



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION III  
ENVIRONMENTAL SCIENCE CENTER  
701 MAPES ROAD  
FORT MEADE, MARYLAND 20755-5350

DATE : December 24, 2008

SUBJECT: Region III Data QA Review

FROM : Khin-Cho Thaung *Caprale for KT*  
Region III ESAT RPO (3ES20)

TO : Ruth Scharr  
Regional Project Manager (3HS32)

Attached is the organic data validation report for the Former Mohr Orchard Arsenic site (Case #: 38015, SDG#: C0320) completed by the Region III Environmental Services Assistance Team (ESAT) contractor under the direction of Region III ESD.

If you have any questions regarding this review, please call me at (410) 305-2743.

Attachments

cc: Joshua Cope (TTEMI)

TO File #: 0014


TDF#: 11087

OFFICE OF ANALYTICAL SERVICES AND QUALITY ASSURANCE

Lockheed Martin Enterprise Solutions & Services  
ESAT Region 3  
US EPA Environmental Science Center  
701 Mapes Road Ft. Meade, MD 20755-530  
Telephone 410-305-3037 Facsimile 410-305-3597

**DATE:** December 18, 2008

**SUBJECT:** Level M2 Organic Data Validation for 38015  
SDG: C0320  
Site: Former Mohr Orchard Arsenic

**FROM:** Habteab Ghebreyesus   
Organic Data Reviewer

Mahboobeh Mecanic   
Senior Oversight Chemist

**TO:** Khin-Cho Thaung  
ESAT Region 3 Project Officer

### **OVERVIEW**

Case 38015, Sample Delivery Group (SDG) C0320, consisted of six (6) soil samples submitted to A4 Scientific, Inc. (A4) for pesticides analysis. The sample set included one (1) field duplicate pair. Samples were analyzed according to Contract Laboratory Program (CLP) Statement of Work (SOW) SOM01.2 through Routine Analytical Services (RAS) program.

### **SUMMARY**

Data were validated according to Innovative Approaches for Validation of Organic Data, Level M2. This level of review includes assessment of all Quality Assurance/Quality Control (QA/QC) data and review of chromatograms, but excludes review of raw data and sample spectra. Areas that may impact data usability are listed below.

### **MINOR PROBLEM**

- Positive results for pesticide compounds with percent differences (%Ds) greater than twenty-five percent (>25%) between the two (2) analytical columns were qualified "J" on the DSFs.

**NOTES**

- Pesticide samples listed below were re-analyzed at dilutions because the detected concentrations of one (1) or more compounds exceeded the linear calibration range in the initial analyses. The positive results for these compounds in these samples were reported from the dilution by the reviewer and annotated with a "+" on the DSFs

<u>Sample</u>	<u>Dilution Factor</u>	<u>Compounds</u>
C0320, C0321	100X	4,4'-DDE, Endrin, 4,4'-DDT
C0322	100X	Dieldrin, 4,4'-DDE, Endrin, 4,4'-DDT
C0323, C0325	100X	4,4'-DDE, 4,4'-DDT
C0324	100X	4,4'-DDE

- Compounds detected below Contract Required Quantitation Limits (CRQLs) were qualified "J" on DSFs.
- Non-spiked compounds were detected in the pesticide analysis of sample C0320 and the Matrix Spike/Matrix Spike Duplicate (MS/MSD) analyses of this sample. Results and precision estimates are as follows:

<u>Compound</u>	<u>Concentration ug/kg</u>			<u>%RSD</u>
	<u>C0320</u>	<u>MS</u>	<u>MSD</u>	
4, 4'-DDE	2000 E	1400 E	1900 E	18.2
4, 4'-DDD	80	83	110 J	18.2
Methoxychlor	580	520	830	25.6
Endrin ketone	110 J	100	150 J	22.1
Endrin aldehyde	ND	43 J	62 J	36.2*

%RSD = Percent Relative Standard Deviation

\* = Relative Percent Difference (RPD) instead of %RSD

ND = Not detected

- Based on sample screening, all samples were initially analyzed at a ten fold (10X) dilution for the pesticide fraction. The CRQLs are elevated in all samples due to this dilution.
- In the pesticide MS/MSD analyses of sample C0320 the RPD for dieldrin, endrin and 4,4'-DDT were outside the control limits on both columns. The recoveries of gamma-BHC (Lindane), endrin and 4,4'-DDT in MS analysis were outside control limits on both columns. Recoveries of dieldrin and endrin on column RTX-Pest and dieldrin, endrin and 4,4'-DDT on column RTX-Pest2 were outside the upper control limits in the MSD analysis. These outliers may be attributed to the high concentrations of these compounds in the parent sample. No data were qualified based on this QC outlier.
- Results for field duplicate pair C0320/C0321 were comparable for all compounds.

- Reported recoveries for pesticides in Laboratory Control Sample (LCS) analyses were within QC limits on both columns.

All data for Case 38015, SDG C0320, were reviewed in accordance with EPA Region 3 Innovative Approaches (Level M2) for Validation of Organic Data, June 1995.

### **ATTACHMENTS**

- 1) Appendix A Glossary of Data Qualifier Terms
- 2) Appendix B Data Summary Forms
- 3) Appendix C Chain-of-Custody Records
- 4) Appendix D Laboratory Case Narrative

DCN: 38015- C0320

## Appendix A

### Glossary of Data Qualifier Codes

## **GLOSSARY OF DATA QUALIFIER CODES (ORGANIC)**

### **CODES RELATED TO IDENTIFICATION**

(confidence concerning presence or absence of analytes):

U = Not detected. The associated number indicates approximate sample concentration necessary to be detected.

(NO CODE) = Confirmed identification.

B = Not detected substantially above the level reported in laboratory or field blanks.

R = Unreliable result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

N = Tentative identification. Consider present. Special methods may be needed to confirm its presence or absence in future sampling efforts.

### **CODES RELATED TO QUANTITATION**

(can be used for both positive results and sample quantitation limits):

J = Analyte Present. Reported value may not be accurate or precise.

K = Analyte present. Reported value may be biased high. Actual value is expected to be lower.

L = Analyte present. Reported value may be biased low. Actual value is expected to be higher.

UJ = Not detected, quantitation limit may be inaccurate or imprecise.

UL = Not detected, quantitation limit is probably higher.

### **OTHER CODES**

NJ = Qualitative identification questionable due to poor resolution. Presumptively present at approximate quantity.

Q = No analytical result.

## Appendix B

### Data Summary Forms

**DATA SUMMARY FORM: Pesticides**

Page 1 of 2

Case #: 38015

SDG : C0320

Number of Soil Samples : 6

Site :

FORMER MOHR ORCHARD ARSENIC

Number of Water Samples : 0

Lab. :

A4

Number of Sediment Samples : 0

Sample Number :		C0320		C0321		C0322		C0323		C0324	
Sampling Location : Prefix: (FMO-110308)		-DI-SS01		-DI-SS02		-DI-SS03		-DI-SS04		-DI-SS05	
Field QC:		Dup of C0321		Dup of C0320							
Matrix :		Soil		Soil		Soil		Soil		Soil	
Units :		ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg	
Date Sampled :		11/3/2008		11/3/2008		11/3/2008		11/3/2008		11/3/2008	
Time Sampled :		10:16		10:18		10:27		10:40		10:46	
%Moisture :		40.4		39		35.2		27.5		31.5	
Dilution Factor :		10.0/100		10.0/100		10.0/100		10.0/100		10.0/100	
Pesticide Compound	CRQL	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
alpha-BHC	1.7										
beta-BHC	1.7										
delta-BHC	1.7										
gamma-BHC (Lindane)	1.7										
Heptachlor	1.7										
Aldrin	1.7										
Heptachlor epoxide	1.7										
Endosulfan I	1.7										
Dieldrin	3.3	470		600		1500 +		440		260	J
4,4'-DDE	3.3	2500 +	J	2700 +		5000 +	J	2600 +	J	2200 +	
Endrin	3.3	2100 +		2200 +		3400 +		500	J	120	J
Endosulfan II	3.3										
4,4'-DDD	3.3	80		100		76	J	13	J		
Endosulfan sulfate	3.3										
4,4'-DDT	3.3	2100 +		2200 +		2100 +		940 +	J	690	
Methoxychlor	17	580		730	J	300		180	J	250	
Endrin ketone	3.3	110	J	150	J	120	J	85	J	40	J
Endrin aldehyde	3.3					190		110		74	J
alpha-Chlordane	1.7										
gamma-Chlordane	1.7										
Toxaphene	170										

CRQL = Contract Required Quantitation Limit

SEE NARRATIVE FOR CODE DEFINITIONS

To calculate sample quantitation limits:  $(CRQL * Dilution Factor) / [(100 - \%Moisture) / 100]$

Revised 09/99

+ = Results reported from dilution



Case #: 38015

SDG : C0320

Site :

FORMER MOHR ORCHARD ARSENIC

Lab. :

A4

Sample Number :		C0325									
Sampling Location : Prefix: (FMO-110308)		-DI-SS06									
Matrix :		Soil									
Units :		ug/Kg									
Date Sampled :		11/3/2008									
Time Sampled :		10:56									
%Moisture :		26.3									
Dilution Factor :		10.0/100									
Pesticide Compound	CRQL	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
alpha-BHC	1.7										
beta-BHC	1.7										
delta-BHC	1.7										
gamma-BHC (Lindane)	1.7										
Heptachlor	1.7										
Aldrin	1.7										
Heptachlor epoxide	1.7										
Endosulfan I	1.7										
Dieldrin	3.3	490									
4,4'-DDE	3.3	4900 +									
Endrin	3.3	470	J								
Endosulfan II	3.3										
4,4'-DDD	3.3	30	J								
Endosulfan sulfate	3.3										
4,4'-DDT	3.3	1500 +									
Methoxychlor	17	470									
Endrin ketone	3.3	86	J								
Endrin aldehyde	3.3	100									
alpha-Chlordane	1.7										
gamma-Chlordane	1.7										
Toxaphene	170										

CRQL = Contract Required Quantitation Limit

SEE NARRATIVE FOR CODE DEFINITIONS

To calculate sample quantitation limits:  $(CRQL * Dilution Factor) / [(100 - \%Moisture) / 100]$ 

Revised 09/99

+ = Results reported from dilution

## Appendix C

### Chain-of-Custody Records

# U.S. EPA Region III Analytical Request Form

Revision 10.06

ASQAB USE ONLY	
RAS#	CT4408
DAS#	Analytical TAT
NSF#	3521

38015

Date: 10/14/2008 & 10/26/2008		Site Activity: Removal <u>Investigation</u>	
Site Name: Former Mohr Orchard Arsenic		Street Address: Orefield, Pennsylvania	
City: North Whitehall Township	State: PA	Latitude: 40.64622° N	Longitude: 75.60078° W
Program: Superfund	Acct. #: 2009 T03 N 302DC6CA3LGRS00	CERCLIS #: -- PAN000306624	
Site ID:	Spill ID: A3LG	Operable Unit:	
Site Specific QA Plan Submitted: <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes		Date Approved:	
EPA Project Leader: Ruth Scharr	Phone#: 215-814-3191	Cell Phone #: -	
Request Preparer: JOSHUA COPE	Phone#: 610-364-2130	Cell Phone #: 215-768-8114,	
Site Leader: ERIK ARMISTEAD	Phone#: 610-364-2151	Cell Phone #: 267 446 2837	
Contractor: Tetra Tech EM Inc		EPA CO/PO: Lorrie Murray/Karen Wodarczyk	
#Samples 5	Matrix: soil	Parameter: TCL Pesticides	Method: SOM01.2
#Samples	Matrix:	Parameter:	Method:
#Samples	Matrix:	Parameter:	Method:
#Samples	Matrix:	Parameter:	Method:
#Samples	Matrix:	Parameter:	Method:
#Samples	Matrix:	Parameter:	Method:
#Samples	Matrix:	Parameter:	Method:
Ship Date From: 11/4/2008		Ship Date To: 11/6/2008	Inorg. Validation Level
Unvalidated Data Requested: <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes		If Yes, TAT Needed: <input type="checkbox"/> 14days <input type="checkbox"/> 7days <input type="checkbox"/> 48hrs <input type="checkbox"/> 24hrs <input type="checkbox"/> Other (Specify)	
Validated Data Package Due: <input type="checkbox"/> 42 days <input type="checkbox"/> 30 days <input type="checkbox"/> 21days <input type="checkbox"/> 14 days <input checked="" type="checkbox"/> Other (Specify) 50 Days		3375 21/29	
Electronic Data Deliverables Required: <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes (EDDs will be provided in Region 3 EDD Format)			
Special Instructions: Detection Limits attached. When EPA receives data package from the lab, please forward Form 1s from Lab to the OSC.			



**USEPA Contract Laboratory Program**  
**Organic Traffic Report & Chain of Custody Record**

Case No: 38015  
DAS No:

R

Region: Project Code: Account Code: CERCLUS ID: Spill ID: Site Name/State: Project Leader: Action: Sampling Co:	3 CT4408 PAN000306624 ALG Former Mohr Orchard - Pesticides/PA Erik Armistead Removal Investigation At NPL Sites Tetra Tech EM Inc.	Date Shipped: 11/3/2008 Carrier Name: FedEx Airbill: 857499852945 Shipped to: A4 Scientific 1544 Sawdust Road, Suite 505 The Woodlands TX 77380 (281) 292-5277	Chain of Custody Record Relinquished By Received By (Date / Time) (Date / Time)	Sampler Signature: Received By (Date / Time)
---	---	---	---	--

ORGANIC SAMPLE No.	MATRIX/ SAMPLER	CONC/ TYPE	ANALYSIS/ TURNAROUND	PRESERVATIVE/ Bottles	TAG No./	STATION LOCATION	SAMPLE COLLECT DATE/TIME	INORGANIC SAMPLE No.	QC Type
C0320	Soil (0"-12")/ Erik Armistead	M/C	CLP PEST (21)	1097 (Ice Only) (1)	FMO-110308-DI-SS01	S: 11/3/2008	10:16		
C0321	Soil (0"-12")/ Erik Armistead	M/C	CLP PEST (21)	1098 (Ice Only) (1)	FMO-110308-DI-SS02	S: 11/3/2008	10:18		Field Duplicate C0320
C0322	Soil (0"-12")/ Erik Armistead	M/C	CLP PEST (21)	1099 (Ice Only) (1)	FMO-110308-DI-SS03	S: 11/3/2008	10:27		See Pen to Armistead
C0323	Soil (0"-12")/ Erik Armistead	M/C	CLP PEST (21)	1100 (Ice Only) (1)	FMO-110308-DI-SS04	S: 11/3/2008	10:40		
C0324	Soil (0"-12")/ Erik Armistead	M/C	CLP PEST (21)	1101 (Ice Only) (1)	FMO-110308-DI-SS05	S: 11/3/2008	10:46		
C0325	Soil (0"-12")/ Erik Armistead	M/C	CLP PEST (21)	1102 (Ice Only) (1)	FMO-110308-DI-SS06	S: 11/3/2008	10:56		

Shipment for Case Complete? Y	Sample(s) to be used for laboratory QC:	Additional Sampler Signature(s):	Chain of Custody Seal Number:
Analysis Key: CLP PEST = CLP TCL Pesticide	Concentration: L = Low, M = Low/Medium, H = High	Type/Designate: Composite = C, Grab = G	Shipment Iced? _____

TR Number: 3-375524367-110308-0001

PR provides preliminary results. Requests for preliminary results will increase analytical costs.

Send Copy to: Sample Management Office, Attn: Heather Bauer, CSC, 15000 Conference Center Dr., Chantilly, VA 20151-3819; Phone 703/818-4200; Fax 703/818-4602

REGION COPY

**jschulze@a4scientific.com**

---

**From:** "Walsh, Colin" <cwalsh20@fedcsc.com>  
**To:** "jessica schulze" <JSchulze@a4scientific.com>  
**Cc:** "sri" <shreedhar@a4scientific.com>; "Laxmi" <Laxmi@a4scientific.com>; "pakanati" <pakanati@a4scientific.com>; <slizys.dan@epa.gov>; <Harris.Carroll@epamail.epa.gov>; <thaung.khin-cho@epa.gov>; <kwedar.john@epa.gov>  
**Sent:** Thursday, November 06, 2008 7:16 AM  
**Attach:** 38015.pdf  
**Subject:** Region 03 | Case 38015 | Lab A4 | SDG C0320 | Issue Insufficient/inappropriate designation of laboratory QC | FINAL

Jessica,

\*\*\*Summary Start\*\*\*

Issue: Laboratory QC is not designated on the TR/COC for the PEST soil samples; however, the Scheduling Notification Form lists that laboratory QC is required. The laboratory would like to select sample C0320 (SDG C0320) as laboratory QC.

Resolution: In accordance with previous direction from Region 3, the laboratory will select a sample for laboratory QC as long as the sample is not a PE, blank, or rinsate sample. The laboratory will note the issue in the Case/SDG Narrative, notify the SMO coordinator of the sample selected for laboratory QC, and proceed with the analysis of the samples.

SMO will note that the laboratory selected sample C0320 (SDG C0320) as laboratory QC.

\*\*\*Summary End\*\*\*

Please let me know if you have any further questions or problems.

Thanks,

Colin

---

**Colin G. Walsh**  
**Environmental Coordinator - Region 3**  
**CSC**

15000 Conference Center Drive, Chantilly, VA 20151  
 Civil Division | (p) 703-818-4544 | (f) 703-818-4602 | [cwalsh20@fedcsc.com](mailto:cwalsh20@fedcsc.com) | [www.csc.com](http://www.csc.com)

---

**From:** jschulze@a4scientific.com [mailto:jschulze@a4scientific.com]  
**Sent:** Wednesday, November 05, 2008 7:12 PM  
**To:** Walsh, Colin  
**Cc:** sri; Laxmi; pakanati  
**Subject:** CASE/SDG 38015/C0320

Colin,

Lab received soil samples on 11/5/2008.

Issue: Per Scheduling Lab QC is required. Per TR/COC no sample was designated. Lab suggest sample C0320.

Please let me know if you have any questions.

Thanks.

Jessica Schulze  
 A4 Scientific Inc.  
 1544 Sawdust Rd. Suite 505  
 The Woodlands, Texas 77380  
 (281) 292-5277

000000417

11/14/2008

## Appendix D

### Laboratory Case Narrative

Contract #: EPW05036	Case #: 38015	SDG #: C0320
----------------------	---------------	--------------

SDG NARRATIVE

SAMPLE RECEIPT & LOGIN

The following samples were received on the dates listed against them. The samples were logged in for analysis as listed.

<u>Client Sample</u>	<u>Lab Sample</u>	<u>Matrix</u>	<u>#Cont.</u>	<u>Received</u>	<u>Analysis</u>	<u>Comments</u>
C0320	0009698-01	Soil	1	11/05/08 10:00	SOM01.2 PEST	SDG FIRST SX-MS/MSD
C0321	0009698-02	Soil	1	11/05/08 10:00	SOM01.2 PEST	
C0322	0009698-03	Soil	1	11/05/08 10:00	SOM01.2 PEST	
C0323	0009698-04	Soil	1	11/05/08 10:00	SOM01.2 PEST	
C0324	0009698-05	Soil	1	11/05/08 10:00	SOM01.2 PEST	
C0325	0009698-06	Soil	1	11/05/08 10:00	SOM01.2 PEST	SDG FINAL SX

The cooler temperatures are listed against the coolers.

<u>DATE RECEIVED</u>	<u>COOLER NO.</u>	<u>Temp (in °C)</u>
11/05/2008	1	3

**Issue:** Laboratory QC is not designated on the TR/COC for the PEST soil samples; however, the Scheduling Notification Form lists that laboratory QC is required. The laboratory would like to select sample C0320 (SDG C0320) as laboratory QC.

**Resolution:** Per Region 3, the laboratory selected a sample for laboratory QC that was not a PE, blank, or rinsate sample. The laboratory notified the SMO coordinator of the sample selected for laboratory QC, and proceed with the analysis of the samples.

SMO has noted that the laboratory selected sample C0320 as laboratory QC.

Directive (email) is enclosed. No other discrepancies or issues were noted during sample receipt and login.

PESTICIDES

1) Extractions

Soil samples were extracted by sonication method followed by GPC and Florisil cleanup. No problems were encountered during extraction.

2) Analysis

Samples were analyzed using instrument C-6890.

A4 SCIENTIFIC, INC.  
1544 Sawdust Road, Suite 505 • The Woodlands, TX 77380 • Phone (281) 292-5277

Contract #: EPW05036	Case #: 38015	SDG #: C0320
----------------------	---------------	--------------

Instrument C-6890 consisted of a dual inlet, dual ECD Agilent 6890 GC/ECD instrument with the following two columns manufactured by Restek. A 1µL injection was used on each column.

Column 1= RTX-PEST: Cat # 11140, 30m long, 0.53mm ID, 0.5µm film thickness (Instrument ID: C-6890A).  
Column 2= RTX-PEST2: Cat # 111340, 30m long, 0.53mm ID, 0.42µm film thickness (Instrument ID: C-6890B).

The following samples were run a dilution, listed against them to get all the compounds within the range.

EPA SAMPLE ID	DILUTION
C0320	100
C0321	100
C0322	100
C0323	100
C0324	100
C0325	100

Manual integrations were performed for the following samples for the compounds listed against them.

COMPOUND	EPA SAMPLE ID (Inst=C-6890A)	EPA SAMPLE ID (Inst=C-6890A)
4, 4'-DDE	C0322DL	
Beta-BHC	PEMEH, PEMEI	
Decachlorobiphenyl	RESCEH, TOXAPH1EH, INDB1EH, INDA3EM, PEMEN, INDA3EP, PIBLKEO	PEMEH, INDA1EH, INDB1EH, INDA2EH, INDA3EM, PEMEN, PIBLKEO, PIBLKEO
Endrin		PLCSHV
Endrin Aldehyde	PEMEI, PEMEN	C0322, C0323, C0323DL, C0324, C0324DL, C0325, C0325DL, PEMEI, PEMEN
Endrin Ketone	PEMEI	PEMEI, PEMEL, PEMEN
Methoxychlor	C0320, C0320DL, C0321, C0321DL, C0322, C0322DL, C0323, C0323DL, C0324, C0324DL, C0325, C0325DL, C0320MS, C0320MSD	C0320, C0320DL, C0321, C0321DL, C0322, C0322DL, C0323, C0323DL, C0324, C0324DL, C0325, C0325DL, C0320MS, C0320MSD

These manual integrations were necessary because the software failed to accurately integrate the entire peak. In all the above instances, the quantitation reports are flagged with "m". A hard copy printout of the manual integration, the scan ranges, and initials of the analyst or manager is included in the data package.

The following equations were used for calculation of the sample results from raw instrument output data:

**Pesticides:**

**Soil/Sediment:**

$$\text{Concentration } \mu\text{g/Kg (Dry weight basis)} = \frac{(A_x)(V_t)(D_f)(GPC)}{(CF)(V_i)(W_s)(D)}$$

A<sub>x</sub> = Area of the peak for the compound to be measured.

CF = Mean Calibration factor from the initial calibration standard (area/ng).

V<sub>t</sub> = Volume of concentrated extract in microliters (µL).

V<sub>i</sub> = Volume of extract injected in microliters (µL). (If a single injection is made onto two columns, use ½ the volume in the syringe as the volume injected onto each column).



A4 SCIENTIFIC, INC.  
1544 Sawdust Road, Suite 505 • The Woodlands, TX 77380 • Phone (281) 292-5277

Contract #: EPW05036	Case #: 38015	SDG #: C0320
----------------------	---------------	--------------

$W_s$  = Weight of sample extracted (g).

$D_f$  = Dilution Factor.

$D$  = % dry weight or  $\frac{100 - \% \text{moisture}}{100}$

$GPC = \frac{V_{in}}{V_{out}}$  = GPC Factor. (If no GPC is performed,  $GPC=1$ ).

$V_{in}$  = Volume of extract loaded onto GPC column.

$V_{out}$  = Volume of extract collected after the GPC cleanup.

I certify that this Sample Data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy Sample Data Package and in the electronic data deliverable has been authorized by the laboratory Manager or Manager's designee, as verified by the following signature.

SN (Production Supervisor)  
Signature and Title

11/19/08  
Date of Signature