	ND	-
Cadmium	0.5	ND	-
Chromium	1.0	2.8	28
Copper	1.0	1.4	14
Cyanide	0.1	ND	-
Lead	1.0	7.1	71
Mercury	0.02	ND	-
Nickel	4.0	ND	-
Zinc	7.0	5.7	57

(a) Method Reporting Level (MRL) represents the minimum concentration of an analyte that can be reported with a known confidence level.
(b) Upper bound of the 95 percent confidence interval on the population mean concentrations for background soil borings at Fort Story.
(c) For metal analytes detected in the background borings, the trigger levels are set at 10 times the 95 percent confidence interval.
(d) All DDT, DDE and DDD levels detected at Fort Story are within the expected background range (Personal Communication, Young, Chase, 1991).
(e) EPA, 1987, *Toxic Substances Control Act (TSCA) PCB Spill Cleanup Policy 40 CFR Section 761 Subpart G.*
(f) Commonwealth of Virginia, State Water Control Board, 1989 VR-680-13-02

ND = Not Detected in the background borings.

As discussed in detail in Section 2.2.1.3, the subsurface at Fort Story PA/SI project sites generally consists of unconsolidated, interbedded sands and clays with minor occurrences of gravel and shell fragments. The hydrogeologic framework within the Fort Story vicinity consists of a system of seven aquifer units separated by intervening semi-confining units.

The chief potable water supply in the region is the surface water reservoir system operated by the City of Norfolk. Potable water is reportedly obtained from groundwater sources only to a minor extent. Groundwater use at Fort Story is restricted to withdrawals from a single well located at Site 6, LARC Maintenance Area. Water obtained from this well is used for nonpotable applications only.

The water table below Fort Story PA/SI project sites is encountered at relatively shallow depths ranging from approximately 10 feet in low-lying areas to approximately 40 feet (bls) in high ridge areas. In coastal sand ridges to the north, however, groundwater levels decline to approximately 3 feet NGVD. Water table contours within the Fort Story area are generally characterized by the presence of a localized groundwater divide in the vicinity of the central sand ridge complex. Ambient groundwater flow directions are generally northward toward the coastline and southward toward the wooded wetland, respectively, from the central sand ridge area. Therefore, contaminants released to the subsurface could migrate through the unconsolidated overburden material into the groundwater. Subsequently, contaminants could discharge into the wetland areas or the Chesapeake Bay.

2.1.3.3 Surface Transport. The sandy surface soils characteristic of the Fort Story area promote efficient infiltration of precipitation received at the Installation. Overland surface runoff is collected in ponds or wetland areas or is routed through Fort Story's storm sewer system to one of three outfalls discharging to either the Atlantic Ocean or Chesapeake Bay. Contaminants adsorbed to affected soils at the PA/SI project sites could be carried by surface water runoff and discharged into ponds, wetland areas or the storm sewer system. Subsequently, contaminants could potentially be discharged into the ocean or bay.

2.2 RESULTS OF INVESTIGATIONS

Eight sites were investigated during the Fort Story PA/SI project. These include seven sites for the PA/SI project (under Delivery Order 0001) and one site for the NIKE PA/SI project (under Delivery Order 0004). No previous field investigation activities had been conducted at any of these sites.

Section 2.2.1 provides a discussion of the installation physical characteristics obtained during the literature search and associated fieldwork. Section 2.2.2 provides a site specific discussion for the seven PA/SI sites. For each medium investigated, the significance of site contamination is evaluated through a comparison of the analytical data to the identified trigger levels as defined in Section 2.1.2. Data of concern from each of the investigated media are summarized on the site figures presented in Sections 2.2.1 and 2.2.2.

2.2.1 Installation Physical Characteristics

Fort Story is located in Virginia Beach, Virginia. Virginia Beach is located in the Hampton Roads region of southeastern Virginia, which is included in the coastal tidewater portion of the Atlantic Coastal Plain physiographic province. Occupying an area of approximately 1,450 acres, Fort Story is situated on Cape Henry, which roughly divides the waters of the Chesapeake Bay to the north from those of the Atlantic Ocean to the east.

2.2.1.1 Topography. Land features encountered at Fort Story consist of linear sand ridges, sand flats and wetland areas. The topography is dominated by a series of prominent linear, well-

Appendix I
HHRA Calculations

Remedial Investigation Report
FTA, LARC 60, and Auto Craft Sites
Fort Story, Virginia

What's New?
FAQ
What is Risk Assessment?
Tutorial
Contacts
Risk Assessment Guidance
Regulatory Guidance
Risk Assessment Overview Diagram
Risk Tools
Worker Risk
ORO Site-Specific Information
SADA
EPA Soil Screening Guidance
Affiliated Organizations

The RAIS needs your help!
Please take the user survey. THANKS!

Toxicity & Chemical-Specific Factors Data Base Search Results

The Data are current as of February 2002

Toxicity Values and Chemical-Specific Factors You Selected:

NOTE: If this page is too wide to print, try selecting a smaller font or printing in landscape mode.
WARNING: The Base Product product with which Session Manager is associated will expire within 30 days. Please contact your SAS installation representative to have it renewed. WARNING: The Base Product product with which Program /web/prod/cgi-bin/tox/TOX_0101.sas is associated will expire within 30 days. Please contact your SAS installation representative to have it renewed.

Chemical	CAS #	GI Absorption Factor	Permeability Constant (cm/hr)
Antimony (metallic)	7440360	0.0200	1.0E-03
Arsenic, Inorganic	7440382	0.4100	1.0E-03
Benz[a]anthracene	56553	0.3100	8.1E-01
Benzo[a]pyrene	50328	0.3100	1.2E+00
Benzo[b]fluoranthene	205992	0.3100	1.2E+00
Chloroform	67663	0.2000	8.9E-03
Dichloroethylene, 1,2-cis-	156592	1.0000	1.0E-02
Indeno[1,2,3-cd]pyrene	193395	0.3100	1.9E+00
Iron	7439896	0.1500	1.0E-03
Manganese (Diet)	7439965	0.0400	1.0E-03
Manganese (Water)	7439965	0.0400	1.0E-03
Methyl Isobutyl Ketone	108101	0.8000	3.3E-03
Naphthalene	91203	0.8000	6.9E-02
Naphthalene, 2-Methyl	91576	0.8000	1.5E-01
Thallium (Soluble Salts)	7440280	0.1500	1.0E-03
Toluene	108883	0.8000	4.5E-02
Vinyl Chloride	75014	1.0000	7.3E-03

Statistical Evaluation of Metal Detects in Soil and Sediment

Firefigher Training Area

Fort Story, Virginia

Arsenic (mg/kg)					
SB04-001-01	**SB04-001-24**	**SB04-001-68**	**SB04-005-01**	**SB04-005-24**	**SB04-005-68**
<1.1	<1.1	<1.2	1.5	<1.1	<1.2
SB04-010-01	**SB04-010-24**	**SB04-010-68**	**SB04-015-01**	**SB04-015-24**	**SB04-015-68**
1.6	1.5	1.2	1.6	< 1.0	1.4
SB04-020-01	**SB04-020-24**	**SD-001-01**	**SD-002-01**	**SD-003-01**	**SD-004-01**
1.4	1.2	2.5	< 1.4	< 1.1	< 1.1

Shapiro-Wilk Test of Normality

i	X(i)	ln(X(i))	X(n-i+1)	ln(X(n-i+1))		a	b
1	0.5	-0.6931472	2.5	0.916290732	2	0.4886	0.786371364
2	0.55	-0.597837	1.6	0.470003629	1	0.3253	0.347368557
3	0.55	-0.597837	1.6	0.470003629	1	0.2553	0.272619713
4	0.55	-0.597837	1.5	0.405465108	1	0.2027	0.203369337
5	0.55	-0.597837	1.5	0.405465108	1	0.1587	0.159224045
6	0.55	-0.597837	1.4	0.336472237	1	0.1197	0.111836816
7	0.6	-0.5108256	1.4	0.336472237	1	0.0837	0.070918831
8	0.6	-0.5108256	1.2	0.182321557	1	0.0496	0.0343801
9	0.7	-0.3566749	1.2	0.182321557	1	0.0163	0.008785643
10	1.2	0.18232156	0.7	-0.356674944	-1		0.000
11	1.2	0.18232156	0.6	-0.510825624	-1		0.000
12	1.4	0.33647224	0.6	-0.510825624	-1		0.000
13	1.4	0.33647224	0.55	-0.597837001	-1		0.000
14	1.5	0.40546511	0.55	-0.597837001	-1		0.000
15	1.5	0.40546511	0.55	-0.597837001	-1		0.000
16	1.6	0.47000363	0.55	-0.597837001	-1		0.000
17	1.6	0.47000363	0.55	-0.597837001	-1		0.000
18	2.5	0.91629073	0.5	-0.693147181	-2		0.000
					n= 18		1.99
						SD =	0.53

W = 0.84355167 $< W_{.05,18} = 0.897$

NOTE: Therefore, data fails the test of Normality and a Non-parametric method must be applied.

Non-Parametric Confidence Limit

Rank	X(i)
1	0.5
2	0.55
3	0.55
4	0.55
5	0.55
6	0.55
7	0.6
8	0.6
9	0.7
10	1.2
11	1.2
12	1.4
13	1.4
14	1.5
15	1.5
16	1.6
17	1.6
18	2.5

n = 18
z= 1.645
u= 13

Non-Parametric Upper Confidence Limit = 1.4 mg/kg

Statistical Evaluation of Metal Detects in Soil and Sediment

Firefighter Training Area

Fort Story, Virginia

Iron (mg/kg)					
SB04-001-01	**SB04-001-24**	**SB04-001-68**	**SB04-005-01**	**SB04-005-24**	**SB04-005-68**
1200	740	1100	3200	3200	1300
SB04-010-01	**SB04-010-24**	**SB04-010-68**	**SB04-015-01**	**SB04-015-24**	**SB04-015-68**
2100	940	960	2100	940	890
SB04-020-01	**SB04-020-24**	**SD-001-01**	**SD-002-01**	**SD-003-01**	**SD-004-01**
1600	1200	17000	440	230	280

Shapiro-Wilk Test of Normality

i	X(i)	ln(X(i))	X(n-i+1)	ln(X(n-i+1))		a	b
1	230	5.43807931	17000	9.740968623	4	0.4886	2.1024
2	280	5.6347896	3200	8.070906089	2	0.3253	0.7925
3	440	6.08677473	3200	8.070906089	2	0.2553	0.5065
4	740	6.60665019	2100	7.649692624	1	0.2027	0.2114
5	890	6.79122146	2100	7.649692624	1	0.1587	0.1362
6	940	6.84587988	1600	7.377758908	1	0.1197	0.0637
7	940	6.84587988	1300	7.170119543	0	0.0837	0.0271
8	960	6.86693328	1200	7.090076836	0	0.0496	0.0111
9	1100	7.00306546	1200	7.090076836	0	0.0163	0.0014
10	1200	7.09007684	1100	7.003065459	0		0.000
11	1200	7.09007684	960	6.866933284	0		0.000
12	1300	7.17011954	940	6.845879875	0		0.000
13	1600	7.37775891	940	6.845879875	-1		0.000
14	2100	7.64969262	890	6.791221463	-1		0.000
15	2100	7.64969262	740	6.606650186	-1		0.000
16	3200	8.07090609	440	6.086774727	-2		0.000
17	3200	8.07090609	280	5.634789603	-2		0.000
18	17000	9.74096862	230	5.438079309	-4		0.000
				n=	18		3.85
						SD =	0.97

W = 0.92692155 > $W_{.05,18}$ = 0.897

Lognormal Confidence Limit

Rank	X(i)
1	230
2	280
3	440
4	740
5	890
6	940
7	940
8	960
9	1100
10	1200
11	1200
12	1300
13	1600
14	2100
15	2100
16	3200
17	3200
18	17000

H=	2.611
n =	18
s=	0.97
mean=	7.11
Confidence =	0.95

Lognormal Upper Confidence Limit = 3634 mg/kg

Statistical Evaluation of Metal Detects in Soil and Sediment

Firefighter Training Area

Fort Story, Virginia

Thallium (mg/kg)					
SB04-001-01	SB04-001-24	SB04-001-68	SB04-005-01	SB04-005-24	SB04-005-68
<1.1	<1.1	<1.2	< 1.1	<1.1	<1.2
SB04-010-01	SB04-010-24	SB04-010-68	SB04-015-01	SB04-015-24	SB04-015-68
< 1.1	< 1.1	< 1.1	< 1.0	< 1.0	< 1.1
SB04-020-01	SB04-020-24	SD-001-01	SD-002-01	SD-003-01	SD-004-01
< 1.0	< 1.0	< 1.4	1.4	< 1.1	< 1.1

Shapiro-Wilk Test of Normality

i	X(i)	ln(X(i))	X(n-i+1)	ln(X(n-i+1))		a	b
1	0.55	-0.597837	1.4	0.336472237	0.9343	0.4886	0.456503
2	0.5	-0.6931472	0.7	-0.356674944	0.3365	0.3253	0.109454
3	0.5	-0.6931472	0.6	-0.510825624	0.1823	0.2553	0.046547
4	0.5	-0.6931472	0.6	-0.510825624	0.1823	0.2027	0.036957
5	0.5	-0.6931472	0.55	-0.597837001	0.0953	0.1587	0.015126
6	0.55	-0.597837	0.55	-0.597837001	0.0000	0.1197	0.00000
7	0.55	-0.597837	0.55	-0.597837001	0.0000	0.0837	0.00000
8	0.55	-0.597837	0.55	-0.597837001	0.0000	0.0496	0.00000
9	0.55	-0.597837	0.55	-0.597837001	0.0000	0.0163	0.00000
10	0.55	-0.597837	0.55	-0.597837001	0.0000		0.00000
11	0.55	-0.597837	0.55	-0.597837001	0.0000		0.00000
12	0.55	-0.597837	0.55	-0.597837001	0.0000		0.00000
13	0.55	-0.597837	0.55	-0.597837001	0.0000		0.00000
14	0.55	-0.597837	0.5	-0.693147181	-0.0953		0.00000
15	0.6	-0.5108256	0.5	-0.693147181	-0.1823		0.00000
16	0.6	-0.5108256	0.5	-0.693147181	-0.1823		0.00000
17	0.7	-0.3566749	0.5	-0.693147181	-0.3365		0.00000
18	1.4	0.33647224	0.55	-0.597837001	-0.9343		0.00000
					n=	18	0.66
						SD =	0.23

W = 0.4746717 $< W_{.05,18} = 0.897$

NOTE: Therefore, data fails the test of Normality and a Non-parametric method must be applied.

Non-Parametric Confidence Limit

Rank	X(i)
1	0.55
2	0.5
3	0.5
4	0.5
5	0.5
6	0.55
7	0.55
8	0.55
9	0.55
10	0.55
11	0.55
12	0.55
13	0.55
14	0.55
15	0.6
16	0.6
17	0.7
18	1.4

n = 18
z= 1.645
u= 13

Non-Parametric Upper Confidence Limit = 0.6 mg/kg

CDI CALCULATIONS FOR SOIL - INGESTION
FIREFIGHTER TRAINING AREA SITE, FORT STORY, VIRGINIA

COPC	Conc (mg/kg)	IR (mg/day)	CF (kg/mg)	FI	EF (days/yr)	ED (yrs)	BW (kg)	CDI (mg/kg-day)
Non-Carcinogenic: Ingestion of Chemicals in Surface Soil - Residential Population (Adults)								
Arsenic	1.4	100	1.00E-06	1	350	24	70	1.92E-06
Iron	3634	100	1.00E-06	1	350	24	70	4.98E-03
Thallium	0.6	100	1.00E-06	1	350	24	70	8.22E-07
Carcinogenic: Ingestion of Chemicals in Surface Soil - Residential Population (Adults)								
Arsenic	1.4	100	1.00E-06	1	350	24	70	6.58E-07
Iron	3634	100	1.00E-06	1	350	24	70	1.71E-03
Thallium	0.6	100	1.00E-06	1	350	24	70	2.82E-07
Non-Carcinogenic: Ingestion of Chemicals in Surface Soil - Residential Population (Child)								
Arsenic	1.4	200	1.00E-06	1	350	6	15	1.79E-05
Iron	3634	200	1.00E-06	1	350	6	15	4.65E-02
Thallium	0.6	200	1.00E-06	1	350	6	15	7.67E-06
Carcinogenic: Ingestion of Chemicals in Surface Soil - Residential Population (Child)								
Arsenic	1.4	200	1.00E-06	1	350	6	15	1.53E-06
Iron	3634	200	1.00E-06	1	350	6	15	3.98E-03
Thallium	0.6	200	1.00E-06	1	350	6	15	6.58E-07

CDI CALCULATIONS FOR SOIL - DERMAL CONTACT
FIREFIGHTER TRAINING AREA SITE, FORT STORY, VIRGINIA

COPC	Conc (mg/kg)	CF (kg/mg)	SA (cm^2)	AF (mg/cm^2)	ABS	EF (days/yr)	ED (yrs)	BW (kg)	CDI (mg/kg-day)
Non-Carcinogenic: Dermal Contact with Chemicals in Surface Soil - Residential Population (Adults)									
Arsenic	1.4	1.00E-06	3600	0.2	0.032	350	24	70	4.42E-07
Iron	3634	1.00E-06	3600	0.2	0.01	350	24	70	3.58E-04
Thallium	0.6	1.00E-06	3600	0.2	0.01	350	24	70	5.92E-08
Carcinogenic: Dermal Contact with Chemicals in Surface Soil - Residential Population (Adults)									
Arsenic	1.4	1.00E-06	3600	0.2	0.032	350	24	70	1.51E-07
Iron	3634	1.00E-06	3600	0.2	0.01	350	24	70	1.23E-04
Thallium	0.6	1.00E-06	3600	0.2	0.01	350	24	70	2.03E-08
Non-Carcinogenic: Dermal Contact with Chemicals in Surface Soil - Residential Population (Child)									
Arsenic	1.4	1.00E-06	2074	0.2	0.032	350	6	15	1.19E-06
Iron	3634	1.00E-06	2074	0.2	0.01	350	6	15	9.64E-04
Thallium	0.6	1.00E-06	2074	0.2	0.01	350	6	15	1.59E-07
Carcinogenic: Dermal Contact with Chemicals in Surface Soil - Residential Population (Child)									
Arsenic	1.4	1.00E-06	2074	0.2	0.032	350	6	15	1.02E-07
Iron	3634	1.00E-06	2074	0.2	0.01	350	6	15	8.26E-05
Thallium	0.6	1.00E-06	2074	0.2	0.01	350	6	15	1.36E-08

CDI CALCULATIONS FOR GROUNDWATER - INGESTION
FIREFIGHTER TRAINING AREA SITE, FORT STORY, VIRGINIA

COPC	Conc (mg/l)	IR (liters/day)	EF (days/yr)	ED (yrs)	BW (kg)	CDI (mg/kg-day)
Non-Carcinogenic: Residential Population Ingestion of Chemicals in Groundwater						
ADULTS:						
Antimony	0.0057	2	350	24	70	1.56E-04
Manganese	0.081	2	350	24	70	2.22E-03
CHILDREN:						
Antimony	0.0057	1	350	6	15	3.64E-04
Manganese	0.081	1	350	6	15	5.18E-03
Carcinogenic: Residential Population Ingestion of Chemicals in Groundwater						
ADULTS:						
Antimony	0.0057	2	350	24	70	5.35E-05
Manganese	0.081	2	350	24	70	7.61E-04
CHILDREN:						
Antimony	0.0057	1	350	6	15	3.12E-05
Manganese	0.081	1	350	6	15	4.44E-04

CDI CALCULATIONS FOR GROUNDWATER - DERMAL CONTACT
FTA SITE, FORT STORY, VIRGINIA

COPC	Conc (mg/l)	SA (cm^2)	PC (cm/hour)	ET (hours/day)	EF (days/yr)	ED (yrs)	CF (1 L/1000 cm^3)	BW (kg)	CDI (mg/kg-day)
Non-Carcinogenic: Residential Population Dermal Contact with Chemicals in Groundwater									
ADULTS:									
Antimony	0.0057	19400	1.00E-03	0.3	350	24	0.001	70	4.54E-07
Manganese	0.081	19400	1.00E-03	0.3	350	24	0.001	70	6.46E-06
CHILDREN:									
Antimony	0.0057	7310	1.00E-03	0.33	350	6	0.001	15	8.79E-07
Manganese	0.081	7310	1.00E-03	0.33	350	6	0.001	15	1.25E-05
Carcinogenic: Residential Population Dermal Contact with Chemicals in Groundwater									
ADULTS:									
Antimony	0.0057	19400	1.00E-03	0.3	350	24	0.001	70	1.56E-07
Manganese	0.081	19400	1.00E-03	0.3	350	24	0.001	70	2.21E-06
CHILDREN:									
Antimony	0.0057	7310	1.00E-03	0.33	350	6	0.001	15	7.53E-08
Manganese	0.081	7310	1.00E-03	0.33	350	6	0.001	15	1.07E-06

Statistical Evaluation of Soil COPCs

LARC 60 Maintenance Area

Fort Eustis, Virginia

Total Arsenic (mg/kg)					
SB06-001-01	**SB06-001-57**	**SB06-001-1012**	**SB06-005-01**	**SB06-005-79**	**SB06-010-01**
1.1	**1.1**	<1.1	<1.0	<1.1	<1.0
SB06-010-45	**SB06-015-01**	**SB06-015-45**	**SB06-020-01**	**SB06-020-45**	
<1.1	<1	<1	<1	**0.86**	

Shapiro-Wilk Test of Normality

i	X(i)	ln(X(i))	X(n-i+1)	ln(X(n-i+1))		a	b
1	0.5	-0.693147181	1.1	0.09531018	0.79	0.5601	0.44161
2	0.5	-0.693147181	1.1	0.09531018	0.79	0.3315	0.26137
3	0.5	-0.693147181	0.86	-0.15082289	0.54	0.226	0.12257
4	0.5	-0.693147181	0.55	-0.597837	0.10	0.1429	0.01362
5	0.5	-0.693147181	0.55	-0.597837	0.10	0.0695	0.00662
6	0.55	-0.597837001	0.55	-0.597837	0.00	0	0
7	0.55	-0.597837001	0.5	-0.69314718	-0.10		0
8	0.55	-0.597837001	0.5	-0.69314718	-0.10		0
9	0.86	-0.15082289	0.5	-0.69314718	-0.54		0
10	1.1	0.09531018	0.5	-0.69314718	-0.79		0
11	1.1	0.09531018	0.5	-0.69314718	-0.79		0
				n=	11		0.85
						SD =	0.32

W = 0.689 $< W_{.05,11} = 0.850$

Note: Therefore, the data fail the test of normality and a non-parametric method must be applied

Non-Parametric Confidence Limit

Rank	X(i)
1	0.5
2	0.5
3	0.5
4	0.5
5	0.5
6	0.55
7	0.55
8	0.55
9	0.86
10	1.1
11	1.1

n = 11

z= 1.645

u= **9**

Non-Parametric Upper Confidence Limit = 0.86 mg/kg

Statistical Evaluation of Groundwater COPCs

LARC 60 Maintenance Area

Fort Eustis, Virginia

Total Cis 1,2-DCE (ug/L)					
6MW-1	6MW-3S	6MW-4	MW-115	MW-117	MW-118
5 U	2	5 U	5 U	1,900	5 U

Shapiro-Wilk Test of Normality

i	X(i)	ln(X(i))	X(n-i+1)	ln(X(n-i+1))		a	b
1	2	0.693147	1900	7.549609165	6.86	0.6431	4.40939
2	2.5	0.916291	2.5	0.916290732	0.00	0.2806	0
3	2.5	0.916291	2.5	0.916290732	0.00	0.0875	0
4	2.5	0.916291	2.5	0.916290732	0.00		0
5	2.5	0.916291	2.5	0.916290732	0.00		0
6	1900	7.549609	2	0.693147181	-6.86		0
				n=	6		4
						SD =	3

W = 0.523 $< W_{.05,6} = 0.788$

Note: Therefore, the data fail the test of normality and a non-parametric method must be applied

Non-Parametric Confidence Limit

Rank	X(i)
1	2
2	2.5
3	2.5
4	2.5
5	2.5
6	1900

n = 6
z= 1.645
u= **6**

Non-Parametric Upper Confidence Limit = 1900 ug/L

Statistical Evaluation of Groundwater COPCs

LARC 60 Maintenance Area

Fort Eustis, Virginia

Total MIBK (ug/L)					
6MW-1	6MW-3S	6MW-4	MW-115	MW-117	MW-118
50	44	19	5 U	250 U	5 U

Shapiro-Wilk Test of Normality

i	X(i)	ln(X(i))	X(n-i+1)	ln(X(n-i+1))		a	b
1	2.5	0.91629	125	4.828313737	3.91	0.6431	2.51582
2	2.5	0.91629	50	3.912023005	3.00	0.2806	0.8406
3	19	2.94444	44	3.784189634	0.84	0.0875	0.07348
4	44	3.78419	19	2.944438979	-0.84		0
5	50	3.91202	2.5	0.916290732	-3.00		0
6	125	4.82831	2.5	0.916290732	-3.91		0
				n=	6		3
						SD =	2

Note: Therefore, the data fail the test of normality and a non-parametric method must be applied

Non-Parametric Confidence Limit

Rank	X(i)
1	2.5
2	2.5
3	19
4	44
5	50
6	125

n = 6

z= 1.645

u= **6**

Non-Parametric Upper Confidence Limit = 125 ug/L

Statistical Evaluation of Groundwater COPCs

LARC 60 Maintenance Area

Fort Eustis, Virginia

Total Toluene (ug/L)					
6MW-1	6MW-3S	6MW-4	MW-115	MW-117	MW-118
5 U	5 U	5 U	5 U	310	5 U

Shapiro-Wilk Test of Normality

i	X(i)	ln(X(i))	X(n-i+1)	ln(X(n-i+1))		a	b
1	2.5	0.91629	310	5.736572297	4.82	0.6431	3.09992
2	2.5	0.91629	2.5	0.916290732	0.00	0.2806	0
3	2.5	0.91629	2.5	0.916290732	0.00	0.0875	0
4	2.5	0.91629	2.5	0.916290732	0.00		0
5	2.5	0.91629	2.5	0.916290732	0.00		0
6	310	5.73657	2.5	0.916290732	-4.82		0
				n=	6		3
						SD =	2

W = 0.496 $< W_{.05,6} = 0.788$

Note: Therefore, the data fail the test of normality and a non-parametric method must be applied

Non-Parametric Confidence Limit

Rank	X(i)
1	2.5
2	2.5
3	2.5
4	2.5
5	2.5
6	310

n = 6
z= 1.645
u= **6**

Non-Parametric Upper Confidence Limit = 310 ug/L

Statistical Evaluation of Groundwater COPCs

LARC 60 Maintenance Area

Fort Eustis, Virginia

Total Vinyl chloride (ug/L)					
6MW-1	6MW-3S	6MW-4	MW-115	MW-117	MW-118
10 U	3.1	10 U	10 U	8.6	10 U

Shapiro-Wilk Test of Normality

i	X(i)	ln(X(i))	X(n-i+1)	ln(X(n-i+1))		a	b
1	3.1	1.1314	8.6	2.151762203	1.02	0.6431	0.65619
2	5	1.60944	5	1.609437912	0.00	0.2806	0
3	5	1.60944	5	1.609437912	0.00	0.0875	0
4	5	1.60944	5	1.609437912	0.00		0
5	5	1.60944	5	1.609437912	0.00		0
6	8.6	2.15176	3.1	1.131402111	-1.02		0
				n=	6		1
						SD =	0.3

W = 0.825 > $W_{.05,6}$ = 0.788

Lognormal Confidence Limit

Rank	X(i)
1	3.1
2	5
3	5
4	5
5	5
6	8.6

H=	2.264
n =	6
s=	0.3
mean=	2
Confidence =	0.95

Lognormal Upper Confidence Limit = 7.4 ug/L

Statistical Evaluation of Groundwater COPCs

LARC 60 Maintenance Area

Fort Eustis, Virginia

Total 2-Methylnaphthalene (ug/L)					
6MW-1	6MW-3S	6MW-4	MW-115	MW-117	MW-118
10 U	20	10 U	10 U	10 U	10 U

Shapiro-Wilk Test of Normality

i	X(i)	ln(X(i))	X(n-i+1)	ln(X(n-i+1))		a	b
1	5	1.60944	20	2.995732274	1.39	0.6431	0.89153
2	5	1.60944	5	1.609437912	0.00	0.2806	0
3	5	1.60944	5	1.609437912	0.00	0.0875	0
4	5	1.60944	5	1.609437912	0.00		0
5	5	1.60944	5	1.609437912	0.00		0
6	20	2.99573	5	1.609437912	-1.39		0
					n=	6	1
						SD =	1

W = 0.496 $< W_{.05,6} = 0.788$

Note: Therefore, the data fail the test of normality and a non-parametric method must be applied

Non-Parametric Confidence Limit

Rank	X(i)
1	5
2	5
3	5
4	5
5	5
6	20

n = 6
z= 1.645
u= **6**

Non-Parametric Upper Confidence Limit = 20 ug/L

Statistical Evaluation of Groundwater COPCs

LARC 60 Maintenance Area

Fort Eustis, Virginia

Total Naphthalene (ug/L)					
6MW-1	6MW-3S	6MW-4	MW-115	MW-117	MW-118
10 U	10 U	10 U	10 U	32	10 U

Shapiro-Wilk Test of Normality

i	X(i)	ln(X(i))	X(n-i+1)	ln(X(n-i+1))		a	b
1	5	1.60944	32	3.465735903	1.86	0.6431	1.19379
2	5	1.60944	5	1.609437912	0.00	0.2806	0
3	5	1.60944	5	1.609437912	0.00	0.0875	0
4	5	1.60944	5	1.609437912	0.00		0
5	5	1.60944	5	1.609437912	0.00		0
6	32	3.46574	5	1.609437912	-1.86		0
				n=	6		1
						SD =	1

W = 0.496 $< W_{.05,6} = 0.788$

Note: Therefore, the data fail the test of normality and a non-parametric method must be applied

Non-Parametric Confidence Limit

Rank	X(i)
1	5
2	5
3	5
4	5
5	5
6	32

n = 6
z= 1.645
u= **6**

Non-Parametric Upper Confidence Limit = 32 ug/L

CDI CALCULATIONS FOR SOIL - INGESTION
LARC 60 MAINTENANCE AREA SITE, FORT STORY, VIRGINIA

COPC	Conc (mg/kg)	IR (mg/day)	CF (kg/mg)	FI	EF (days/yr)	ED (yrs)	BW (kg)	CDI (mg/kg-day)
Non-Carcinogenic: Ingestion of Chemicals in Surface Soil - Residential Population (Adults)								
Arsenic	0.86	100	1.00E-06	1	350	24	70	1.18E-06
Carcinogenic: Ingestion of Chemicals in Surface Soil - Residential Population (Adults)								
Arsenic	0.86	100	1.00E-06	1	350	24	70	4.04E-07
Non-Carcinogenic: Ingestion of Chemicals in Surface Soil - Residential Population (Child)								
Arsenic	0.86	200	1.00E-06	1	350	6	15	1.10E-05
Carcinogenic: Ingestion of Chemicals in Surface Soil - Residential Population (Child)								
Arsenic	0.86	200	1.00E-06	1	350	6	15	9.42E-07

CDI CALCULATIONS FOR SOIL - DERMAL CONTACT
LARC 60 MAINTENANCE AREA SITE, FORT STORY, VIRGINIA

COPC	Conc (mg/kg)	CF (kg/mg)	SA (cm^2)	AF (mg/cm^2)	ABS	EF (days/yr)	ED (yrs)	BW (kg)	CDI (mg/kg-day)
Non-Carcinogenic: Dermal Contact with Chemicals in Surface Soil - Residential Population (Adults)									
Arsenic	0.86	1.00E-06	3600	0.2	0.032	350	24	70	2.71E-07
Carcinogenic: Dermal Contact with Chemicals in Surface Soil - Residential Population (Adults)									
Arsenic	0.86	1.00E-06	3600	0.2	0.032	350	24	70	9.31E-08
Non-Carcinogenic: Dermal Contact with Chemicals in Surface Soil - Residential Population (Child)									
Arsenic	0.86	1.00E-06	2074	0.2	0.032	350	6	15	7.30E-07
Carcinogenic: Dermal Contact with Chemicals in Surface Soil - Residential Population (Child)									
Arsenic	0.86	1.00E-06	2074	0.2	0.032	350	6	15	6.25E-08

CDI CALCULATIONS FOR GROUNDWATER - INGESTION
FIREFIGHTER TRAINING AREA SITE, FORT STORY, VIRGINIA

COPC	Conc (mg/l)	IR (liters/day)	EF (days/yr)	ED (yrs)	BW (kg)	CDI (mg/kg-day)
Non-Carcinogenic: Residential Population Ingestion of Chemicals in Groundwater						
ADULTS:						
cis 1,2-DCE	1.9	2	350	24	70	5.21E-02
MIBK	0.05	2	350	24	70	1.37E-03
Toluene	0.31	2	350	24	70	8.49E-03
Vinyl chloride	0.0074	2	350	24	70	2.03E-04
2-Methylnaphthalene	0.02	2	350	24	70	5.48E-04
Naphthalene	0.032	2	350	24	70	8.77E-04
Antimony	0.0054	2	350	24	70	1.48E-04
Arsenic	0.014	2	350	24	70	3.84E-04
Iron	15	2	350	24	70	4.11E-01
Manganese	0.191	2	350	24	70	5.23E-03
CHILDREN:						
cis 1,2-DCE	1.9	1	350	6	15	1.21E-01
MIBK	0.05	1	350	6	15	3.20E-03
Toluene	0.31	1	350	6	15	1.98E-02
Vinyl chloride	0.0074	1	350	6	15	4.73E-04
2-Methylnaphthalene	0.02	1	350	6	15	1.28E-03
Naphthalene	0.032	1	350	6	15	2.05E-03
Antimony	0.0054	1	350	6	15	3.45E-04
Arsenic	0.014	1	350	6	15	8.95E-04
Iron	15	1	350	6	15	9.59E-01
Manganese	0.191	1	350	6	15	1.22E-02
Carcinogenic: Residential Population Ingestion of Chemicals in Groundwater						
ADULTS:						
cis 1,2-DCE	1.9	2	350	24	70	1.78E-02
MIBK	0.05	2	350	24	70	4.70E-04
Toluene	0.31	2	350	24	70	2.91E-03
Vinyl chloride	0.0074	2	350	24	70	6.95E-05
2-Methylnaphthalene	0.02	2	350	24	70	1.88E-04
Naphthalene	0.032	2	350	24	70	3.01E-04
Antimony	0.0054	2	350	24	70	5.07E-05
Arsenic	0.014	2	350	24	70	1.32E-04
Iron	15	2	350	24	70	1.41E-01
Manganese	0.191	2	350	24	70	1.79E-03
CHILDREN:						
cis 1,2-DCE	1.9	1	350	6	15	1.04E-02
MIBK	0.05	1	350	6	15	2.74E-04
Toluene	0.31	1	350	6	15	1.70E-03
Vinyl chloride	0.0074	1	350	6	15	4.05E-05
2-Methylnaphthalene	0.02	1	350	6	15	1.10E-04
Naphthalene	0.032	1	350	6	15	1.75E-04
Antimony	0.0054	1	350	6	15	2.96E-05
Arsenic	0.014	1	350	6	15	7.67E-05
Iron	15	1	350	6	15	8.22E-02
Manganese	0.191	1	350	6	15	1.05E-03

CDI CALCULATIONS FOR GROUNDWATER - DERMAL CONTACT
LARC 60 SITE, FORT STORY, VIRGINIA

COPC	Conc (mg/l)	SA (cm^2)	PC (cm/hour)	ET (hours/day)	EF (days/yr)	ED (yrs)	CF (1 L/1000 cm^3)	BW (kg)	CDI (mg/kg-day)
Non-Carcinogenic: Residential Population Dermal Contact with Chemicals in Groundwater									
ADULTS:									
cis 1,2-DCE	1.9	19400	1.00E-02	0.3	350	24	0.001	70	1.51E-03
MIBK	0.05	19400	3.30E-03	0.3	350	24	0.001	70	1.32E-05
Toluene	0.31	19400	4.50E-02	0.3	350	24	0.001	70	1.11E-03
Vinyl chloride	0.0074	19400	7.30E-03	0.3	350	24	0.001	70	4.31E-06
2-Methylnaphthalene	0.02	19400	1.50E-01	0.3	350	24	0.001	70	2.39E-04
Naphthalene	0.032	19400	6.90E-02	0.3	350	24	0.001	70	1.76E-04
Antimony	0.0054	19400	1.00E-03	0.3	350	24	0.001	70	4.31E-07
Arsenic	0.014	19400	1.00E-03	0.3	350	24	0.001	70	1.12E-06
Iron	15	19400	1.00E-03	0.3	350	24	0.001	70	1.20E-03
Manganese	0.191	19400	1.00E-03	0.3	350	24	0.001	70	1.52E-05
CHILDREN:									
cis 1,2-DCE	1.9	7310	1.00E-02	0.3	350	6	0.001	15	2.66E-03
MIBK	0.05	7310	3.30E-03	0.3	350	6	0.001	15	2.31E-05
Toluene	0.31	7310	4.50E-02	0.3	350	6	0.001	15	1.96E-03
Vinyl chloride	0.0074	7310	7.30E-03	0.3	350	6	0.001	15	7.57E-06
2-Methylnaphthalene	0.02	7310	1.50E-01	0.3	350	6	0.001	15	4.21E-04
Naphthalene	0.032	7310	6.90E-02	0.3	350	6	0.001	15	3.10E-04
Antimony	0.0054	7310	1.00E-03	0.3	350	6	0.001	15	7.57E-07
Arsenic	0.014	7310	1.00E-03	0.3	350	6	0.001	15	1.96E-06
Iron	15	7310	1.00E-03	0.3	350	6	0.001	15	2.10E-03
Manganese	0.191	7310	1.00E-03	0.3	350	6	0.001	15	2.68E-05

CDI CALCULATIONS FOR GROUNDWATER - DERMAL CONTACT
LARC 60 SITE, FORT STORY, VIRGINIA

COPC	Conc (mg/l)	SA (cm^2)	PC (cm/hour)	ET (hours/day)	EF (days/yr)	ED (yrs)	CF (1 L/1000 cm^3)	BW (kg)	CDI (mg/kg-day)
Carcinogenic: Residential Population Dermal Contact with Chemicals in Groundwater									
ADULTS:									
cis 1,2-DCE	1.9	19400	1.00E-02	0.3	350	24	0.001	70	5.19E-04
MIBK	0.05	19400	3.30E-03	0.3	350	24	0.001	70	4.51E-06
Toluene	0.31	19400	4.50E-02	0.3	350	24	0.001	70	3.81E-04
Vinyl chloride	0.0074	19400	7.30E-03	0.3	350	24	0.001	70	1.48E-06
2-Methylnaphthalene	0.02	19400	1.50E-01	0.3	350	24	0.001	70	8.20E-05
Naphthalene	0.032	19400	6.90E-02	0.3	350	24	0.001	70	6.04E-05
Antimony	0.0054	19400	1.00E-03	0.3	350	24	0.001	70	1.48E-07
Arsenic	0.014	19400	1.00E-03	0.3	350	24	0.001	70	3.83E-07
Iron	15	19400	1.00E-03	0.3	350	24	0.001	70	4.10E-04
Manganese	0.191	19400	1.00E-03	0.3	350	24	0.001	70	5.22E-06
CHILDREN:									
cis 1,2-DCE	1.9	7310	1.00E-02	0.3	350	6	0.001	15	2.28E-04
MIBK	0.05	7310	3.30E-03	0.3	350	6	0.001	15	1.98E-06
Toluene	0.31	7310	4.50E-02	0.3	350	6	0.001	15	1.68E-04
Vinyl chloride	0.0074	7310	7.30E-03	0.3	350	6	0.001	15	6.49E-07
2-Methylnaphthalene	0.02	7310	1.50E-01	0.3	350	6	0.001	15	3.60E-05
Naphthalene	0.032	7310	6.90E-02	0.3	350	6	0.001	15	2.65E-05
Antimony	0.0054	7310	1.00E-03	0.3	350	6	0.001	15	6.49E-08
Arsenic	0.014	7310	1.00E-03	0.3	350	6	0.001	15	1.68E-07
Iron	15	7310	1.00E-03	0.3	350	6	0.001	15	1.80E-04
Manganese	0.191	7310	1.00E-03	0.3	350	6	0.001	15	2.30E-06

CDI CALCULATIONS FOR GROUNDWATER - INHALATION
LARC 60 MAINTENANCE AREA SITE, FORT STORY, VIRGINIA

COPC	Conc (mg/m^3)	IR (m^3/hour)	ET (hours)	EF (days/yr)	ED (yrs)	BW (kg)	CDI (mg/kg-day)
Non-Carcinogenic: Residential Population Inhalation of Volatilized Chemicals in Groundwater							
ADULTS:							
cis 1,2-DCE	1.64E+02	0.83	0.2	350	24	70	3.73E-01
MIBK	4.42E+00	0.83	0.2	350	24	70	1.01E-02
Toluene	2.78E+01	0.83	0.2	350	24	70	6.32E-02
Vinyl Chloride	7.75E-01	0.83	0.2	350	24	70	1.76E-03
2-Methylnaphthalene	1.14E+00	0.83	0.2	350	24	70	2.59E-03
Naphthalene	1.86E+00	0.83	0.2	350	24	70	4.23E-03
Antimony	---	0.83	0.2	350	24	70	0.00E+00
Arsenic	---	0.83	0.2	350	24	70	0.00E+00
Iron	---	0.83	0.2	350	24	70	0.00E+00
Manganese	---	0.83	0.2	350	24	70	0.00E+00
CHILDREN:							
cis 1,2-DCE	1.64E+02	0.5	0.2	350	6	15	1.05E+00
MIBK	4.42E+00	0.5	0.2	350	6	15	2.83E-02
Toluene	2.78E+01	0.5	0.2	350	6	15	1.78E-01
Vinyl Chloride	7.75E-01	0.5	0.2	350	6	15	4.95E-03
2-Methylnaphthalene	1.14E+00	0.5	0.2	350	6	15	7.29E-03
Naphthalene	1.86E+00	0.5	0.2	350	6	15	1.19E-02
Antimony	---	0.5	0.2	350	6	15	0.00E+00
Arsenic	---	0.5	0.2	350	6	15	0.00E+00
Iron	---	0.5	0.2	350	6	15	0.00E+00
Manganese	---	0.5	0.2	350	6	15	0.00E+00
Carcinogenic: Residential Population Inhalation of Volatilized Chemicals in Groundwater							
ADULTS:							
cis 1,2-DCE	1.64E+02	0.83	0.2	350	24	70	1.28E-01
MIBK	4.42E+00	0.83	0.2	350	24	70	3.45E-03
Toluene	2.78E+01	0.83	0.2	350	24	70	2.17E-02
Vinyl Chloride	7.75E-01	0.83	0.2	350	24	70	6.04E-04
2-Methylnaphthalene	1.14E+00	0.83	0.2	350	24	70	8.89E-04
Naphthalene	1.86E+00	0.83	0.2	350	24	70	1.45E-03
Antimony	---	0.83	0.2	350	24	70	0.00E+00
Arsenic	---	0.83	0.2	350	24	70	0.00E+00
Iron	---	0.83	0.2	350	24	70	0.00E+00
Manganese	---	0.83	0.2	350	24	70	0.00E+00
CHILDREN:							
cis 1,2-DCE	1.64E+02	0.5	0.2	350	6	15	8.99E-02
MIBK	4.42E+00	0.5	0.2	350	6	15	2.42E-03
Toluene	2.78E+01	0.5	0.2	350	6	15	1.52E-02
Vinyl Chloride	7.75E-01	0.5	0.2	350	6	15	4.25E-04
2-Methylnaphthalene	1.14E+00	0.5	0.2	350	6	15	6.25E-04
Naphthalene	1.86E+00	0.5	0.2	350	6	15	1.02E-03
Antimony	---	0.5	0.2	350	6	15	0.00E+00
Arsenic	---	0.5	0.2	350	6	15	0.00E+00
Iron	---	0.5	0.2	350	6	15	0.00E+00
Manganese	---	0.5	0.2	350	6	15	0.00E+00

Chemical Concentration in Air Calculations - LARC 60 Site
VDEQ Shower Model

Medium: Groundwater Population: Future Resident Receptor Age:Adult & Child	kl	20*(44/MW)^.5	cm/hr	liquid-film mass transfer coefficient
		20	cm/hr	mass transfer coefficient for CO2
		44		conversion factor (MW CO2)
	MW	chemical specific	g/mole	
	kg	3000*(18/MW)^.5	cm/hr	gas-film mass transfer coefficient
		3000	cm/hr	mass transfer coefficient for water
		18		conversion factor (MW H2O)
	MW	chemical specific	g/mole	
	KL	(1/kl+R*T/H*kg)^-1	cm/hr	overall mass transfer coefficient
	R	8.2E-05	atm-L/mole-K	gas constant
	T	293	degrees K	room temperature
	H	chemical specific	atm-m3/mole	Henry's Law Constant
	KaL	KL*(Tl*us)/(Ts*ul)	cm/hr	adjusted mass transfer coefficient
	Tl	293	degrees K	calibration temperature
	Ts	318	degrees K	shower temperature
	ul	1.002	centipoise	water viscosity at Tl
	us	0.596	centipoise	water viscosity at Ts

Cwd	CW*(1-exp(-KaL*ts/60*d)		mg/L	concentration leaving shower droplet
ts		2	seconds	shower droplet drop time
		60		conversion factor
d		1	mm	shower droplet diameter
S	CWd*FR/SV		mg/m3-min	VOC in air generation rate
FR		20	L/minute	shower water flow rate
SV		6	m3	shower room air volume
CA	S/Ra*t		mg/m3	VOC concentration in shower room air
Ra		0.01667	1/minute	air exchange rate
t		20	minutes	total time in shower room
ET	Ds+e(-Ra*t)/Ra-e-(Ra*(Ds-t/Ra)*1/60		hours	exposure time
ET		0.041	hours	exposure time
Ds		12	minutes	shower duration

	Exposure Point Conc. (EPC) Groundwater CW ug/L	Exposure Point Conc. (EPC) Groundwater CW mg/L	Exposure Point Conc. (EPC) Air CA mg/m3	Molecular Weight g/mole	Henry's Law Constant atm-m^3/ mole	kl liq-film mass transfer coefficient cm/hr	kg gas-film mass transfer coefficient cm/hr	KL overall mass transfer coefficient cm/hr	KaL Adjusted mass transfer coefficient cm/hr	Cwd	Indoor Air VOC generation rate(S) mg/m^3-min	VF	Kl cm/sec
Metals													
Antimony			N/A										
Arsenic			N/A										
Iron			N/A										
Manganese			N/A										
Volatile Organic Compounds (VOCs)													
Dichloroethene-cis-1,2	1,900	1.9	1.64E+02	9.69E+01	4.08E-03	1.35E+01	1.29E+03	1.27E+01	1.70E+01	8.22E-01	2.74E+00	8.65E+01	3.53E-03
Methyl isobutyl ketone	50	0.05	4.42E+00	1.00E+02	1.60E-02	1.33E+01	1.27E+03	1.31E+01	1.75E+01	2.21E-02	7.36E-02	8.84E+01	3.63E-03
Toluene	310	0.31	2.78E+01	9.21E+01	6.64E-03	1.38E+01	1.33E+03	1.33E+01	1.78E+01	1.39E-01	4.63E-01	8.96E+01	3.70E-03
Vinyl Chloride	7.4	0.0074	7.75E-01	6.25E+01	2.70E-02	1.68E+01	1.61E+03	1.66E+01	2.23E+01	3.88E-03	1.29E-02	1.05E+02	4.62E-03
Semivolatile Organic Compounds (SVOCs)													
Methylnaphthalene-2	20	0.020	1.14E+00	1.42E+02	5.17E-04	1.11E+01	1.07E+03	7.49E+00	1.00E+01	5.69E-03	1.90E-02	5.69E+01	2.08E-03
Naphthalene	32	0.032	1.86E+00	1.28E+02	4.83E-04	1.17E+01	1.12E+03	7.72E+00	1.03E+01	9.33E-03	3.11E-02	5.83E+01	2.14E-03

Statistical Evaluation of Autocraft Soil COPCs
Ft. Story Autocraft Site RI
Fort Story, Virginia

Total Benzo(a)anthracene (ug/kg)					
SB07-001-01	**SB07-002-01**	**SB07-003-01**	**SB07-004-01**	**SB07-005-01**	**SB07-006-01**
2,500	<360	<340	<360	<350	<340
SB07-001-57	**SB07-002-24**	**SB07-003-57**	**SB07-004-24**	**SB07-005-24**	**SB07-006-24**
620	<340	<350	<340	<350	<340
SB07-001-911	**SB07-002-68**	**SB07-003-911**	**SB07-004-68**	**SB07-005-68**	**SB07-006-911**
<340	<350	<360	<350	<350	<340

Shapiro-Wilk Test of Normality

i	X(i)	ln((X(i))	X(n-i+1)	ln(X(n-i+1))		a	b
1	170	5	2,500	8	2.688	0.4886	1.313
2	170	5	620	6	1.294	0.3253	0.421
3	170	5	180	5	0.057	0.2553	0.015
4	170	5	180	5	0.057	0.2027	0.012
5	170	5	180	5	0.057	0.1587	0.009
6	170	5	175	5	0.029	0.1197	0.003
7	170	5	175	5	0.029	0.0837	0.002
8	175	5	175	5	0.000	0.0496	0.000
9	175	5	175	5	0.000	0.0163	0.000
10	175	5	175	5	0.000		0.000
11	175	5	175	5	0.000		0.000
12	175	5	170	5	-0.029		0.000
13	175	5	170	5	-0.029		0.000
14	180	5	170	5	-0.057		0.000
15	180	5	170	5	-0.057		0.000
16	180	5	170	5	-0.057		0.000
17	620	6	170	5	-1.294		0.000
18	2,500	8	170	5	-2.688		0.000
					n= 18		1.776
						SD =	0.681

W = 0.400305076 $< W_{.05,18} = 0.897$

Note: Therefore the data fail the test of norality and a Non-Parameteric method must be applied.

Non-Parametric Confidence Limit

Rank	X(i)
1	170
2	170
3	170
4	170
5	170
6	170
7	170
8	175
9	175
10	175
11	175
12	175
13	175
14	180
15	180
16	180
17	620
18	2,500

n = 18
z= 1.65
u= 11

Non-Parametric Upper Confidence Limit = 175 ug/kg

Statistical Evaluation of Autocraft Soil COPCs

Ft. Story Autocraft Site RI

Fort Story, Virginia

Total Benzo(b)fluoranthene (ug/kg)					
SB07-001-01	**SB07-002-01**	**SB07-003-01**	**SB07-004-01**	**SB07-005-01**	**SB07-006-01**
4,100	<360	<340	<360	<350	<340
SB07-001-57	**SB07-002-24**	**SB07-003-57**	**SB07-004-24**	**SB07-005-24**	**SB07-006-24**
1,100	<340	<350	<340	<350	<340
SB07-001-911	**SB07-002-68**	**SB07-003-911**	**SB07-004-68**	**SB07-005-68**	**SB07-006-911**
<340	<350	<360	<350	<350	<340

Shapiro-Wilk Test of Normality

i	X(i)	ln((X(i))	X(n-i+1)	ln(X(n-i+1))		a	b
1	170	5	4,100	8	3.183	0.4886	1.555
2	170	5	2,500	8	2.688	0.3253	0.874
3	170	5	180	5	0.057	0.2553	0.015
4	170	5	180	5	0.057	0.2027	0.012
5	170	5	180	5	0.057	0.1587	0.009
6	170	5	175	5	0.029	0.1197	0.003
7	170	5	175	5	0.029	0.0837	0.002
8	175	5	175	5	0.000	0.0496	0.000
9	175	5	175	5	0.000	0.0163	0.000
10	175	5	175	5	0.000		0.000
11	175	5	175	5	0.000		0.000
12	175	5	170	5	-0.029		0.000
13	175	5	170	5	-0.029		0.000
14	180	5	170	5	-0.057		0.000
15	180	5	170	5	-0.057		0.000
16	180	5	170	5	-0.057		0.000
17	2,500	8	170	5	-2.688		0.000
18	4,100	8	170	5	-3.183		0.000
				n=	18		2.471
						SD =	0.946

W = 0.400964613 $< W_{.05,18} = 0.897$

Note: Therefore the data fail the test of norality and a Non-Parameteric method must be applied.

Non-Parametric Confidence Limit

Rank	X(i)
1	170
2	170
3	170
4	170
5	170
6	170
7	170
8	175
9	175
10	175
11	175
12	175
13	175
14	180
15	180
16	180
17	2,500
18	4,100

n = 18
z= 1.65
u= 11

Non-Parametric Upper Confidence Limit = 175 ug/kg

Statistical Evaluation of Autocraft Soil COPCs

Ft. Story Autocraft Site RI

Fort Story, Virginia

Total Benzo(a)pyrene (ug/kg)					
SB07-001-01	**SB07-002-01**	**SB07-003-01**	**SB07-004-01**	**SB07-005-01**	**SB07-006-01**
3,400	<360	<340	<360	<350	<340
SB07-001-57	**SB07-002-24**	**SB07-003-57**	**SB07-004-24**	**SB07-005-24**	**SB07-006-24**
940	<340	<350	<340	<350	<340
SB07-001-911	**SB07-002-68**	**SB07-003-911**	**SB07-004-68**	**SB07-005-68**	**SB07-006-911**
<340	<350	<360	<350	<350	<340

Shapiro-Wilk Test of Normality

i	X(i)	ln((X(i))	X(n-i+1)	ln(X(n-i+1))		a	b
1	170	5	3,400	8	2.996	0.4886	1.464
2	170	5	940	7	1.710	0.3253	0.556
3	170	5	180	5	0.057	0.2553	0.015
4	170	5	180	5	0.057	0.2027	0.012
5	170	5	180	5	0.057	0.1587	0.009
6	170	5	175	5	0.029	0.1197	0.003
7	170	5	175	5	0.029	0.0837	0.002
8	175	5	175	5	0.000	0.0496	0.000
9	175	5	175	5	0.000	0.0163	0.000
10	175	5	175	5	0.000		0.000
11	175	5	175	5	0.000		0.000
12	175	5	170	5	-0.029		0.000
13	175	5	170	5	-0.029		0.000
14	180	5	170	5	-0.057		0.000
15	180	5	170	5	-0.057		0.000
16	180	5	170	5	-0.057		0.000
17	940	7	170	5	-1.710		0.000
18	3,400	8	170	5	-2.996		0.000
					n= 18		2.061
						SD =	0.786

W = 0.40475227 $< W_{.05,18} = 0.897$

Note: Therefore the data fail the test of norality and a Non-Parameteric method must be applied.

Non-Parametric Confidence Limit

Rank	X(i)
1	170
2	170
3	170
4	170
5	170
6	170
7	170
8	175
9	175
10	175
11	175
12	175
13	175
14	180
15	180
16	180
17	940
18	3,400

n = 18
z= 1.65
u= 11

Non-Parametric Upper Confidence Limit = 175 ug/kg

Statistical Evaluation of Autocraft Soil COPCs

Ft. Story Autocraft Site RI

Fort Story, Virginia

Total Indeno(1,2,3-cd)pyrene (ug/kg)					
SB07-001-01	**SB07-002-01**	**SB07-003-01**	**SB07-004-01**	**SB07-005-01**	**SB07-006-01**
1,500	<360	<340	<360	<350	<340
SB07-001-57	**SB07-002-24**	**SB07-003-57**	**SB07-004-24**	**SB07-005-24**	**SB07-006-24**
260	<340	<350	<340	<350	<340
SB07-001-911	**SB07-002-68**	**SB07-003-911**	**SB07-004-68**	**SB07-005-68**	**SB07-006-911**
<340	<350	<360	<350	<350	<340

Shapiro-Wilk Test of Normality

i	X(i)	ln((X(i))	X(n-i+1)	ln(X(n-i+1))		a	b
1	170	5	1,500	7	2.177	0.4886	1.064
2	170	5	260	6	0.425	0.3253	0.138
3	170	5	180	5	0.057	0.2553	0.015
4	170	5	180	5	0.057	0.2027	0.012
5	170	5	180	5	0.057	0.1587	0.009
6	170	5	175	5	0.029	0.1197	0.003
7	170	5	175	5	0.029	0.0837	0.002
8	175	5	175	5	0.000	0.0496	0.000
9	175	5	175	5	0.000	0.0163	0.000
10	175	5	175	5	0.000		0.000
11	175	5	175	5	0.000		0.000
12	175	5	170	5	-0.029		0.000
13	175	5	170	5	-0.029		0.000
14	180	5	170	5	-0.057		0.000
15	180	5	170	5	-0.057		0.000
16	180	5	170	5	-0.057		0.000
17	260	6	170	5	-0.425		0.000
18	1,500	7	170	5	-2.177		0.000
				n=	18		1.243
						SD =	0.512

W = 0.347043391 $< W_{.05,18} = 0.897$

Note: Therefore the data fail the test of norality and a Non-Parameteric method must be applied.

Non-Parametric Confidence Limit

Rank	X(i)
1	170
2	170
3	170
4	170
5	170
6	170
7	170
8	175
9	175
10	175
11	175
12	175
13	175
14	180
15	180
16	180
17	260
18	1,500

n = 18
z= 1.65
u= 11

Non-Parametric Upper Confidence Limit = 175 ug/kg

CDI CALCULATIONS FOR SOIL - INGESTION
AUTO CRAFT BUILDING AREA SITE, FORT STORY, VIRGINIA

COPC	Conc (mg/kg)	IR (mg/day)	CF (kg/mg)	FI	EF (days/yr)	ED (yrs)	BW (kg)	CDI (mg/kg-day)
Non-Carcinogenic: Ingestion of Chemicals in Soil - Residential Population (Adults)								
Arsenic	1.5	100	1.00E-06	1	350	24	70	2.05E-06
Iron	8100	100	1.00E-06	1	350	24	70	1.11E-02
Manganese	170	100	1.00E-06	1	350	24	70	2.33E-04
Benzo(a)anthracene	0.175	100	1.00E-06	1	350	24	70	2.40E-07
Benzo(b)fluoranthene	0.175	100	1.00E-06	1	350	24	70	2.40E-07
Benzo(b)pyrene	0.175	100	1.00E-06	1	350	24	70	2.40E-07
Indeno(1,2,3-cd)pyrene	0.175	100	1.00E-06	1	350	24	70	2.40E-07
Carcinogenic: Ingestion of Chemicals in Soil - Residential Population (Adults)								
Arsenic	1.5	100	1.00E-06	1	350	24	70	7.05E-07
Iron	8100	100	1.00E-06	1	350	24	70	3.80E-03
Manganese	170	100	1.00E-06	1	350	24	70	7.98E-05
Benzo(a)anthracene	0.175	100	1.00E-06	1	350	24	70	8.22E-08
Benzo(b)fluoranthene	0.175	100	1.00E-06	1	350	24	70	8.22E-08
Benzo(b)pyrene	0.175	100	1.00E-06	1	350	24	70	8.22E-08
Indeno(1,2,3-cd)pyrene	0.175	100	1.00E-06	1	350	24	70	8.22E-08
Non-Carcinogenic: Ingestion of Chemicals in Soil - Residential Population (Child)								
Arsenic	1.5	200	1.00E-06	1	350	6	15	1.92E-05
Iron	8100	200	1.00E-06	1	350	6	15	1.04E-01
Manganese	170	200	1.00E-06	1	350	6	15	2.17E-03
Benzo(a)anthracene	0.175	200	1.00E-06	1	350	6	15	2.24E-06
Benzo(b)fluoranthene	0.175	200	1.00E-06	1	350	6	15	2.24E-06
Benzo(b)pyrene	0.175	200	1.00E-06	1	350	6	15	2.24E-06
Indeno(1,2,3-cd)pyrene	0.175	200	1.00E-06	1	350	6	15	2.24E-06
Carcinogenic: Ingestion of Chemicals in Soil - Residential Population (Child)								
Arsenic	1.5	200	1.00E-06	1	350	6	15	1.64E-06
Iron	8100	200	1.00E-06	1	350	6	15	8.88E-03
Manganese	170	200	1.00E-06	1	350	6	15	1.86E-04
Benzo(a)anthracene	0.175	200	1.00E-06	1	350	6	15	1.92E-07
Benzo(b)fluoranthene	0.175	200	1.00E-06	1	350	6	15	1.92E-07
Benzo(b)pyrene	0.175	200	1.00E-06	1	350	6	15	1.92E-07
Indeno(1,2,3-cd)pyrene	0.175	200	1.00E-06	1	350	6	15	1.92E-07

CDI CALCULATIONS FOR SOIL - DERMAL CONTACT
AUTO CRAFT BUILDING AREA SITE, FORT STORY, VIRGINIA

COPC	Conc (mg/kg)	CF (kg/mg)	SA (cm^2)	AF (mg/cm^2)	ABS	EF (days/yr)	ED (yrs)	BW (kg)	CDI (mg/kg-day)
Non-Carcinogenic: Dermal Contact with Chemicals in Surface Soil - Residential Population (Adults)									
Arsenic	1.5	1.00E-06	3600	0.2	0.032	350	24	70	4.73E-07
Iron	8100	1.00E-06	3600	0.2	0.01	350	24	70	7.99E-04
Manganese	170	1.00E-06	3600	0.2	0.01	350	24	70	1.68E-05
Benzo(a)anthracene	0.175	1.00E-06	3600	0.2	0.1	350	24	70	1.73E-07
Benzo(b)fluoranthene	0.175	1.00E-06	3600	0.2	0.1	350	24	70	1.73E-07
Benzo(b)pyrene	0.175	1.00E-06	3600	0.2	0.1	350	24	70	1.73E-07
Indeno(1,2,3-cd)pyrene	0.175	1.00E-06	3600	0.2	0.1	350	24	70	1.73E-07
Carcinogenic: Dermal Contact with Chemicals in Surface Soil - Residential Population (Adults)									
Arsenic	1.5	1.00E-06	3600	0.2	0.032	350	24	70	1.62E-07
Iron	8100	1.00E-06	3600	0.2	0.01	350	24	70	2.74E-04
Manganese	170	1.00E-06	3600	0.2	0.01	350	24	70	5.75E-06
Benzo(a)anthracene	0.175	1.00E-06	3600	0.2	0.1	350	24	70	5.92E-08
Benzo(b)fluoranthene	0.175	1.00E-06	3600	0.2	0.1	350	24	70	5.92E-08
Benzo(b)pyrene	0.175	1.00E-06	3600	0.2	0.1	350	24	70	5.92E-08
Indeno(1,2,3-cd)pyrene	0.175	1.00E-06	3600	0.2	0.1	350	24	70	5.92E-08
Non-Carcinogenic: Dermal Contact with Chemicals in Surface Soil - Residential Population (Child)									
Arsenic	1.5	1.00E-06	2074	0.2	0.032	350	6	15	1.27E-06
Iron	8100	1.00E-06	2074	0.2	0.01	350	6	15	2.15E-03
Manganese	170	1.00E-06	2074	0.2	0.01	350	6	15	4.51E-05
Benzo(a)anthracene	0.175	1.00E-06	2074	0.2	0.1	350	6	15	4.64E-07
Benzo(b)fluoranthene	0.175	1.00E-06	2074	0.2	0.1	350	6	15	4.64E-07
Benzo(b)pyrene	0.175	1.00E-06	2074	0.2	0.1	350	6	15	4.64E-07
Indeno(1,2,3-cd)pyrene	0.175	1.00E-06	2074	0.2	0.1	350	6	15	4.64E-07
Carcinogenic: Dermal Contact with Chemicals in Surface Soil - Residential Population (Child)									
Arsenic	1.5	1.00E-06	2074	0.2	0.032	350	6	15	1.09E-07
Iron	8100	1.00E-06	2074	0.2	0.01	350	6	15	1.84E-04
Manganese	170	1.00E-06	2074	0.2	0.01	350	6	15	3.86E-06
Benzo(a)anthracene	0.175	1.00E-06	2074	0.2	0.1	350	6	15	3.98E-08
Benzo(b)fluoranthene	0.175	1.00E-06	2074	0.2	0.1	350	6	15	3.98E-08
Benzo(b)pyrene	0.175	1.00E-06	2074	0.2	0.1	350	6	15	3.98E-08
Indeno(1,2,3-cd)pyrene	0.175	1.00E-06	2074	0.2	0.1	350	6	15	3.98E-08

CDI CALCULATIONS FOR GROUNDWATER - INGESTION
AUTO CRAFT BUILDING AREA SITE, FORT STORY, VIRGINIA

COPC	Conc (mg/l)	IR (liters/day)	EF (days/yr)	ED (yrs)	BW (kg)	CDI (mg/kg-day)
Non-Carcinogenic: Residential Population Ingestion of Chemicals in Groundwater						
ADULTS:						
Chloroform	0.011	2	350	24	70	3.01E-04
Iron	8.1	2	350	24	70	2.22E-01
Manganese	0.08	2	350	24	70	2.19E-03
CHILDREN:						
Chloroform	0.011	1	350	6	15	7.03E-04
Iron	8.1	1	350	6	15	5.18E-01
Manganese	0.08	1	350	6	15	5.11E-03
Carcinogenic: Residential Population Ingestion of Chemicals in Groundwater						
ADULTS:						
Chloroform	0.011	2	350	24	70	1.03E-04
Iron	8.1	2	350	24	70	7.61E-02
Manganese	0.08	2	350	24	70	7.51E-04
CHILDREN:						
Chloroform	0.011	1	350	6	15	6.03E-05
Iron	8.1	1	350	6	15	4.44E-02
Manganese	0.08	1	350	6	15	4.38E-04

CDI CALCULATIONS FOR GROUNDWATER - DERMAL CONTACT
AUTO CRAFT BUILDING AREA SITE, FORT STORY, VIRGINIA

COPC	Conc (mg/l)	SA (cm^2)	PC (cm/hour)	ET (hours/day)	EF (days/yr)	ED (yrs)	CF (1 L/1000 cm^3)	BW (kg)	CDI (mg/kg-day)
Non-Carcinogenic: Residential Population Dermal Contact with Chemicals in Groundwater									
ADULTS:									
Chloroform	0.011	19400	8.90E-03	0.3	350	24	0.001	70	7.81E-06
Iron	8.1	19400	1.00E-03	0.3	350	24	0.001	70	6.46E-04
Manganese	0.08	19400	1.00E-03	0.3	350	24	0.001	70	6.38E-06
CHILDREN:									
Chloroform	0.011	7310	8.90E-03	0.3	350	6	0.001	15	1.37E-05
Iron	8.1	7310	1.00E-03	0.3	350	6	0.001	15	1.14E-03
Manganese	0.08	7310	1.00E-03	0.3	350	6	0.001	15	1.12E-05
Carcinogenic: Residential Population Dermal Contact with Chemicals in Groundwater									
ADULTS:									
Chloroform	0.011	19400	8.90E-03	0.3	350	24	0.001	70	2.68E-06
Iron	8.1	19400	1.00E-03	0.3	350	24	0.001	70	2.21E-04
Manganese	0.08	19400	1.00E-03	0.3	350	24	0.001	70	2.19E-06
CHILDREN:									
Chloroform	0.011	7310	8.90E-03	0.3	350	6	0.001	15	1.18E-06
Iron	8.1	7310	1.00E-03	0.3	350	6	0.001	15	9.73E-05
Manganese	0.08	7310	1.00E-03	0.3	350	6	0.001	15	9.61E-07

CDI CALCULATIONS FOR GROUNDWATER - INHALATION
AUTO CRAFT BUILDING AREA SITE, FORT STORY, VIRGINIA

COPC	Conc (mg/m^3)	IR (m^3/hour)	ET (hours)	EF (days/yr)	ED (yrs)	BW (kg)	CDI (mg/kg-day)
Non-Carcinogenic: Residential Population Inhalation of Volatilized Chemicals in Groundwater							
ADULTS:							
Chloroform	8.75E-01	0.83	0.2	350	24	70	1.99E-03
Iron	---	0.83	0.2	350	24	70	0.00E+00
Manganese	---	0.83	0.2	350	24	70	0.00E+00
CHILDREN:							
Chloroform	8.75E-01	0.5	0.2	350	6	15	5.59E-03
Iron	---	0.5	0.2	350	6	15	0.00E+00
Manganese	---	0.5	0.2	350	6	15	0.00E+00
Carcinogenic: Residential Population Inhalation of Volatilized Chemicals in Groundwater							
ADULTS:							
Chloroform	8.75E-01	0.83	0.2	350	24	70	6.82E-04
Iron	---	0.83	0.2	350	24	70	0.00E+00
Manganese	---	0.83	0.2	350	24	70	0.00E+00
CHILDREN:							
Chloroform	8.75E-01	0.5	0.2	350	6	15	4.79E-04
Iron	---	0.5	0.2	350	6	15	0.00E+00
Manganese	---	0.5	0.2	350	6	15	0.00E+00

Chemical Concentration in Air Calculations - Auto Craft Building Site
VDEQ Shower Model

Medium: Groundwater Population: Future Resident Receptor Age:Adult & Child	kl	20*(44/MW)^.5	cm/hr	liquid-film mass transfer coefficient
		20	cm/hr	mass transfer coefficient for CO2
		44		conversion factor (MW CO2)
	MW	chemical specific	g/mole	
	kg	3000*(18/MW)^.5	cm/hr	gas-film mass transfer coefficient
		3000	cm/hr	mass transfer coefficient for water
		18		conversion factor (MW H2O)
	MW	chemical specific	g/mole	
	KL	(1/kl+R*T/H*kg)^-1	cm/hr	overall mass transfer coefficient
	R	8.2E-05	atm-L/mole-K	gas constant
	T	293	degrees K	room temperature
	H	chemical specific	atm-m3/mole	Henry's Law Constant
	KaL	KL*(Tl*us)/(Ts*ul)	cm/hr	adjusted mass transfer coefficient
	Tl	293	degrees K	calibration temperature
	Ts	318	degrees K	shower temperature
	ul	1.002	centipoise	water viscosity at Tl
	us	0.596	centipoise	water viscosity at Ts

Cwd	CW*(1-exp(-KaL*ts/60*d)		mg/L	concentration leaving shower droplet
ts		2	seconds	shower droplet drop time
		60		conversion factor
d		1	mm	shower droplet diameter
S	CWd*FR/SV		mg/m3-min	VOC in air generation rate
FR		20	L/minute	shower water flow rate
SV		6	m3	shower room air volume
CA	S/Ra*t		mg/m3	VOC concentration in shower room air
Ra		0.01667	1/minute	air exchange rate
t		20	minutes	total time in shower room
ET	Ds+e(-Ra*t)/Ra-e-(Ra*(Ds-t/Ra)*1/60		hours	exposure time
ET		0.041	hours	exposure time
Ds		12	minutes	shower duration

	Exposure Point Conc. (EPC) Groundwater CW ug/L	Exposure Point Conc. (EPC) Groundwater CW mg/L	Exposure Point Conc. (EPC) Air CA mg/m3	Molecular Weight g/mole	Henry's Law Constant atm-m^3/ mole	kl liq-film mass transfer coefficient cm/hr	kg gas-film mass transfer coefficient cm/hr	KL overall mass transfer coefficient cm/hr	KaL Adjusted mass transfer coefficient cm/hr	Cwd	Indoor Air VOC generation rate(S) mg/m^3-min	VF	Kl cm/sec
Metals													
Iron			N/A										
Manganese			N/A										
Volatile Organic Compounds (VOCs)													
Chloroform	11	0.011	8.75E-01	1.19E+02	3.67E-03	1.21E+01	1.16E+03	1.14E+01	1.52E+01	4.38E-03	1.46E-02	7.96E+01	3.16E-03

Appendix J
Toxicity Profiles: Human Health Risk Assessment

Remedial Investigation Report
FTA, LARC 60, and Auto Craft Sites
Fort Story, Virginia

APPENDIX J

TOXICITY PROFILES
HUMAN HEALTH RISK ASSESSMENT
FTA, LARC 60, AND AUTO CRAFT SITES
FORT STORY, VIRGINIA

ANTIMONY

Antimony and its compounds are generally regarded as primary skin irritants. Lesions generally appear on exposed, moist areas of the body, but rarely on the face. The dusts are also irritants to the eyes, nose, and throat, and may be associated with gingivitis, anemia, and ulceration of the nasal septum and larynx.

Antimony dust is absorbed from the lungs into the blood stream. Principal organs attacked include certain enzyme systems (protein and carbohydrate metabolism), heart, lungs, and the mucous membrane of the respiratory tract. Symptoms of acute oral poisoning include violent irritation of the nose, mouth, stomach, and intestines, vomiting, bloody stools, slow shallow respiration, pulmonary congestion, coma, and sometimes death due to circulatory or respiratory failure.

Chronic oral poisoning presents symptoms of dry throat, nausea, headache, sleeplessness, loss of appetite, and dizziness. Liver and kidney degeneration changes are late manifestations. Antimony compounds are generally less toxic than antimony. Antimony trisulfide, however, has been reported to cause myocardial changes in man and experimental animals.

Antimony has not been classified as to carcinogenicity by the USEPA.

ARSENIC

Low levels of exposure to inorganic arsenic may produce injury in several body tissues (ATSDR, 1989a). When ingested, a common effect is irritation of the digestive tract leading to pain, nausea, vomiting and diarrhea. Other effects characteristic of oral exposure include decreased production of red and white blood cells, abnormal heart function, blood vessel damage, liver and/or kidney injury and impaired nerve function that causes a "pins and needles" sensation in the feet and hands.

Direct dermal contact with arsenic compounds, frequently from inorganic arsenic dusts in the air, may result in mild to severe irritation of the skin, eyes and throat.

The single most characteristic effect of oral exposure to this compound is a pattern of skin abnormalities. Although these skin changes, called hyperkeratoses, are not considered to be a health concern, a small number of hyperkeratoses may ultimately progress to skin cancer. In

addition, arsenic ingestion has been reported to increase the risk of cancer in the liver, bladder, kidney and lung.

Of much greater concern is the ability of inhaled arsenic to increase the risk of lung cancer. This has been observed mostly from high levels of airborne arsenic in or around smelters, but lower levels may increase lung cancer as well.

Based on increased lung cancer mortality in populations exposed primarily through inhalation and on increased skin cancer incidence in several areas consuming drinking water with high arsenic concentrations, the USEPA has designated arsenic as a Group A carcinogen (known human carcinogen).

CHLOROFORM

Chloroform is toxic to the central nervous system, liver and kidneys (ATSDR, 1989b). Short-term exposure to high concentrations of chloroform in the air can cause fatigue, dizziness and headache. Long-term exposure to high levels of chloroform through inhalation and ingestion can cause jaundice and burning urination.

Limited data from experiments in animals indicate that chloroform may have reproductive and developmental effects. In animals, high doses of chloroform have caused cancer in the liver and kidney.

The USEPA has classified chloroform as a Group B2 probable human carcinogen via both oral and inhalation exposure.

1,2-DICHLOROETHENE

1,2-dichloroethene (1,2-DCE) is a volatile organic compound consisting of a mixture of cis- and trans- isomers. Although the proportion of each depends upon the manufacturer's specification, the properties of the mixture are expected to be similar to those of the individual isomers. Human health effects due to chronic exposure to 1,2-DCE have not been extensively studies. However, liver, heart, and lung effects have been reported for animals subjected to chronic exposures to the trans isomeric form only (ATSDR, 1990a).

Direct skin contact with 1,2-DCE has not been shown to cause serious health effects. Acute exposure to trans 1,2-DCE has been known to cause drowsiness, headache, tiredness and nausea.

1,2-DCE has not been studied for cancer effects in humans and animals.

IRON

Soluble iron salts, especially ferric chloride and ferric sulfate, are cutaneous irritants and their aerosols are irritating to the respiratory tract. Iron compounds, as classes are not associated with any particular industrial risk. The inhalation of iron oxide fumes or dust may cause a benign pneumoconiosis. It is probable that the inhalation of pure iron oxide does not cause fibrotic pulmonary changes, whereas the inhalation of iron oxide plus other substances may cause injury.

Iron is not considered a carcinogen by USEPA.

MANGANESE

Manganese poisoning in humans may result from occupational contact where manganese is absorbed via inhalation. Manganese fumes and dusts result in pneumonia development early on and this condition is reversible. The form of pneumonia does not respond to antibiotic therapy but resolves when the insult is removed.

Chronic manganese intoxication results in central nervous system disorders and associated degenerative pathology of the ganglion cells in the putamen, pallidium, central caudate and thalamus. Clinically, chronic manganese intoxication resembles Parkinson's disease with rigor, tremors and akinesia.

There is no human data for the carcinogenicity of manganese or any of its salts. Based on animal studies, the USEPA has classified manganese as Class D.

METHYL ISOBUTYL KETONE

Methyl isobutyl ketone (MIBK), a clear liquid with a characteristic odor, is a ketone with the chemical formula of $CH_3COCH_2CH(CH_3)_2$ (Budavari et al. 1989). It is widely used as a solvent for various paints, lacquers, varnishes, adhesives, and rubber cements and as an extractant for mineral oils. The most likely exposures to MIBK are by inhalation of the vapors and by skin contact (NIOSH 1978).

At high concentrations, MIBK is a central nervous system depressant, inducing ataxia, narcosis, and death in experimental animals (Krasavage et al. 1982, Specht et al. 1940, Specht 1938). Human exposure to lower concentrations has resulted in central nervous system effects such as headache, weakness, vertigo, insomnia, and somnolence. Gastrointestinal effects including nausea, vomiting, loss of appetite, heart burn, and intestinal pain were reported also (Linari et al. 1964, Hjelm et al. 1990). Exposure to MIBK has been shown to irritate the conjunctiva and mucous membranes of the nose and throat (Hjelm et al. 1990, Elkins 1959). MIBK may also produce dermatitis, with skin lesions varying from erythema to small areas of peeling (Linari et al. 1964).

No studies were available to evaluate the carcinogenicity of MIBK. Furthermore, EPA has not assigned a weight-of-evidence classification for carcinogenicity.

PAHs

PAHs are organic compounds and as such are lipid soluble. Acute exposures to PAHs are not known to cause major adverse effects. Slight central nervous system depression may result from high concentrations in the air. However, generally exposure concentrations are low level chronic exposures in occupational situations.

The animal studies for the carcinogenic PAHs have provided support for carcinogenic potential following exposure through the skin, following subcutaneous and intramuscular injection as well as exposure orally and via inhalation. Oral exposures to rates, mice, and hamsters have produced stomach tumors while higher oral doses have resulted in leukemia and lung ademonas. Upper respiratory tract tumors have been produced via inhalation exposures in hamsters.

The six PAHs identified as COPCs (benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, and naphthalene) are classified as B2 probably human carcinogens.

THALLIUM

Human health effects may be observed through exposure to thallium through inhalation, significant skin absorption and ingestion (ECDIN, 1984). Inhalation of thallium results in nausea, vomiting, loss of hair, abdominal colic, pain in legs and chest, nervousness and irritability. Thallium may be absorbed through the eyes with long term or repeated exposures resulting in effects on vision.

Severe symptoms associated with acute poisoning may result via ingestion with doses as low as 6 mg/kg of body while doses of 14 mg/kg are often fatal. When large doses are taken, paraesthesia, lethargy, delirium, myocardial abnormalities, convulsions, and coma appear soon after ingestion. In less severe cases, the onset of symptoms may be insidious. Vomiting and abdominal pain are common.

Chronic poisoning via ingestion may result in excitation and insomnia as initial symptoms with leg joint pain, weakness, and polyneuritis occuring after exposure for weeks or months. Loss of hair, anorexia, vomiting, weight loss, depression, hysterical laughter, cardiac disturbances and albuminuria are also noted.

Thallium is recognized by NIOSH as a neurotoxic agent which may cause birth defects, specifically skeletal deformities, low birth weight and premature birth.

TOLUENE

Inhalation of toluene results in depression of the central nervous system; toluene does not appear to exert other systemic effects at low concentrations (ATSDR, 1989c). Humans exposed to toluene in the range of 100 to 500 ppm experience fatigue, confusion, incoordination, impairment to

reaction time, perception, and motor control and function effects. The liver and kidney do not appear to be primary target organs for toluene exposure.

Because there is no evidence that toluene is a carcinogen, the USEPA designates toluene as Group D.

VINYL CHLORIDE

Vinyl chloride is a colorless gas, is a halogenated aliphatic hydrocarbon with the empirical formula of C2H3Cl. It is used primarily as an intermediate in the manufacture of polyvinyl chloride (PVC); limited quantities are used as a refrigerant and as an intermediate in the production of chlorinated compounds.

Vinyl chloride is rapidly absorbed from the gastrointestinal tract and lungs. Metabolism of vinyl chloride occurs primarily in the liver via oxidation by hepatic microsomal enzymes to polar compounds which can be conjugated with glutathione and/or cysteine. These covalently bound metabolites are then excreted in the urine.

In humans and animals, vinyl chloride is a CNS depressant, inducing narcosis and anesthesia at high concentrations. Nonneoplastic toxic effects observed in workers exposed by inhalation to vinyl chloride include hepatotoxicity, acroosteolysis and scleroderma, and Raynaud's syndrome, a vascular disorder of the extremities. For the oral route of exposure, the primary target organ of vinyl chloride toxicity in animals is the liver. Chronic oral administration of 1.7-14.1 mg/kg/day of vinyl chloride induced dose-related increases in nonneoplastic lesions of the liver of rats.

The carcinogenicity of vinyl chloride in humans has been demonstrated in a number of epidemiological studies and case reports many of which associated occupational exposure to vinyl chloride to the development of angiosarcomas of the liver. In addition to liver cancer, exposure to vinyl chloride also has been linked to an increased risk of lung, brain, hematopoietic, and digestive tract. Inhalation exposure to vinyl chloride induced an increased incidence of liver angiosarcomas; kidney nephroblastomas; and lung, brain, and forestomach tumors in rodents.

EPA has classified vinyl chloride as a Group A chemical, human carcinogen.

Appendix K
Toxicity Profiles: Ecological Risk Assessment

Remedial Investigation Report
FTA, LARC 60, and Auto Craft Sites
Fort Story, Virginia

ACETONE

Fate and Transport

Acetone has a high vapor pressure and therefore would be expected to volatilize readily, but because of its high water solubility, volatilization is probably limited. Once in the atmosphere, it is apparently oxidized. Acetone has a low octanol/water partition coefficient and therefore is probably not readily adsorbed. Biodegradation is probably important in determining the fate of acetone in the environment because of its aliphatic nature (Clement Associates, 1985).

Toxicity

The toxicity of acetone to aquatic organisms is low. The LC_{50} value for sunfish was reported to be 14.2 g/l, and the threshold concentration for immobilization of *Daphnia magna* was reported to be over 9 g/l (Clement Associates 1985). Acetone is also of low acute toxicity in rats. LD_{50} values range from 1.34 - 9.57 g/kg for various age groups. An oral LD_{50} for acetone in rats was reported as 8.46 g/kg (Fawell and Hunt, 1988).

ALUMINUM

Fate and Transport

Aluminum is often taken up and concentrated in root tissue. According to the Draft Toxicological Profile for Aluminum (ATSDR, 1991), it is unclear to what extent aluminum is taken up into root food crops and leafy vegetables, however, it is not bioconcentrated in plants. In addition, aluminum is not expected to biomagnify in terrestrial food chains.

The potential for accumulation of aluminum has been studied in several aquatic species. Bioconcentration of aluminum in fish is a function of the water quality. Brook Trout have been shown to accumulate slightly more aluminum as pH levels increase. In Smallmouth Bass, aluminum accumulation was higher in gill tissues than other tissues. Aluminum concentrations were also highest in the gill tissues and lowest in the muscles of rainbow trout. No information was found on the biomagnification of aluminum in aquatic food chains.

Toxicity

Most studies of the health effects of aluminum to animals involved oral and inhalation exposure. Few studies are available regarding respiratory effects in animals. Two studies that involved exposure of rats, guinea pigs and hamsters to aluminum chlorohydrate, reported reactions similar to that of dust exposure, sometimes accompanied by pneumonia.

According to the Draft Toxicological Profile for Aluminum (ATSDR 1991), the effects of aluminum on the development of laboratory animals are controversial. Some studies show decreases in pup growth and neurological development, while others do not. In mice, aluminum chloride has not been shown to produce adverse effects in pups, when administered during gestation. However, aluminum lactate in food during gestation produced weight decreases and lowered birth weights in pups, but it was difficult to determine whether these effects were permanent. Studies on pups that were exposed to aluminum after they were born also have mixed results. Aluminum is fatal to laboratory animals (rats, mice) only at very high doses.

BARIUM

Fate and Transport

Barium is likely to precipitate out of solution as an insoluble salt in aquatic media. Waterborne barium can also adsorb to suspended particulate matter. Sedimentation of suspended solids removes a large portion of the barium from surface water. The uptake of barium by fish and marine organisms is another removal mechanism; barium levels in sea water range from 2 to 63 mg/l with a mean concentration of about 13 mg/l. According to the Draft Toxicological Profile for Barium (ATSDR, 1990), this compound was found to bioconcentrate in marine plants by a factor of 1,000 times the level present in water. BCFs of marine animals, plankton, and in brown algae of 100, 120, and 260, respectively, have also been reported.

In soils, barium may be taken up by vegetation or transported through soil with precipitation, however, this transport pathway has not been comprehensively studied. Relative to the amount of barium found in soils, little is bioconcentrated by plants. Barium is not very mobile in soil systems, and the rate of its transportation depends on soil material, such as high capacity and calcium carbonate. Barium is more mobile and is more likely to be leached from soils in the presence of chloride due to the increased solubility of barium chloride. The mobility of this compound in soil is reduced by the precipitation of barium carbonate and sulfate.

Toxicity

Barium has been associated with several adverse effects in experimental animals. The cardiovascular system may be one of the primary targets of barium toxicity. Exposure of animals to barium has also been associated with respiratory, gastrointestinal, musculoskeletal, neurological, developmental and reproductive effects. Most studies with experimental animals were performed with rats and mice. Reduced life span was observed in chronic oral studies with mice, and acute parenteral administration of barium compounds to animals has resulted in paralysis of the respiratory muscles. Similar effects have been shown in animals in cases of acute inhalation and ingestion (ATSDR, 1990).

CHROMIUM

Fate and Transport

Hexavalent chromium is quite soluble, existing in solution as a component of a complex anion. It is not sorbed to any significant degree by clays or hydrous metal oxides. The anionic form varies according to pH and may be a chromate, hydrochromate or dichromate. Because all anionic forms are so soluble, they are quite mobile in the aquatic environment. Chromium (VI) is efficiently removed by activated carbon and thus may have some affinity for organic materials in natural water. Most chromium (III) in the aquatic environment is hydrolyzed and precipitates as chromium hydroxide. Sorption to sediments and bioaccumulation will remove much of the remaining chromium (III) from solution. Chromium (III) is adsorbed only weakly to inorganic materials. Chromium (III) and chromium (VI) are readily interconvertible in nature depending on microenvironmental conditions such as pH, hardness, and the types of other compounds present (Clement Associates, 1985).

Chromium (III) tends to be adsorbed strongly onto clay particles and organic particulate matter, but can be mobilized if it is complexed with organic molecules. Hexavalent compounds are not strongly adsorbed by soil components and chromium (VI) is mobile in groundwater. Chromium (VI) is quickly reduced to chromium (III) in poorly drained soils having a high content of organic matter. Chromium (VI) of natural origin is rarely found in soils (Clement Associates, 1985).

Toxicity

Acute toxicity values for chromium (VI) are available for freshwater animal species in 27 genera and range from 23.07 µg/l for a cladoceran to 1,870,000 µg/l for a stonefly. All five tested species of daphnids are especially sensitive. The few data that are available indicate that the acute toxicity of chromium (VI) decreases as hardness and pH increase (USEPA, 1986).

Acute values for chromium (III) are available for 20 freshwater animal species in 18 genera ranging from 2,221 µg/l for a mayfly to 71,060 µg/l for caddisfly. Hardness has a significant influence on toxicity, with chromium (III) being more toxic in soft water (USEPA, 1986).

The chronic value for chromium (VI) for both rainbow trout and brook trout is 264.6 µg/l, which is much lower than the chronic value of 1,987 µg/l for the fathead minnow. In three chronic tests, a temporary reduction in growth occurred at low concentrations. Six chronic tests with five species of daphnids gave chronic values that range from <2.5 to 40 µg/l. Except for the fathead minnow, all the chronic tests were conducted in soft water. Green algae are quite sensitive to chromium (VI). The bioconcentration factor obtained with rainbow trout is less than 3. Growth of chinook salmon was reduced at a measured concentration of 16 µg/l (USEPA, 1986).

A life-cycle test for chromium (III) with *Daphnia magna* in soft water gave a chronic value of 66 µg/l. In a comparable test in hard water the lowest test concentration of 44 µg/l inhibited reproduction of *Daphnia magna*, but this effect may have resulted from ingested precipitated chromium. In a life-cycle test with the fathead minnow in hard water the chronic value was 1,025 µg/l. Toxicity data are available for only two freshwater plant species. A concentration of 9,900 µg/l inhibited growth of roots of Eurasian watermilfoil. A freshwater green alga was affected by a concentration of 397 µg/l in soft water. No bioconcentration factor has been measured for chromium (III) with freshwater organisms (USEPA, 1986).

Chromium is essential for regulating carbohydrate metabolism in mammals. Chromium deficiency has been described in rats, guinea pigs, and squirrel monkey; signs include reduced growth, decreased life span, elevated serum cholesterol, increased formation of aortic plaques, and signs resembling those of diabetes mellitus. Chromium has proved effective in counteracting the deleterious effects of cadmium in rats and of vanadium in chickens. It is beneficial but not essential to growth in higher plants. Residues in plants seldom exceed a few parts per million, except in plants living on infertile serpentine soils containing high Cr concentrations, or grown on soils smended with sewage sludge. Plants with elevated Cr residues show no toxic effects, although concentrations in excess of 1 ppm in the aqueous medium may inhibit germination of the seed and growth of roots and shoots (Eisler, 1986).

Among warm-blooded organisms, hexavalent chromium was fatal to dogs in 3 months at 100 mg/kg in their food and killed most mammalian experimental animals at injected doses of 1 to 5 mg Cr/kg body weight, but had no measurable effect on chickens at dietary levels of 100 mg/kg or a 32-day period. Trivalent chromium compounds were generally less toxic than hexavalent chromium compounds, but significant differences may occur in uptake of anionic and cationic Cr (III) species, and this difference may affect survival (Eisler, 1986). For birds and mammals, dietary levels of 10.0 mg Cr+3/kg adversely affected young black ducks, and 5.1 mg Dr+6/kg in food and water of mice was associated with elevated tissue residues. Available evidence suggests that organs and tissues of fish and wildlife that contain greater than 4.0 mg total Cr/kg dry weight should be viewed as presumptive evidence of Cr contamination (Eisler, 1986).

COBALT

Fate and Transport

Cobalt is naturally occurring in the environment and has an essential role in biological organisms. Cobalt is essential to plants for biological nitrogen fixation. It is very insoluble in its oxide, hydroxide and carbonate states. In acid conditions, dissolution and leaching are more likely to occur. Cobalt concentrations are generally highest in the soil horizon where organic material and clays are richest. Cobalt sorbed by soil oxides was not readily desorbed, and rapidly became non-isotopically exchangeable with solution cobalt, whereas the cobalt sorbed by humic acid was relatively easily desorbed, and a large proportion remained isotopically exchangeable. Uptake of cobalt by plants is a function of the concentration of cobalt in the soil solution and the exchange sites of the cation exchange complex. Soil drainage status also has a major influence on the amount of cobalt available for plant uptake. In poorly drained soils, the amount of extractable cobalt is generally greater than in well drained areas, and plant uptake is significantly increased. Experiments have shown that most of the cobalt in the soil is contained in or associated with manganese in mineral form (Alloway, 1993).

Toxicity

Cobalt has both beneficial and harmful effects on plant and animal life. Cobalt is part of vitamin B_{12}, which is essential to mammalian life. Cobalt is used to treat anemia. Sheep and cattle found grazing in pastures with low cobalt concentrations in the vegetation lost appetite, became weak and emaciated, suffered severe anemia, and died (Alloway, 1993). Excessive cobalt in animals can cause lung, skin and heart effects. Soluble cobalt compounds have been shown to be generally more toxic than insoluble compounds.

Oral LD_{50} values for cobalt compounds in Winstar rats ranged from 91 mg cobalt /kg as cobalt fluoride to 317 mg cobalt /kg as cobalt carbonate. Cobalt fluoride and cobalt bromide appeared to be the most toxic of the tested cobalt compounds. An LD_{50} of 3,672 mg cobalt/ kg was also found for tricobalt tetroxide, a highly insoluble cobalt compound. Sublethal oral doses resulted in respiratory, cardiovascular, gastrointestinal, hematological, musculoskeletal, hepatic, renal, ocular, thyroid, hypothermic, body weight, developmental, and reproductive effects (ATSDR, 1992).

COPPER

Fate and Transport

Copper has two oxidation states, +1 (cuprous) and +2 (cupric). Cuprous copper is unstable in aerated water over the pH range of most natural waters (6 to 8) and oxidizes to the cupric state. Several processes determine the fate of copper in the aquatic environment: formation of complexes, especially with humic substances; sorption to hydrous metal oxides, clays, and organic materials; and bioaccumulation. Copper has a strong affinity for hydrous iron and manganese oxides, clays, carbonate minerals, and organic matter. Sorption to these materials, both suspended in the water column and in the sediment, results in relative enrichment of the solid phase and reduction in dissolved levels (Clement Associates, 1985).

Because many copper compounds and complexes are readily soluble, copper is among the more mobile heavy metals in soil and other surface environments. The major process that limits the environmental mobility of copper is adsorption to organic matter, clays and other materials (Clement Associates, 1985).

The bioconcentration factor (BCF) of copper in fish obtained in various field studies is 10-100 indicating a low potential for bioconcentration. The BCF is higher in molluscs, such as oysters, where it may reach 30,000. However, abundant evidence has shown that there is no biomagnification in the food chain. Studies have been performed on bottom-feeding fish such as suckers and bullheads, as well as on herbivorous, omnivorous and carnivorous animals.

Toxicity

Acute toxicity data are available for species in 41 genera of freshwater animals. At a hardness of 50 mg/l, the genera range in sensitivity from 16.74 µg/l for the squawfish, *Ptychocheilus*, to 10,240 µg/l for the stonefly, *Acroneuria*. Data for eight aquatic species indicate that acute toxicity decreases as hardness increases. Additional data for several species indicate that toxicity also decreases with increases in alkalinity and total organic carbon (USEPA, 1986).

Chronic values are available for 15 freshwater species and range from 3.873 µg/l for brook trout to 60.36 µg/l for northern pike. Fish and invertebrate species seem to be about equally sensitive to the chronic toxicity of copper. Toxicity tests have been conducted on copper with a wide range of freshwater plants and the sensitivities are similar to those of animals. Copper does not appear to bioconcentrate very much in the edible portion of freshwater aquatic species (USEPA, 1986).

Sheep are very susceptible to copper toxicosis, and poisoning may be acute or chronic. The toxic dose is about 200 mg/kg. Copper intake of 1.5 g/day for 30 days is known to be fatal for many breeds of sheep. Swine develop copper poisoning at levels of 250 mg/kg in the diet unless zinc and iron levels are increased. Cattle are much more resistant to copper than sheep or swine (Clement Associates, 1985).

IRON

Fate and Transport

Iron is an essential element required by both plants and animals. The ferrous, or bivalent (Fe^{++}), and the ferric, or trivalent (Fe^{+++}) irons are the primary forms of concern in the aquatic environment, although other forms may be in organic and inorganic wastewater streams. Prime pollution sources are industrial wastes, mine drainage waters, and iron-bearing groundwaters. In the presence of dissolved oxygen, iron in water is precipitated as a hydroxide, $Fe(OH)_3$ or occasionally as ferric oxide (Fe_2O_3). Both of these precipitates form as gels or flocs that may be detrimental, when suspended in water, to fishes and other aquatic life. They can settle to form flocculent materials that cover stream bottoms thereby destroying bottom-dwelling invertebrates, plants or incubating fish eggs.

Toxicity

A 96-hour LC_{50} value of 0.32 mg/l (320 µg/l) was obtained for mayflies, stoneflies, and caddisflies (USEPA 1979). Iron was found to be toxic to carp at concentrations of 0.9 mg/l (900 µg/l) when the pH of the water was 5.5, and both pike and trout died at iron concentrations of 1 to 2 mg/l (1,000 to 2,000 µg/l) (USEPA 1976). The USEPA (1986) has established a criterion of 1,000 µg/l for fresh water, based upon laboratory tests. Data obtained under laboratory conditions suggest a greater toxicity for iron than that obtained in natural ecosystems, due to variations in alkalinity, pH, hardness, temperature and the presence of ligands which change the valence state and solubility, and therefore the toxicity of the metal.

LEAD

Fate and Transport

Natural compounds of lead are not usually mobile in normal surface or groundwater because the lead leached from ores is adsorbed by ferric hydroxide or combines with carbonate or sulfate ions to form insoluble compounds. The transport of lead in the aquatic environment is influenced by the speciation of the ion. Lead exists mainly as the divalent cation in most unpolluted waters and becomes adsorbed into particulate phases. Volatilization of lead compounds probably is not important in most aquatic environments (Clement Associates, 1985).

Sorption processes appear to exert a dominant effect on the distribution of lead in the environment. Adsorption to inorganic solids, organic materials, and hydrous iron and manganese oxides usually controls the mobility of lead and results in a strong partitioning of lead to the bed sediments in aquatic systems. The sorption mechanism most important in a particular system varies with geological setting, pH, Eh, availability of ligands, dissolved and particulate ion concentrations, salinity, and chemical composition (Clement Associates, 1985).

Lead does not seem to be biomagnified in food chains, yet it may accumulate in plants such as fungi, as well as earthworms, millipedes, terrestrial birds and mammals, freshwater invertebrates and fish. In aquatic environments, lead concentrations are usually highest in benthic organisms and algae, and lowest in upper-trophic-level predators like carnivorous fish. High BCFs were determined in studies using oysters, freshwater algae and marine algae. Bioconcentration factors are available for four freshwater invertebrate and two fish species and range from 42 to 1,700. Available bioconcentration factors for saltwater species range from 17.5 to 2,570.

Toxicity

The acute and chronic toxicity of lead to several species of freshwater animals has been shown to decrease as the hardness of water increases. At a hardness of 50 mg/l the acute sensitivities of 10 species range from 142.5 µ/l for an amphipod to 235,900 µg/l for a midge. Freshwater algae are affected by concentrations of lead above 500 µg/l. Data on the chronic effects of lead freshwater animals are available for two fish and two invertebrate species. The lowest and highest available chronic values (12.26 and 128.1 µg/l) are both for a cladoceran, but in soft and hard water, respectively (USEPA, 1986).

Among sensitive species of birds, survival was reduced at doses of 50 to 75 mg Pb^{2+}/kg body weight or 28 mg organolead/kg body weight, reproduction was impaired at dietary levels of 50 mg Pb^{2+}/kg, and signs of poisoning were evident at doses as low as 2.8 mg organolead/kg body weight. In general, forms of lead other than shot (or ingestible lead object), or routes of administration other than ingestion, are unlikely to cause clinical signs of lead poisoning in birds. Data for toxic and sublethal effects of lead on mammalian wildlife are missing. For sensitive species of domestic and laboratory animals, survival was reduced at acute oral lead doses of 4 mg/kg body weight (rat), at chronic oral doses of 5 mg/kg body weight (dog), and at dietary levels of 1.7 mg/kg body weight (horse). Sublethal effects were documented in monkeys exposed to doses as low as 0.1 mg Pb/kg body weight daily or fed diets containing 0.5 mg Pb/kg. In general, organolead compounds were more toxic than inorganic lead compounds, food chain biomagnification of lead was negligible, and younger organisms were most susceptible (Eisler, 1988).

MANGANESE

Fate and Transport

Manganese is an abundant element which occurs as a component of over 100 minerals, including various sulfides, oxides, carbonates, silicates, phosphates, and borates. Soils derive virtually all their

manganese content from the parent materials and concentrations are related to those materials, with lower concentrations found in sandstone materials (20-500 mg/kg), moderate concentrations found in limestones (400-600 mg/kg), and highest concentrations found in igneous and metamorphic rocks (200-1000 mg/kg). In soils, manganese commonly occurs as the oxide minerals birnessite and vernadite. The various oxides of manganese show a strong tendency to form mixed crystals with other transition metals, including cobalt (Alloway, 1993).

The availability of manganese for plant uptake is largely governed by the supply of H^+ ions and electrons (Alloway, 1993). The transport and partitioning in water is controlled by the solubility of the specific chemical form present, which is determined by pH, Eh (oxidation-reduction potential), and the characteristics of available anions. The metal may exist in water in any of four oxidation states (2+, 3+, 4+, or 7+). Divalent manganese (Mn^{++}) predominates in most waters with pH 4-7, but may becomes oxidized at pH greater than 8 or 9. The principal anion associated with Mn^{++} in water is usually carbonate (CO_3^{-2}). Sorption of manganese to soils and sediments is highly variable and depends mainly on the cation exchange capacity and the organic composition of the soil. Generally the soil adsorption constants increase as a function of the organic content and the ion exchange capacity of the soil. At low concentrations, manganese may be fixed by clays and will not be released into solution readily. At higher concentrations, manganese may be desorbed by ion exchange mechanisms with other ions in solution. Lastly, the oxidation state of manganese in soils and sediments may be altered by microbial activity. Studies have shown that Mn^{++} in suspensions of silt or clay loams from several areas of the United States was oxidized by microorganisms, leading to the precipitation of manganese minerals (ATSDR, 1992).

Toxicity

Manganese compounds are required for good health in animals. Manganese deficiency has been linked with impaired growth, skeletal abnormalities, impaired reproductive function in females, testicular degeneration in males, and altered metabolism of carbohydrates. Excessive manganese can cause adverse effects. However, most studies have shown that manganese has low acute oral toxicity. Doses as high as 2,300 mg/kg/day have been tolerated by rats for 6 months without lethality. Oral administration of highly concentrated manganese solutions (16,000-44,000 mg/l) can cause lethality in animals. No effects were seen in mice or rats exposed to average oral doses of 810 or 930 mg/kg/day. In rats fed manganese orally, some minor neurological effects were seen in doses as low as 14 mg/kg for up to 8 months . Decreased litter weights were seen in rats dosed with 1,240 mg/kg during the first 20 days of gestation. Repeated intramuscular injection of rats and mice with suspensions of metallic manganese did not result in tumors (ATSDR, 1992).

NICKEL

Fate and Transport

Nickel is a highly mobile metal in aquatic systems because many nickel compounds are highly soluble in water. However, the insoluble sulfide is formed under reducing conditions and in the presence of sulfur. In natural, unpolluted waters, sorption and coprecipitation processes involving hydrous iron and manganese oxides are probably at least moderately effective in limiting the mobility of nickel. In more organic-rich, polluted waters, it appears that little sorption of nickel is likely. The lack of other controls on nickel mobility probably makes incorporation into bed sediments an important fate of nickel in surface waters (Clement Associates, 1985).

In general, nickel is not accumulated in significant amounts by aquatic organisms. Bioconcentration factors are usually on the order of 100 to 1,000. Uptake of nickel from the soil by plants can also occur. Bioconcentration factors in freshwater range from 0.8 for fish muscle to 193 for a cladoceran. In saltwater, bioconcentration factors range from 261.8 with an oyster to 675 with a brown alga.

Toxicity

Acute values with twenty-one freshwater species in 18 genera range from 1,101 µg/l for a cladoceran to 43,240 µg/l for a fish. Fishes and invertebrates are both spread throughout the range of sensitivity. Acute values with four species are significantly correlated with hardness. Data are available concerning the chronic toxicity of nickel to two invertebrates and two fishes in freshwater. Data available for two species indicate that chronic toxicity decreases as hardness increases. The measured chronic values ranged from 14.77 µg/l with *Daphnia magna* in soft water to 526.7 µg/l with the fathead minnow in hard water (USEPA, 1986).

Nickel appears to be quite toxic to freshwater algae, with concentrations as low as 50 µg/l producing significant inhibition. Bioconcentration factors for nickel range from 0.8 for fish muscle to 193 for a cladoceran (USEPA, 1986).

TOTAL PAHs

Fate and Transport

Polynuclear Aromatic Hydrocarbons (PAHs) occur as a result of natural processes, such as forest fires and volcanic activity, and anthropogenic activities, such as catalytic cracking, manufacturing of asphalt and coal tar pitch, heating and power generation, and internal combustion engines. PAHs released to the atmosphere are subject to short- and long-term transport. Atmospheric residence time and transport distance depend on the size of the particles to which PAHs are sorbed and the molecular weight of the PAH.

Much of the PAHs released into the atmosphere eventually reaches the soil by direct deposition of by deposition on vegetation. In sediments, PAHs can biodegrade, biotransform, or accumulate in aquatic organisms, specifically bottom-dwelling vertebrates. PAHs in soil can biodegrade or accumulate in terrestrial plants, through roots or foliage. Specific transport and partitioning are determined by: water solubility; vapor pressure; concentration; and molecular weight of the PAH. The half-life for PAHs differs according to physical properties. For example, the half-life in soil for Benz(a)anthracene ranges from 102 days to 1.86 years while the half life for Benzo(b)fluoranthene ranges from 360 days to 1.67 years. (Howard, 1990). PAHs may accumulate in terrestrial animals through the food chain or by ingestion of soil. PAHs can also enter groundwater and be transported within an aquifer. In surface water, these compounds can volatilize, photodegrade, oxidize, biodegrade, bind to particles, or accumulate in aquatic organisms. Because of their low solubility, PAHs in aquatic systems are usually found sorbed to particles that either have settled to the bottom or are suspended in the water column. PAHs tend to be removed from the water column by volatilization to the atmosphere, binding to sediments or by being accumulated or sorbed onto aquatic biota.

Bioconcentration factors (BCFs) of PAHs in fish and crustaceans have frequently been reported to be in the range of 100-2000 (ATSDR, 1989), and exposure to PAHs has been linked to the development of tumors in fish. The ability of fish to metabolize PAHs may explain why benzo(a) pyrene is frequently not detected or found at only low levels in fish from environments heavily contaminated with PAHs. According to the Draft Toxicological Profile for PAHs (ATSDR, 1989), one study ranked the amount of benzo-(a)pyrene metabolism by aquatic organisms as follows: fish > shrimp > crustaceans > clams. Half lives for elimination of PAHs in fish ranged from 1.5 days to 9 days.

Toxicity

Numerous PAH compounds are distinct in their ability to produce tumors in skin and most epithelial tissues of practically all animal species tested. Certain carcinogenic PAHs are capable of passage across skin, lungs, and intestine, and can enter the rat fetus, for example, following intragastric or

intravenous administration to pregnant dams. Acute and chronic exposure to various carcinogenic PAHs have resulted in destruction of hematopoietic and lymphoid tissues, ovotoxicity, anitspermatogonic effects, adrenal necrosis, changes in intestinal and respiratory epithelia, and other effects. For the most part, however, tissue damage occurs at dose levels that would also be expected to induce carcinomas. Laboratory studies with mice have shown that many carcinogenic PAHs adversely affect the immune system, thus directly impacting an organism's general health; in general, the more carcinogenic the PAH, the greater (Eisler, 1987).

No studies were located regarding either deaths in animals following dermal exposure or neurological effects to PAHs in animals, although the skin is susceptible to PAH induced toxicity in animals. The developmental toxicity data in animals for PAHs are limited. Available animal studies exclusively discuss the reproductive effects of benzo(a)pyrene, adverse effects such as decreased fertility and total sterility in mice (F1 progeny of CD-1). Effects of hepatic injury have also been observed in animals. In one study, a simple injection of pyrene resulted in minimal swelling of the liver. Longer administration of PAHs has been reported to result in adverse hepatic effects in animals. Adverse hematological effects have also been observed in animals following exposure to PAHs. PAHs tend to exert their adverse effects on rapidly proliferating tissues, such as the bone marrow forming elements and the lymphatic system.

For avian wildlife, data are missing on PAH background concentrations and on acute and chronic toxicity. Studies with mallard embryos and PAHs applied to the egg surface showed toxic and adverse sublethal effects at concentrations between 0.036 and 0.18 μg PAH/kg whole egg (Eisler, 1987).

A growing literature exists on uptake, retention, and translocation of PAHs by aquatic plants and animals. Authorities generally agree that: most species of aquatic organisms studied to date rapidly accumulate PAHs from low concentrations in the ambient medium; uptake of PAHs is highly species specific, being higher in algae, molluscs, and other species which are incapable of metabolizing PAHs; bioconcentration factors tend to increase as the molecular weight of the PAH increases, with increasing octanol/water partition coefficient values, with time until approaching an apparent equilibrium level (sometimes within 24 hours), and with increases in dissolved organic matter in the medium, lipid content of the organism, and a variety of endogenous and exogenous factors (Eisler, 1987).

THALLIUM

Fate and Transport

Thallium is a nonvolatile heavy metal which is relatively stable in the environment. If released to the atmosphere, thallium may exist as an oxide, hydroxide, sulfate or as the sulfide Tl_2S. These thallium compounds are not volatile. It has been speculated that thallium sulfate and TlOH will partition into water vapor because they are soluble in water and thus, precipitation may remove these forms of thallium from the atmosphere. Thallium oxides are less soluble in water, and may be subject to only atmospheric dispersion and gravitational settling. The atmospheric half-life of suspended thallium particles is unknown. Thallium may partition from water to soils and sediments. Thallium may be bioconcentrated by organisms from water. It is also absorbed by plants from soil and thereby enters the terrestrial food chain. Little is known about the transformation and degradation of thallium in water or soil (ATSDR, 1992).

There are limited animal data on the effects of oral exposure to thallium. The lowest acute oral LD_{50}s reported ranged from 12 (guinea pig) to 29 (rat) mg/kg (as thallium acetate) and 5 (guinea pig) to 30 (dog and rabbit) mg/kg (as thallic oxide). Rats exposed for 15 weeks to diets containing thallium showed increased mortality at a dose of 4.5 mg/kg/day (as thallic oxide) and 2.3 mg/kg/day (as thallium acetate). Other subchronic and chronic studies using sublethal doses caused electrocardiographic changes in rabbits (lethal dose), hair loss in rats, degenerative changes in cranial and peripheral nerves in rats, and abnormalities in testicular morphology, function, or biochemistry in rats. Subchronic oral exposure also

caused dominant lethal mutations in rats. No studies were located regarding carcinogenic or immunological effects in animals following oral exposure to thallium (ATSDR, 1992).

TOLUENE

Fate and Transport

Toluene released to the soil will be lost by evaporation from near-surface soil and by leaching to the ground water. Toluene is expected to exhibit very high to moderate mobility in soil, depending on site specific characteristics of soil type, load, flow rate and other loss factors such as evaporation and biodegradation. Biodegradation occurs both in soil and ground water , but is apt to be slow, especially at high concentrations, which may be toxic to microorganisms. The presence of acclimated microbial populations may allow rapid biodegradation. It will not significantly hydrolyze in soil or water under normal environmental conditions. Toluene released to water will be lost by both volatilization to the atmosphere and biodegradation. The predominant process will depend on water temperature, mixing conditions, and the existence of acclimated microorganisms at the site. It will not significantly hydrolyze, directly photolyze, absorb to sediment, or bioconcentrate in aquatic organisms. Toluene released to the atmosphere will degrade by reaction with photochemically produced hydroxyl radicals or be washed out in rain. It will not be subject to direct photolysis. The half-life of toluene in soil ranges from 4 days to 22 days (Howard, 1990). Limited data indicate that toluene has a moderate tendency to bioaccumulate in the food chain. Toluene does have some tendency to accumulate in fatty tissues. (ATSDR, 1989)

There are limited animal data on the effects of oral exposure to toluene. The available oral exposure data focus on acute oral lethality studies. Reported acute oral LD_{50}s ranged from 5,580 mg/kg to 7,300 mg/kg for the adult rat. Age may play a role in the acute lethality of toluene. No studies were located regarding immunological, reproductive, genetic, or carcinogenic effects following acute oral exposure to toluene. Subchronic oral exposure effects included increased relative heart weights in rats exposed to toluene at 1250 mg/kg/day for 13 weeks and myocardial degeneration in mice exposed to 5000 mg/kg/day for 13 weeks. Various other subchronic studies (oral exposure for 13 weeks) reported increased liver and kidney weights in mice and rats, hemorrhages in the urinary bladder of rats, and increased relative brain weight in mice and brain necrosis in rats (ATSDR, 1989).

VANADIUM

Fate and Transport

The size distribution of vanadium-bearing particles in the atmosphere is altered during long-range transportation. Large particles like man-made ore-processing dust settle near their source, whereas smaller particles like those emitted from oil-fueled power plants have a longer residence time. In the course of biogeochemical movement between soil and water these particulates are adsorbed to hydroxides or associated with organic compounds and are deposited on the sea bed. The transport of vanadium in both water and soil is influenced by: pH; redox potential; and the presence of particulates. Some marine organisms, particularly the ascidians (sea squirts), bioconcentrate vanadium very efficiently, attaining concentrations approximately 10,000 times greater than the ambient sea water. According to the Draft Toxicological Profile for Vanadium (ATSDR 1990), upon the death of the organism, the body burden adds to the accumulation of vanadium in silt.

In general, marine plants and invertebrates contain higher levels of vanadium than terrestrial plants and animals. Furthermore, in the terrestrial environment, bioconcentration is more commonly observed amongst the lower plant phyla than in the higher, seed-producing phyla. The uptake of vanadium in the above-ground parts of many plants is low, although root concentrations have some correlation with levels in the soil. Certain legumes, such as Astralagus preussi, have been shown to be

vanadium accumulators. Also Amanita muscaria, a poisonous mushroom, has been demonstrated to contain levels up to 112 ppm. Vanadium is fairly mobile in neutral or alkaline soils, but its mobility decreases in acidic soils.

Toxicity

Animal health effects have been studied mostly on the rat, mouse and rabbit. The absorption of vanadium through the gastrointestinal tract of animals is low. Minor renal effects have been shown in rats, after oral exposure, and in rabbits after inhalation exposure. Minimal or no studies were located regarding neurological, immunological, or genotoxic effects in animals. Other studies have shown that long-term vanadium exposure has results in diminished weight gains and gross pathological changes in animals. Acute studies with rats showed the highest vanadium concentration to be located in the skeleton. High concentrations of vanadium over short periods of time caused rabbits to experience conjunctivitis and some fatty tissue degeneration of the liver. Studies in animals support the findings that vanadium primarily effects the respiratory system.

ZINC

Fate and Transport

Zinc can occur in both suspended and dissolved forms. Dissolved zinc may occur as the free (hydrated) zinc ion or as dissolved complexes and compounds with varying degrees of stability and toxicity. Suspended zinc may be dissolved following minor changes in water chemistry or may be sorbed to suspended matter. The predominant fate of zinc in aerobic aquatic systems is sorption of the divalent cation by hydrous iron and manganese oxides, clay minerals and organic material. Concentrations of zinc in suspended and bed sediments always exceed concentrations in ambient water. Zinc tends to be more readily sorbed at higher pH than lower pH and tends to be desorbed from sediments as salinity increases (Clement Associates, 1985).

Microcosm studies generally indicate that zinc is not biomagnified. Although biota seem to be a minor sink compared to sediments, this compound is actively bioaccumulated in aquatic systems. Zinc has been found to accumulate in freshwater animal tissues from 51 to 1,130 times the concentration present in the water. A 1981 study reported zinc BCF values of 1000 for both aquatic plants and fish. Steady-state bioconcentration factors for twelve saltwater species range from 3,692 to 23,820.

Toxicity

Acute toxicity values are available for 43 species of freshwater animals and data for eight species indicate that acute toxicity decreases as hardness increases. Additional data indicate that toxicity increases as temperature increases. Chronic values for two invertebrates ranges from 46.73 µg/l for *Daphnia magna* to >5,243 µg/l for the caddisfly, *Clistoronia magnificia*. Chronic values for seven fish species ranged from 36.41 µg/l for the flagfish, *Jordanella floridae*, to 854.7 µg/l for the brook trout, *Salvelinus fontinalis* (USEPA, 1986).

The sensitivity range of freshwater plants to zinc is greater than that for animals. Growth of the alga, *Selenastrum capricornutum*, was inhibited by 30 µg/l. On the other hand, with several other species of green algae, 4-day EC_{50}s exceeded 200,000 µg/l. Zinc was found to bioaccumulate in freshwater animal tissues from 51 to 1,130 times the concentration present in the water (USEPA, 1986).

REFERENCES:

Alloway, B.J. (ed.) 1993. Heavy Metals in Soils. Blackie Academic and Professional. Distributed by: John Wiley and Sons, Inc., Somerset, New Jersey.

Agency for Toxic Substances and Disease Registry. 1992. Toxicological Profile for Manganese. U.S. Public Health Service.

Agency for Toxic Substances and Disease Registry. 1992. Toxicological Profile for Thallium. U.S. Public Health Service.

Agency for Toxic Substances and Disease Registry. 1992. Toxicological Profile for Cobalt. U.S. Public Health Service.

Agency for Toxic Substances and Disease Registry. 1991. Toxicological Profile for Aluminum. U.S. Public Health Service.

Agency for Toxic Substances and Disease Registry. 1990. Toxicological Profile for Vanadium. U.S. Public Health Service.

Agency for Toxic Substances and Disease Registry. 1990. Toxicological Profile for Barium. U.S. Public Health Service.

Agency for Toxic Substances and Disease Registry. 1990. Toxicological Profile for Lead. U.S. Public Health Service.

Agency for Toxic Substances and Disease Registry. 1989. Toxicological Profile for Toluene. U.S. Public Health Service.

Agency for Toxic Substances and Disease Registry. 1989. Draft Toxicological Profile for PAHs. U.S. Public Health Service.

Agency for Toxic Substances and Disease Registry. 1989. Toxicological Profile for Zinc. U.S. Public Health Service.

Clement Associates, Inc. 1985. Chemical, Physical, and Biological Properties of Compounds Present at Hazardous Waste Sites. Final Report. Prepared for USEPA. Arlington, VA.

Eisler, R. 1988. Lead Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review. U.S. Fish Wildl. Serv. Biol. Rep. 85(1.14). 134 pp.

Eisler, R. 1987. Polycyclic Aromatic Hydrocarbon Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review. U.S. Fish Wildl. Serv. Biol. Rep. 85(1.11). 81 pp.

Eisler, R. 1986. Chromium Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review. U.S. Fish Wildl. Serv. Biol. Rep. 85(1.6). 60 pp.

Fawell, J.K. and S. Hunt. 1988. Environmental Toxicology: Organic Pollutants. Ellis Horwood Limited. Chichester, West Sussex, England.

Howard, P.H. 1990. Handbook of Environmental Fate and Exposure Data for Organic Chemicals. Volume II, Solvents. Lewis Publishers. Chelsea, Michigan.

Kabata-Pendias, A., and H. Pendias, Ph.D. 1984. Trace Elements in Soils and Plants. CRC Press, Inc. Boca Raton, FL.

Luckey, T.D. and B. Venugopal. 1977. Metal Toxicity in Mammals.1 - Physiologic and Chemical Basis for Metal Toxicity. Plenum Press, New York, NY.

U.S. Environmental Protection Agency. 1986. Quality Criteria for Water. Office of Water Regulations and Standards. Washington, D.C.

U.S. Environmental Protection Agency. 1979. Water-Related Environmental Fate of 129 Priority Pollutants. Volume II. Prepared by Versar Incorporated.

Appendix L
Wildlife Species of the Fort Story/Cape Henry Region

Remedial Investigation Report
FTA, LARC 60, and Auto Craft Sites
Fort Story, Virginia

SELECTED LIST OF WILDLIFE OF THE FORT STORY/CAPE HENRY REGION
(excluding fish and marine life)

Common Name	Scientific Name	Common Name	Scientific Name
Mammals			
Bobcat	*Lynx rufus*	Meadow-jumping Mouse	*Zapus hudsonius*
Common Mole*	*Condylura cristata*	Mink	*Mustela vison*
Cotton Mouse	*Peromyscus gossypinus*	Muskrat	*Ondata zibethicus*
E. Cottontail Rabbit*	*Sylvilagus floridanus*	Otter	*Lutra canadensis*
Evening Bat	*Nycticelus humeralis*	Raccoon*	*Procyon lotor*
Golden Mouse	*Peromyscus nuttalli*	Red Bat	*Lasiurus borealis*
Gray Fox	*Urocyon cinereoargenteus*	Red Fox	*Vulpes fluva*
Gray Squirrel*	*Sciurus carolinensis*	Red Squirrel	*Tamiasciurus hudsonicus*
Least Shrew	*Cayptositis parva*	Rice Rat	*Oryxomys palustris*
Lemming Mouse	*Synaptomys cooperi*	Short-tailed Shrew	*Blarina brevicauda*
Little Brown Bat	*Myotis lucifungus*	Silver-haired Bat	*Lasionycteris noctivagens*
Long-tailed Weasel	*Mustela frenata*	Southern Flying Squirrel	*Glaucomys volanus*
Marsh Rabbit	*Sylvilagus palustris*	Virginia Opossum	*Didelphis marsupialis*
Meadow Mouse	*Microtus pennsylvanicus*	White-footed Mouse*	*Peromyscus leucopus*
Birds			
Acadian Flycatcher	*Empidonax flaviventris*	Belted Kingfisher	*Megaceryle alcyon alcyon*
American Bittern	*Botaurus lentiginosus*	Black and White Warbler	*Mniotilta varia*
American Coot	*Fulica americana*	Black Duck	*Anas rubripes*
American Crow*	*Corvus brachyrhynchos*	Black Vulture	*Coragyps atratus*
American Kestrel	*Falco sparverius*	Black-bellied Plover	*Squatorola squatarola*
American Redstart	*Setophaga ruticilla*	Black-billed Cuckoo	*Coccyzus erythrophthalmus*
American Widgeon	*Mareca americana*	Black-crowned Night Heron	*Nycticorax nycticorax hoactile*
Baltimore Oriole	*Icterus galbula*	Black-throated Blue Warbler	*Dendroica caerulescens*
Barn Owl	*Tyto alba*	Black-throated Green Warbler*	*Dendroica virens*
Barn Swallow	*Hirundo rustica erythrogaster*	Blue Jay	*Cyanocitta cristata*
Bay-breasted Warbler	*Dendroica castanea*	Blue-gray Gnatcatcher*	*Polioptila caerulea*

Birds (continued)

Bobwhite*	*Colinus virginianus*
Boat-tailed Grackle*	*Cassidix mexicanus*
Bobolink	*Dolichonyx oryzivorus*
Broad-winged Hawk	*Buteo platypterus platypterus*
Brown Creeper	*Certhia familiaris*
Brown Thrasher	*Toxostoma rufum*
Brown-headed Nuthatch*	*Sitta pusilla*
Cape Warbler	*Dendroica tigrina*
Cardinal*	*Richmondena cardinalis*
Carolina Chickadee	*Parus carolinensis*
Carolina Wren*	*Thryothorus ludoviclianus*
virescens	
Catbird*	*Dumetella carolinensis*
Cedar Waxwing	*Bombycilla cedrorum*
faxoni	
Chimney Swift	*Dhoetura pelagica*
Chipping Sparrow	*Spizella passerina*
Chuck-wills-widow	*Caprimulgus caroliniensis*
Common Grackle*	*Quiscalus quiscula*
Common Loon	*Gavia immer*
Common Merganser	*Mergus merganser*
Common Nighthawk	*Chordeiles minor*
Common Tern	*Sterma hirundo hirundo*
Common Yellowthroat	*Geothlypis trichas*
Cooper's Hawk	*Accipiter cooperii*
Cowbird	*Molothrus ater ater*
Downy Woodpecker	*Dendrocopus pubenscens*
Eastern Bluebird*	*Sialis sialis*
Eastern Kingbird	*Tyrannus tyrannus*
Eastern Meadowlark	*Sturnella magna*
Eastern Phoebe	*Sayomis phoebe*
Eastern Wood Pewee	*Contopus virens*
Glouse Sparrow	*Passer domesticus*
European Starling*	*Sturnus vulgaris*
Fish Crow*	*Corvus ossifragus*

Flicker	*Colaptes auratus*
Gannet	*Morus bassanus*
Golden-crowned Kinglet*	*Regulus satrapa satrapa*
Goldfinch	*Spinus tristis*
Great Blue Heron	*Ardea herodias*
Great-crested Flycatcher*	*Myiarchus crinitus*
Great Egret	*Casmerodinus albus*
Great Horned Owl	*Bubo virginianus*
Greater Scaup	*Aythya valisineria*
Greater Yellowlegs*	*Tringa melanoleuca*
Green-backed Heron	*Butorides virescens*
Hairy Woodpecker	*Dendrocopus villosus*
Hermit Thrush	*Hylocichla guttata*
Herring Gull*	*Larus argentatus*
Hooded Merganser	*Lophodytes cucullatus*
Hooded Warbler	*Wilsonia citrina*
House Finch*	*Carpodacus mexicanus*
House Wren*	*Troglodytes aedon*
Indigo Bunting	*Passerina cyanea*
Kentucky Warbler	*Oporonis formosus*
Killdeer*	*Charadrius vociferus*
King rail	*Rallus elagans elegans*
Laughing Gull*	*Larus atricilla*
Least Tern	*Sterna albifrons*
Little Blue Heron	*Florida caerulea caerulea*
Loggerhead Shrike	*Lanius ludovicianus*
Louisiana Waterthrush	*Seiurus motacilla*
Magnolia Warbler	*Dendroica magnolia*
Mallard*	*Anas platyrhynchos*
Marsh Hawk	*Circus cyaneus*
Marsh Wren	*Troglodytes aedon*
Mourning Dove*	*Zenaidia macroura*
Myrtle Warbler	*Dendroica coronata*

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Birds (continued)

Orchard Oriole	*Icterus spurius*
Osprey*	*Pandion haliaetus carolinensis*
Ovenbird	*Seiurus aurocapillus*
Parula Warbler	*Parula americana*
Pied-billed Grebe	*Podilymbus podiceps podiceps*
Pileated Woodpecker*	*Hylatomus pileatus*
Pine Warbler	*Dendroica pinus*
Piping Plover	*Charadius melodus*
Prairie Warbler*	*Dendroica discolor*
Prothonotary Warbler*	*Protonotaria citrea*
Purple Finch	*Carpodacus purpureus*
Purple Martin	*Progne subis subis*
Red-winged Blackbird	*Agelaius phoeniceus*
Red-bellied Woodpecker	*Centurus carolinus*
Red-breasted Merganser	*Mergus serrator*
Red-breasted Nuthatch	*Sitta canadensis*
Red-eyed Vireo	*Vireo olivaceus*
Red-shouldered Hawk	*Buteo lineatus*
Red-tailed Hawk	*Buteo jamaicensis*
Redhead	*Aythya americana*
Ring-billed Gull*	*Larus delawarensis*
Robin*	*Turdus migratorius*
Ruby-crowned Kinglet	*Regulus calendula*
Ruby-throated Hummingbird	*Archilochus colubris*
Rufous-sided Towhee*	*Pipilo erythrophthalmus*
Scarlet Tanager	*Piranga olivacea*
Screech Owl	*Otus asio*
Sedge Wren	*Cistothorus platensis*
Semi-palmated Sandpiper	*Piranga oilvacea*
Sharp-shinned Hawk	*Accipiter striatus*
Slate-colored Junco	*Junco hyemalis*
Snowy Egret	*Leucophoyx thula*
Song Sparrow	*Melospiza melodia*
Spotted Sandpiper	*Actitis macularia*
Summer Tanager	*Piranga rubra*
Swamp Sparrow	*Melospiza georgia*
Tree Sparrow	*Spizella arborea*
Tree Swallow	*Iridoprocne bicolor*
Tufted Titmouse*	*Parus bicolor*
Turkey Vulture	*Cathartes aura*
White-breasted Nuthatch	*Sitta carolinensis*
White-eyed Vireo	*Vireo griseus*
White-throated Sparrow*	*Zonotrichia albicollis*
Wilson's Snipe	*Capella gallinago delicata*
Winter Wren	*Troglodytes troglodytes*
Wood Duck	*Axis sponsa*
Wood Thrush	*Hylocichla mustelina*
Yellow Warbler	*Dendroica petechia*
Yellow-bellied Sapsucker	*Sphyrapicus varius*
Yellow-billed Cuckoo	*Coccyzus americanus*
Yellow-breasted Chat	*Icteria virens*
Yellow-crowned Night Heron	*Nyctanassa violacea*
Yellow-throated Vireo	*Vireo Flavifrons*
Yellow-throated Warbler	*Dendroica dominica*

Reptiles and Amphibians

Bronze Frog	*Rana clamitans clamitans*
Carpenter Frog	*Rana virgatipes*
Common Snapping Turtle	*Chelydra serpertina*
Eastern Box Turtle	*Terrapene carolina carolina*
Eastern Cottonmouth	*Agkistrodon piscivorous*
Eastern Garter Snake	*Thamnophis sirtalis*

Reptiles and Amphibians (continued)

Eastern Gray Tree Frog	*Hyla chrysoscelis*
Eastern Kingsnake	*Lampropetis getulus*
Eastern Mud Salamander	*Pseudotriton montanus*
Eastern Mud Snake	*Farancia abacura*
Eastern Painted Turtle	*Chrysemys picta*
Eastern Ribbon Snake	*Thamnophis sauritus*
Green Treefrog	*Hyla cinerea*
Marbled Salamander	*Ambystoma opacum*
Northern Diamondback Terrapin	*Malaclemys terrapin*
Red-bellied Turtle*	*Chrysemys scripta rubriventer*
Red-bellied Water Snake	*Natrix erythrogaster*
Scarlet Snake	*Cemophora coccinea*
Slimy Salamander	*Plethodon glutinosus*
Southern Copperhead	*Agkistrodon contorix*
Southern Cricket Frog	*Acris gryllus*
Southern Dusty Salamander	*Desmognathus auriculatus*
Southern Water Snake	*Nerodia fascinata*
Yellow Spotted Turtle	*Clemmys guttata*

Note: * = Observed by Malcolm Pirnie during April 1996 field visits.

Sources: Horne Engineering and Environmental Services. *Draft Fort Story Integrated Natural Resources Management Plan*, June 28, 1995.

Field Surveys by Malcolm Pirnie, April 1996

Appendix M
ERA Exposure Calculations

Remedial Investigation Report
FTA, LARC 60, and Auto Craft Sites
Fort Story, Virginia

EXPOSURE CALCULATIONS FOR KILLDEER
FTA SITE, FORT STORY, VIRGINIA

Chemical (mg/kg)	Concentration in Sediment/ Surface Soil (mg/kg)	Concentration in Terrestrial Invertebrates (mg/kg)	Concentration in Vegetation (mg/kg)	Estimated Exposure from Soil/Sediment (mg/kg BW-day)	Estimated Exposure from Invertebrates (mg/kg BW-day)	Estimated Exposure from Vegetation (mg/kg BW-day)	Total Estimated Exposure (mg/kg BW-day)	Killdeer NOAEL (mg/kg BW-day)	Hazard Quotents (unitless)
Acetone	3.43E-02	3.43E-02	3.43E-02	4.40E-05	3.98E-04	4.41E-05	4.87E-04	NA	NA
Toluene	1.80E-01	1.80E-01	1.69E-01	2.31E-04	2.09E-03	2.18E-04	2.54E-03	NA	NA
Fluoranthene	6.50E-01	4.55E-01	7.93E-03	8.34E-04	5.29E-03	1.02E-05	6.13E-03	NA	NA
Pyrene	7.20E-01	5.04E-01	8.78E-03	9.24E-04	5.85E-03	1.13E-05	6.79E-03	NA	NA
Aluminum	7.60E+03	7.60E+03	3.04E+01	9.75E+00	8.83E+01	3.91E-02	9.81E+01	1.31E+02	7.52E-01
Barium	1.10E+02	1.10E+02	1.65E+01	1.41E-01	1.28E+00	2.12E-02	1.44E+00	2.28E+01	6.32E-02
Chromium	5.80E+00	5.80E-01	4.35E-02	7.44E-03	6.74E-03	5.60E-05	1.42E-02	2.39E+00	5.96E-03
Cobalt	2.60E+00	2.60E+00	7.80E-02	3.34E-03	3.02E-02	1.00E-04	3.36E-02	NA	NA
Copper	1.30E+01	3.12E+01	5.20E+00	1.67E-02	3.62E-01	6.69E-03	3.86E-01	71.8	5.37E-03
Iron	1.70E+04	1.70E+04	6.80E+01	2.18E+01	1.97E+02	8.75E-02	2.19E+02	NA	NA
Lead	2.10E+02	2.00E+02	9.45E+00	2.70E-01	2.32E+00	1.22E-02	2.60E+00	4.21E+00	6.17E-01
Manganese	4.20E+01	4.20E+01	1.05E+01	5.39E-02	4.88E-01	1.35E-02	5.55E-01	1.21E+03	4.60E-04
Thallium	1.40E+00	1.40E+00	5.60E-03	1.80E-03	1.63E-02	7.20E-06	1.81E-02	NA	NA
Vanadium	1.80E+01	1.80E+01	9.90E-02	2.31E-02	2.09E-01	1.27E-04	2.32E-01	2.66E+01	8.73E-03
Zinc	2.20E+01	1.25E+02	3.30E+01	2.82E-02	1.46E+00	4.25E-02	1.53E+00	7.00E+00	2.18E-01
	Cs	Ci = Cs x EUF	Cv = Cs X PUF	EEs=(CsxFSxIRxFR)/BW Cs = Conc. in sediment FS = 10% IR = 0.0123 kg/day FR = 0.145 x 0.66 FR = 0.096 BW = 0.092 kg	EEi=CixFRxNIRi Ci = Conc. in invertebrates FR = 0.096 NIRi = NIRf x 90% NIRf = 0.134 g/g-day	EEv = CvxFRvxNIRv Cv = Conc. in vegetation FR = 0.096 NIRv = NIRf X 10% NIRf = 0.134 g/g-day	EEt = EEs + EEi + EEv		HQ = EEt/NOAELr

WHITE FOOTED MOUSE EXPOSURE CALCULATIONS
FTA SITE, FORT STORY, VIRGINIA

Chemical	Concentration in Sediment/ Surface Soil (mg/kg)	Concentration in Terrestrial Invertebrates (mg/kg)	Concentration in Vegetation (mg/kg)	Estimated Exposure from Soil/Sediment (mg/kg BW-day)	Estimated Exposure from Invertebrates (mg/kg BW-day)	Estimated Exposure from Vegetation (mg/kg BW-day)	Total Estimated Exposure (mg/kg BW-day)	White-Footed Mouse NOAEL (mg/kg BW-day)	Hazard Quotents (unitless)
Acetone	3.43E-02	3.43E-02	3.43E-02	9.15E-05	3.98E-03	2.88E-03	6.95E-03	2.50E+01	2.79E-04
Toluene	1.80E-01	1.80E-01	1.69E-01	4.80E-04	2.09E-02	1.42E-02	3.56E-02	2.88E+01	1.24E-03
Fluoranthene	6.50E-01	4.55E-01	7.93E-03	1.73E-03	5.28E-02	6.66E-04	5.52E-02	1.11E+00	4.98E-02
Pyrene	7.20E-01	5.04E-01	8.78E-03	1.92E-03	5.85E-02	7.38E-04	6.11E-02	1.11E+00	5.52E-02
Aluminum	7.60E+03	7.60E+03	3.04E+01	2.03E+01	8.82E+02	2.55E+00	9.04E+02	2.12E+00	4.27E+02
Barium	1.10E+02	1.10E+02	1.65E+01	2.93E-01	1.28E+01	1.39E+00	1.44E+01	1.27E+01	1.13E+00
Chromium	5.80E+00	5.80E-01	4.35E-02	1.55E-02	6.73E-02	3.65E-03	8.64E-02	6.83E+03	1.26E-05
Cobalt	2.60E+00	2.60E+00	7.80E-02	6.93E-03	3.02E-01	6.55E-03	3.15E-01	NA	NA
Copper	1.30E+01	3.12E+01	5.20E+00	3.47E-02	3.62E+00	4.37E-01	4.09E+00	4.15E+01	9.86E-02
Iron	1.70E+04	1.70E+04	6.80E+01	4.53E+01	1.97E+03	5.71E+00	2.02E+03	NA	NA
Lead	2.10E+02	2.00E+02	9.45E+00	5.60E-01	2.31E+01	7.94E-01	2.45E+01	1.99E+01	1.23E+00
Manganese	4.20E+01	4.20E+01	1.05E+01	1.12E-01	4.87E+00	8.82E-01	5.87E+00	2.20E+02	2.67E-02
Thallium	1.40E+00	1.40E+00	5.60E-03	3.73E-03	1.62E-01	4.70E-04	1.67E-01	1.80E-02	9.26E+00
Vanadium	1.80E+01	1.80E+01	9.90E-02	4.80E-02	2.09E+00	8.32E-03	2.14E+00	5.20E-01	4.12E+00
Zinc	2.20E+01	1.25E+02	3.30E+01	5.87E-02	1.45E+01	2.77E+00	1.74E+01	3.99E+02	4.35E-02
	Cs	Ci = Cs x EUF	Cv = Cs x PUF	EEs=(CsxFSxIRxFR)/BW	EEi=CixFRxNIRi	EEv=CvxFRxNIRv	EEt = EEs + EEi + EEv		HQ = EEt/NOAELr
				Cs = Conc. in sediment FS = 2% IR = 0.003 kg/day FR = 1 BW = 0.0225 kg	Ci = Conc. in inverts. FR = 1 NIRi = NIRf x 58% NIRf = 0.20 g/g-day	Cv = Conc. in vege. FR = 1 NIRv = NIRf x 42% NIRf = 0.20 g/g-day			

GRAY FOX EXPOSURE CALCULATIONS
FTA SITE, FORT STORY, VIRGINIA

Chemical	Concentration in Sediment/ Surface Soil (mg/kg)	Concentration in Vegetation Consumed by Prey (mg/kg)	Concentration in Invertebrates Consumed by Prey (mg/kg)	Concentration in Prey (mg/kg)	Concentration in Vegetation Consumed by Fox (mg/kg)	Estimated Exposure from Surface Soil (mg/kg BW-day)	Estimated Exposure from Prey (mg/kg BW-day)
Acetone	3.43E-02	3.43E-02	3.43E-02	3.43E-02	2.20E-01	8.20E-07	4.59E-05
Toluene	1.80E-01	1.69E-01	1.80E-01	1.75E-01	1.69E-01	4.30E-06	2.34E-04
Fluoranthene	6.50E-01	7.80E-03	4.55E-01	2.31E-01	7.80E-03	1.55E-05	3.10E-04
Pyrene	7.20E-01	8.64E-03	5.04E-01	2.56E-01	8.64E-03	1.72E-05	3.43E-04
Aluminum	7.60E+03	3.04E+01	7.60E+03	3.82E+03	3.04E+01	1.82E-01	5.11E+00
Barium	1.10E+02	1.65E+01	1.10E+02	6.33E+01	1.65E+01	2.63E-03	8.47E-02
Chromium	5.80E+00	4.35E-02	5.80E-01	3.12E-01	4.35E-02	1.39E-04	4.17E-04
Cobalt	2.60E+00	7.80E-02	2.60E+00	1.34E+00	7.80E-02	6.21E-05	1.79E-03
Copper	1.30E+01	5.20E+00	3.12E+01	1.82E+01	5.20E+00	3.11E-04	2.44E-02
Iron	1.70E+04	6.80E+01	1.70E+04	8.53E+03	6.80E+01	4.06E-01	1.14E+01
Lead	2.10E+02	9.45E+00	2.00E+02	1.04E+02	9.45E+00	5.02E-03	1.40E-01
Manganese	4.20E+01	1.05E+01	4.20E+01	2.63E+01	1.05E+01	1.00E-03	3.52E-02
Thallium	1.40E+00	5.60E-03	1.40E+00	7.03E-01	5.60E-03	3.35E-05	9.41E-04
Vanadium	1.80E+01	9.90E-02	1.80E+01	9.05E+00	9.90E-02	4.30E-04	1.21E-02
Zinc	2.20E+01	3.30E+01	1.25E+02	7.92E+01	1.14E+02	5.26E-04	1.06E-01

Cs

Cv = Cs x PUF

Ci = Cs x EUF

Cp = Cv/2 + Ci/2

EEs=(CsxFSxIRxFR)/BW

Cs = Conc. in sediment
FS = 2.8%
IR = 0.24 kg/day
FR = area/HR
FR = 0.016
BW = 4.5 kg

EEp = Cp x FR x NIRp

Cp = Conc. in prey
FR = 0.016
(NIRp = NIRf x 93%)
NIRp = 0.0837

GRAY FOX EXPOSURE CALCULATIONS
FTA SITE, FORT STORY, VIRGINIA

Chemical	Estimated Exposure from Vegetation (mg/kg BW-day)	Estimated Exposure from Diet (mg/kg BW-day)	Total Estimated Exposure (mg/kg BW-day)	Gray Fox NOAEL (mg/kg BW-day)	Hazard Quotents (unitless)
Acetone	2.22E-05	6.81E-05	6.89E-05	4.27E+00	1.61E-05
Toluene	1.71E-05	2.51E-04	2.55E-04	4.97E+00	5.13E-05
Fluoranthene	7.86E-07	3.11E-04	3.26E-04	1.91E-01	1.71E-03
Pyrene	8.71E-07	3.44E-04	3.61E-04	1.91E-01	1.89E-03
Aluminum	3.06E-03	5.11E+00	5.29E+00	3.63E-01	1.46E+01
Barium	1.66E-03	8.64E-02	8.90E-02	2.18E+00	4.08E-02
Chromium	4.38E-06	4.22E-04	5.60E-04	1.17E+03	4.80E-07
Cobalt	7.86E-06	1.80E-03	1.86E-03	NA	NA
Copper	5.24E-04	2.49E-02	2.52E-02	7.09E+00	3.56E-03
Iron	6.85E-03	1.14E+01	1.18E+01	NA	NA
Lead	9.53E-04	1.41E-01	1.46E-01	3.44E+00	4.24E-02
Manganese	1.06E-03	3.62E-02	3.72E-02	3.76E+01	9.90E-04
Thallium	5.64E-07	9.42E-04	9.75E-04	3.20E-03	3.05E-01
Vanadium	9.98E-06	1.21E-02	1.26E-02	9.00E-02	1.40E-01
Zinc	1.15E-02	1.18E-01	1.18E-01	6.83E+01	1.73E-03

EEv=CvxFRxNIRv EEd = EEv + EEp EEt = EEs+EEd HQ = EEt/NOAELr

Cv = Conc. in vege.
FR = 0.016
(NIRv = NIRf x 7%)
NIRv = 0.0063 g/g-day

NORTHERN BOBWHITE EXPOSURE CALCULATIONS
LARC SITE, FORT STORY, VIRGINIA

Chemical (mg/kg)	Concentration in Sediment/ Surface Soil (mg/kg)	Concentration in Terrestrial Invertebrates (mg/kg)	Concentration in Vegetation (mg/kg)	Estimated Exposure from Soil/Sediment (mg/kg BW-day)	Estimated Exposure from Invertebrates (mg/kg BW-day)	Estimated Exposure from Vegetation (mg/kg BW-day)	Total Estimated Exposure (mg/kg BW-day)	Northern Bobwhite NOAEL (mg/kg BW-day)	Hazard Quotents (unitless)
Aluminum	6.50E+02	6.50E+02	2.60E+00	7.29E+00	7.15E+00	1.74E-01	1.46E+01	1.07E+02	1.37E-01
Barium	2.70E+00	2.70E+00	4.05E-01	3.03E-02	2.97E-02	2.71E-02	8.71E-02	1.87E+01	4.66E-03
Copper	4.10E+01	9.84E+01	1.64E+01	4.60E-01	1.08E+00	1.10E+00	2.64E+00	5.89E+01	4.49E-02
Iron	9.40E+02	9.40E+02	3.76E+00	1.05E+01	1.03E+01	2.52E-01	2.11E+01	NA	NA
Lead	1.20E+01	1.14E+01	5.40E-01	1.35E-01	1.25E-01	3.62E-02	2.96E-01	3.45E+00	8.58E-02
Manganese	6.90E+00	6.90E+00	1.73E+00	7.73E-02	7.59E-02	1.16E-01	2.69E-01	9.90E+02	2.71E-04
Vanadium	2.70E+00	2.70E+00	1.49E-02	3.03E-02	2.97E-02	9.95E-04	6.10E-02	2.18E+01	2.80E-03
Zinc	3.30E+01	1.88E+02	4.95E+01	3.70E-01	2.07E+00	3.32E+00	5.76E+00	5.74E+00	1.00E+00
		Ci = Cs x EUF	Cv = Cs X PUF	EEs=(CsxFSxIRxFR)/BW	EEi=CixFRxNIRi	EEv = CvxFRvxNIRv	EEt = EEs + EEi + EEv		HQ = EEt/NOAELr
				Cs = Conc. in sediment FS = 10.4% IR = 0.018 kg/day FR = 1 BW = 0.167 kg	Ci = Conc. in inverts. FR = 1 NIRi = NIRf x 86% NIRf = 0.078 g/g-day	Cv = Conc. in veg. FR = 1 NIRv = NIRf X 14% NIRf = 0.078 g/g-day			

WHITE-FOOTED MOUSE EXPOSURE CALCULATIONS
LARC SITE, FORT STORY, VIRGINIA

Chemical	Concentration in Sediment/ Surface Soil (mg/kg)	Concentration in Terrestrial Invertebrates (mg/kg)	Concentration in Vegetation (mg/kg)	Estimated Exposure from Soil/Sediment (mg/kg BW-day)	Estimated Exposure from Invertebrates (mg/kg BW-day)	Estimated Exposure from Vegetation (mg/kg BW-day)	Total Estimated Exposure (mg/kg BW-day)	White-Footed Mouse NOAEL (mg/kg BW-day)	Hazard Quotents (unitless)
Aluminum	6.50E+02	6.50E+02	2.60E+00	1.73E+00	7.54E+01	2.18E-01	7.74E+01	2.12E+00	3.65E+01
Barium	2.70E+00	2.70E+00	4.05E-01	7.20E-03	3.13E-01	3.40E-02	3.54E-01	1.27E+01	2.78E-02
Copper	4.10E+01	9.84E+01	1.64E+01	1.09E-01	1.14E+01	1.38E+00	1.29E+01	4.15E+01	3.11E-01
Iron	9.40E+02	9.40E+02	3.76E+00	2.51E+00	1.09E+02	3.16E-01	1.12E+02	NA	NA
Lead	1.20E+01	1.14E+01	5.40E-01	3.20E-02	1.32E+00	4.54E-02	1.40E+00	1.99E+01	7.02E-02
Manganese	6.90E+00	6.90E+00	1.73E+00	1.84E-02	8.00E-01	1.45E-01	9.64E-01	2.20E+02	4.39E-03
Vanadium	2.70E+00	2.70E+00	1.49E-02	7.20E-03	3.13E-01	1.25E-03	3.22E-01	5.20E-01	6.19E-01
Zinc	3.30E+01	1.88E+02	4.95E+01	8.80E-02	2.18E+01	4.16E+00	2.61E+01	3.99E+02	6.53E-02
	Cs	Ci = Cs x EUF	Cv = Cs x PUF	EEs=(CsxFSxIRxFR)/BW Cs = Conc. in sediment FS = 2% IR = 0.003 kg/day FR = 1 BW = 0.0225 kg	EEi=CixFRxNIRi Ci = Conc. in inverts. FR = 1 NIRi = NIRf x 58% NIRf = 0.20 g/g-day	EEv=CvxFRxNIRv Cv = Conc. in vege. FR = 1 NIRv = NIRf x 42% NIRf = 0.20 g/g-day	EEt = EEs + EEi + EEv		HQ = EEt/NOAELr

GRAY FOX EXPOSURE CALCULATIONS
LARC SITE, FORT STORY, VIRGINIA

Chemical	Concentration in Sediment/ Surface Soil (mg/kg)	Concentration in Vegetation Consumed by Prey (mg/kg)	Concentration in Invertebrates Consumed by Prey (mg/kg)	Concentration in Prey (mg/kg)	Concentration in Vegetation Consumed by Fox (mg/kg)	Estimated Exposure from Surface Soil (mg/kg BW-day)
Aluminum	6.50E+02	6.50E+02	2.60E+00	3.26E+02	6.50E+02	4.27E-02
Barium	2.70E+00	2.70E+00	4.05E-01	1.55E+00	2.70E+00	1.77E-04
Copper	4.10E+01	9.84E+01	1.64E+01	5.74E+01	9.84E+01	2.69E-03
Iron	9.40E+02	9.40E+02	3.76E+00	4.72E+02	9.40E+02	6.18E-02
Lead	1.20E+01	1.14E+01	5.40E-01	5.97E+00	1.14E+01	7.88E-04
Manganese	6.90E+00	6.90E+00	1.73E+00	4.31E+00	6.90E+00	4.53E-04
Vanadium	2.70E+00	2.70E+00	1.49E-02	1.36E+00	2.70E+00	1.77E-04
Zinc	3.30E+01	1.88E+02	4.95E+01	1.19E+02	1.88E+02	2.17E-03
	Cs	Cv = Cs x PUF	Ci = Cs x EUF	Cp = Cv/2 + Ci/2		EEs=(CsxFSxIRxFR)/BW Cs = Conc. in sediment FS = 2.8% IR = 0.24 kg/day FR = area/HR FR = 0.044 BW = 4.5 kg

GRAY FOX EXPOSURE CALCULATIONS
LARC SITE, FORT STORY, VIRGINIA

Chemical	Estimated Exposure from Prey (mg/kg BW-day)	Estimated Exposure from Vegetation (mg/kg BW-day)	Estimated Exposure from Diet (mg/kg BW-day)	Total Estimated Exposure (mg/kg BW-day)	Gray Fox NOAEL (mg/kg BW-day)	Hazard Quotents (unitless)
Aluminum	1.20E+00	1.80E-01	1.38E+00	1.42E+00	3.63E-01	3.92E+00
Barium	5.72E-03	7.48E-04	6.47E-03	6.64E-03	2.18E+00	3.05E-03
Copper	2.11E-01	2.73E-02	2.39E-01	2.41E-01	7.09E+00	3.40E-02
Iron	1.74E+00	2.61E-01	2.00E+00	2.06E+00	NA	NA
Lead	2.20E-02	3.16E-03	2.51E-02	2.59E-02	3.44E+00	7.54E-03
Manganese	1.59E-02	1.91E-03	1.78E-02	1.82E-02	3.76E+01	4.86E-04
Vanadium	5.00E-03	7.48E-04	5.75E-03	5.92E-03	9.00E-02	6.58E-02
Zinc	4.38E-01	5.21E-02	4.90E-01	4.92E-01	6.83E+01	7.20E-03

EEp = Cp x FR x NIRp

Cp = Conc. in prey
FR = 0.044
NIRp = NIRf x 93%
NIRp = 0.0837

EEv=CvxFRxNIRv

Cv = Conc. in vege.
FR = 0.044
NIRv = NIRf x 7%
NIRv = 0.0063 g/g-day

EEd = EEv + EEp

EEt = EEs+EEd

HQ = EEt/NOAELr

KILLDEER EXPOSURE CALCULATIONS - AUTO CRAFT SITE
FORT STORY, VIRGINIA

Chemical (mg/kg)	Concentration in Surface Soil (mg/kg)	Concentration in Terrestrial Invertebrates (mg/kg)	Concentration in Vegetation (mg/kg)	Estimated Exposure from Soil (mg/kg BW-day)	Estimated Exposure from Invertebrates (mg/kg BW-day)	Estimated Exposure from Vegetation (mg/kg BW-day)	Total Estimated Exposure (mg/kg BW-day)	Killdeer NOAEL (mg/kg BW-day)	Hazard Quotents (unitless)
Methyl ethyl ketone	3.75E-02	3.75E-02	3.75E-02	1.05E-05	9.53E-05	1.06E-05	1.16E-04	NA	NA
Acenaphthene	3.11E-01	2.18E-01	3.79E-03	8.73E-05	5.53E-04	1.07E-06	6.42E-04	NA	NA
Benz(a)anthracene	2.50E+00	1.75E+00	3.05E-02	7.02E-04	4.45E-03	8.58E-06	5.16E-03	NA	NA
Benzo(b)fluoranthene	4.10E+00	2.87E+00	5.00E-02	1.15E-03	7.29E-03	1.41E-05	8.46E-03	NA	NA
Benzo(k)fluoranthene	3.39E-01	2.37E-01	4.14E-03	9.52E-05	6.03E-04	1.16E-06	6.99E-04	NA	NA
Benzo(g,h,i)perylene	2.00E+00	1.40E+00	2.44E-02	5.62E-04	3.56E-03	6.87E-06	4.13E-03	NA	NA
Benzo(a)pyrene	3.40E+00	2.38E+00	4.15E-02	9.55E-04	6.05E-03	1.17E-05	7.01E-03	NA	NA
Butylbenzylphthalate	3.76E-01	2.63E-01	4.59E-03	1.06E-04	6.69E-04	1.29E-06	7.76E-04	NA	NA
Chrysene	2.00E+00	1.40E+00	2.44E-02	5.62E-04	3.56E-03	6.87E-06	4.13E-03	NA	NA
Fluoranthene	5.80E+00	4.06E+00	7.08E-02	1.63E-03	1.03E-02	1.99E-05	1.20E-02	NA	NA
Indeno(1,2,3-cd)pyrene	1.26E+00	8.82E-01	1.54E-02	3.54E-04	2.24E-03	4.33E-06	2.60E-03	NA	NA
Phenanthrene	1.02E+00	7.14E-01	1.24E-02	2.86E-04	1.81E-03	3.50E-06	2.10E-03	NA	NA
Pyrene	1.10E+01	7.70E+00	1.34E-01	3.09E-03	1.96E-02	3.78E-05	2.27E-02	NA	NA
Chromium	9.00E+00	9.00E-01	6.75E-02	2.53E-03	2.29E-03	1.90E-05	4.83E-03	2.39E+00	2.02E-03
Copper	1.80E+01	4.32E+01	7.20E+00	5.05E-03	1.10E-01	2.03E-03	1.17E-01	5.07E+01	2.30E-03
Iron	9.10E+03	9.10E+03	3.64E+01	2.55E+00	2.31E+01	1.02E-02	2.57E+01	NA	NA
Lead	9.50E+01	9.03E+01	4.28E+00	2.67E-02	2.29E-01	1.20E-03	2.57E-01	4.21E+00	6.11E-02
Nickel	4.80E+00	9.12E+00	2.88E+00	1.35E-03	2.32E-02	8.10E-04	2.53E-02	1.58E+02	1.60E-04
Zinc	6.40E+01	5.19E+04	9.60E+01	1.80E-02	1.32E+02	2.70E-02	1.32E+02	6.12E+00	2.15E+01

	Cs	Ci = Cs x EUF	Cv = Cs X PUF	EEs=(CsxFSxIRxFR)/BW	EEi=CixFRxNIRi	EEv = CvxFRvxNIRv	EEt = EEs + EEi + EEv	HQ = EEt/NOAELr
				Cs = Conc. in sediment FS = 10% IR = 0.0123 kg/day FR = 0.032 x 0.66 FR = 0.021 BW = 0.092 kg	Ci = Conc. in invertebrates FR = 0.021 NIRi = NIRf x 90% NIRf = 0.134 g/g-day	Cv = Conc. in vegetation FR = 0.021 NIRv = NIRf X 10% NIRf = 0.134 g/g-day		

WHITE FOOTED MOUSE EXPOSURE CALCULATIONS
AUTO CRAFT SITE, FORT STORY, VIRGINIA

Chemical	Concentration in Surface Soil (mg/kg)	Concentration in Terrestrial Invertebrates (mg/kg)	Concentration in Vegetation (mg/kg)	Estimated Exposure from Soil (mg/kg BW-day)	Estimated Exposure from Invertebrates (mg/kg BW-day)	Estimated Exposure from Vegetation (mg/kg BW-day)	Total Estimated Exposure (mg/kg BW-day)	White-Footed Mouse NOAEL (mg/kg BW-day)	Hazard Quotents (unitless)
Methyl ethyl ketone	3.75E-02	3.75E-02	3.75E-02	5.40E-05	2.35E-03	1.70E-03	4.10E-03	1.46E+01	2.81E-04
Acenaphthene	3.11E-01	2.18E-01	3.79E-03	4.48E-04	1.36E-02	1.72E-04	1.43E-02	1.11E+00	1.29E-02
Benz(a)anthracene	2.50E+00	1.75E+00	3.05E-02	3.60E-03	1.10E-01	1.38E-03	1.15E-01	1.11E+00	1.03E-01
Benzo(b)fluoranthene	4.10E+00	2.87E+00	5.00E-02	5.90E-03	1.80E-01	2.27E-03	1.88E-01	1.11E+00	1.70E-01
Benzo(k)fluoranthene	3.39E-01	2.37E-01	4.14E-03	4.88E-04	1.49E-02	1.88E-04	1.55E-02	1.11E+00	1.40E-02
Benzo(g,h,i)perylene	2.00E+00	1.40E+00	2.44E-02	2.88E-03	8.77E-02	1.11E-03	9.17E-02	1.11E+00	8.27E-02
Benzo(a)pyrene	3.40E+00	2.38E+00	4.15E-02	4.90E-03	1.49E-01	1.88E-03	1.56E-01	1.11E+00	1.41E-01
Butylbenzylphthalate	3.76E-01	2.63E-01	4.59E-03	5.41E-04	1.65E-02	2.08E-04	1.72E-02	1.11E+00	1.56E-02
Chrysene	2.00E+00	1.40E+00	2.44E-02	2.88E-03	8.77E-02	1.11E-03	9.17E-02	1.11E+00	8.27E-02
Fluoranthene	5.80E+00	4.06E+00	7.08E-02	8.35E-03	2.54E-01	3.21E-03	2.66E-01	1.11E+00	2.40E-01
Indeno(1,2,3-cd)pyrene	1.26E+00	8.82E-01	1.54E-02	1.81E-03	5.52E-02	6.97E-04	5.78E-02	1.11E+00	5.21E-02
Phenanthrene	1.02E+00	7.14E-01	1.24E-02	1.47E-03	4.47E-02	5.64E-04	4.68E-02	1.11E+00	4.22E-02
Pyrene	1.10E+01	7.70E+00	1.34E-01	1.58E-02	4.82E-01	6.09E-03	5.04E-01	1.11E+00	4.55E-01
Chromium	9.00E+00	9.00E-01	6.75E-02	1.30E-02	5.64E-02	3.06E-03	7.24E-02	6.83E+03	1.06E-05
Copper	1.80E+01	4.32E+01	7.20E+00	2.59E-02	2.71E+00	3.27E-01	3.06E+00	4.13E+01	7.41E-02
Iron	9.10E+03	9.10E+03	3.64E+01	1.31E+01	5.70E+02	1.65E+00	5.85E+02	NA	NA
Lead	9.50E+01	9.03E+01	4.28E+00	1.37E-01	5.65E+00	1.94E-01	5.98E+00	1.99E+01	3.00E-01
Nickel	4.80E+00	9.12E+00	2.88E+00	6.91E-03	5.71E-01	1.31E-01	7.09E-01	9.99E+01	7.10E-03
Zinc	6.40E+01	5.19E+04	9.60E+01	9.22E-02	3.25E+03	4.35E+00	3.25E+03	3.99E+02	8.16E+00
	Cs	Ci = Cs x EUF	Cv = Cs x PUF	EEs=(CsxFSxIRxFR)/BW	EEi=CixFRxNIRi	EEv=CvxFRxNIRv	EEt = EEs + EEi + EEv		HQ = EEt/NOAELr
				Cs = Conc. in sediment FS = 2% IR = 0.003 kg/day FR = 0.54 BW = 0.0225 kg	Ci = Conc. in invertebrates FR = 0.54 NIRi = NIRf x 58% NIRf = 0.20 g/g-day	Cv = Conc. in vege. FR = 0.54 NIRv = NIRf x 42% NIRf = 0.20 g/g-day			

GRAY FOX EXPOSURE CALCULATIONS - AUTO CRAFT SITE
FORT STORY, VIRGINIA

Chemical	Concentration in Surface Soil (mg/kg)	Concentration in Vegetation Consumed by Prey (mg/kg)	Concentration in Invertebrates Consumed by Prey (mg/kg)	Concentration in Prey (mg/kg)	Concentration in Vegetation Consumed by Fox (mg/kg)	Estimated Exposure from Surface Soil (mg/kg BW-day)	Estimated Exposure from Prey (mg/kg BW-day)
Methyl ethyl ketone	3.75E-02	3.75E-02	3.75E-02	3.75E-02	3.75E-02	1.68E-07	9.42E-06
Acenaphthene	3.11E-01	3.79E-03	2.18E-01	1.11E-01	3.79E-03	1.39E-06	2.78E-05
Benz(a)anthracene	2.50E+00	3.05E-02	1.75E+00	8.90E-01	3.05E-02	1.12E-05	2.24E-04
Benzo(b)fluoranthene	4.10E+00	5.00E-02	2.87E+00	1.46E+00	5.00E-02	1.84E-05	3.67E-04
Benzo(k)fluoranthene	3.39E-01	4.14E-03	2.37E-01	1.21E-01	4.14E-03	1.52E-06	3.03E-05
Benzo(g,h,i)perylene	2.00E+00	2.44E-02	1.40E+00	7.12E-01	2.44E-02	8.96E-06	1.79E-04
Benzo(a)pyrene	3.40E+00	4.15E-02	2.38E+00	1.21E+00	4.15E-02	1.52E-05	3.04E-04
Butylbenzylphthalate	3.76E-01	4.59E-03	2.63E-01	1.34E-01	4.59E-03	1.68E-06	3.36E-05
Chrysene	2.00E+00	2.44E-02	1.40E+00	7.12E-01	2.44E-02	8.96E-06	1.79E-04
Fluoranthene	5.80E+00	7.08E-02	4.06E+00	2.07E+00	7.08E-02	2.60E-05	5.19E-04
Indeno(1,2,3-cd)pyrene	1.26E+00	1.54E-02	8.82E-01	4.49E-01	1.54E-02	5.64E-06	1.13E-04
Phenanthrene	1.02E+00	1.24E-02	7.14E-01	3.63E-01	1.24E-02	4.57E-06	9.12E-05
Pyrene	1.10E+01	1.34E-01	7.70E+00	3.92E+00	1.34E-01	4.93E-05	9.84E-04
Chromium	9.00E+00	6.75E-02	9.00E-01	4.84E-01	6.75E-02	4.03E-05	1.21E-04
Copper	1.80E+01	7.20E+00	4.32E+01	2.52E+01	7.20E+00	8.06E-05	6.33E-03
Iron	9.10E+03	1.11E+02	9.10E+03	4.61E+03	1.11E+02	4.08E-02	1.16E+00
Lead	9.50E+01	1.16E+00	9.03E+01	4.57E+01	1.16E+00	4.26E-04	1.15E-02
Nickel	4.80E+00	2.88E+00	9.12E+00	6.00E+00	2.88E+00	2.15E-05	1.51E-03
Zinc	6.40E+01	7.81E-01	5.19E+04	2.59E+04	7.81E-01	2.87E-04	6.51E+00
	Cs	Cv = Cs x PUF	Ci = Cs x EUF	Cp = Cv/2 + Ci/2		EEs=(CsxFSxIRxFR)/BW	EEp = Cp x FR x NIRp
						Cs = Conc. in sediment	Cp = Conc. in prey
						FS = 2.8%	FR = 0.003
						IR = 0.24 kg/day	(NIRp = NIRf x 93%)
						FR = area/HR	NIRp = 0.0837
						FR = 0.003	
						BW = 4.5 kg	

GRAY FOX EXPOSURE CALCULATIONS - AUTO CRAFT SITE
FORT STORY, VIRGINIA

Chemical	Estimated Exposure from Vegetation (mg/kg BW-day)	Estimated Exposure from Diet (mg/kg BW-day)	Total Estimated Exposure (mg/kg BW-day)	Gray Fox NOAEL (mg/kg BW-day)	Hazard Quotents (unitless)
Methyl ethyl ketone	7.09E-07	1.01E-05	1.03E-05	2.50E+00	4.12E-06
Acenaphthene	7.17E-08	2.79E-05	2.93E-05	1.91E-01	1.53E-04
Benz(a)anthracene	5.76E-07	2.24E-04	2.35E-04	1.91E-01	1.23E-03
Benzo(b)fluoranthene	9.45E-07	3.68E-04	3.86E-04	1.91E-01	2.02E-03
Benzo(k)fluoranthene	7.82E-08	3.04E-05	3.19E-05	1.91E-01	1.67E-04
Benzo(g,h,i)perylene	4.61E-07	1.79E-04	1.88E-04	1.91E-01	9.86E-04
Benzo(a)pyrene	7.84E-07	3.05E-04	3.20E-04	1.91E-01	1.68E-03
Butylbenzylphthalate	8.67E-08	3.37E-05	3.54E-05	1.91E-01	1.85E-04
Chrysene	4.61E-07	1.79E-04	1.88E-04	1.91E-01	9.86E-04
Fluoranthene	1.34E-06	5.20E-04	5.46E-04	1.91E-01	2.86E-03
Indeno(1,2,3-cd)pyrene	2.91E-07	1.13E-04	1.19E-04	1.91E-01	6.21E-04
Phenanthrene	2.35E-07	9.14E-05	9.60E-05	1.91E-01	5.03E-04
Pyrene	2.54E-06	9.86E-04	1.04E-03	1.91E-01	5.42E-03
Chromium	1.28E-06	1.23E-04	1.63E-04	1.17E+03	1.40E-07
Copper	1.36E-04	6.46E-03	6.54E-03	7.13E+00	9.18E-04
Iron	2.10E-03	1.16E+00	1.20E+00	NA	NA
Lead	2.19E-05	1.15E-02	1.19E-02	3.44E+00	3.47E-03
Nickel	5.44E-05	1.56E-03	1.58E-03	1.71E+01	9.27E-05
Zinc	1.48E-05	6.51E+00	6.51E+00	6.89E+01	9.46E-02

EEv=CvxFRxNIRv EEd = EEv + EEp EEt = EEs+EEw+EEd HQ = EEt/NOAELr

Cv = Conc. in vege.
FR = 0.003
(NIRv = NIRf x 7%)
NIRv = 0.0063 g/g-day