LOG OF BORING

CENTRAL ILLINOIS DRILLING COMPANY
1909 OAKWOOD AVE.
BLOOMINGTON, ILLINOIS 61701
(309) 662-5968

CONTRACTED WITH CARUS CHEMICAL CO. BORING NO. 6A
PROJECT NAME MONITORING WELL CONTRACT NO.
LOCATION PER PLAN 10' N OF PREVIOUS WELL
DATUM HAMMER WT. 140# HAMMER DROP 30" HOLE DIA. 8"
SURFACE ELEV. CORE DIA. CASING
DATE STARTED 4-22-83 COMPLETED 4-22-83 DRILLING METHOD HSA

ELEV.	DESCRIPTION	STRATA DEPTH	DEPTH SCALE	SAMPLES BLOWS FT.	NO.	TYPE	RECOV.	QP	NOTES
		0.0	50						
	Br. silty clay, cinders, debris dry moist		5 10						
		14.4	15						
	Red clay, wood, gray clay, rock fragments very moist		20	5-5-10	1	ss	14"		WATER 4-22-83 DD 21.0 11:15am BAR 32.0 2:00pm AAR---------- DWL Rubble at 6.4-7.1 MONITORING WELL SLOTTED PIPE SCRE 31.0-16.0 2" PIPE 16.0-2.5' stick up GRAVEL 31.0-15.5' SAND 15.5'-14.5' BENTONITE PELLETS 14.5'-12.4' BACKFILLED CUTTIN 12.4'-2.0' GROUT 2.0'-surfac
			25						
		31.0	30						
	END OF BORING 31.0'		35						

FEB 03 '93 10:46 CARUS ENGINEERING P.1

TO: Scott Newman

COMPANY: GeoSyntec

FROM: Jim Miller

Carus Chemical
1500 Eight Street
LaSalle, IL 61301

DATE: 2-3-93

FAX #: 815-224-6816 - Manufacturing
815-224-6805 - South Lab
815-224-6841 - North Lab
815-224-6835 - Engineering

Number of pages (including this cover): 7. If there are any problems with this transmission, please call 815-223-1500.

Comments: Sorry I did not get samples of material.

Hope these logs & map will help. Ravine is evidently E-W from green bldg & well that you installed is in it.

Jim.

The information contained in this facsimile message is privileged and/or confidential information intended only for the use of the individual or entity named above. If the reader of this message is not the intended recipient, or the employee or agent responsible to deliver it to the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited.

If you have received this communication in error, please notify us immediately by telephone, and return the original message to us at the above address via the U.S. Postal Service. Thank You.

FEB 03 '93 10:47 CARUS ENGINEERING P.2

PATRICK ENGINEERING INC.

BORING NUMBER B-1-93 SHEET 1 OF 2
CLIENT Chemstress Consultant Co.
PROJECT & NO. Carus Chemical Co. - 1800x1
LOCATION See boring location plan.
LOGGED BY JFB
GROUND ELEVATION

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL ◻ ---○--- △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
	0.0		Misc. debris @ surface dark brown, and gray brown, and fine Black to c-f sand, some silty clay, little c-f gravel, cinders, brick present, loose to medium dense GM	AU-1 0.0-1.0			NL.10.
	1.0			SS-2 1.0-3.0 19"R	5 4 4 3	N=8	
	2.0		- Cinder Fill - very				
	3.0		moist to saturated				
	4.0			SS-3 3.5-5.5 10"R	4 3 4 3	N=7	
	5.0						
	6.0						
	7.0		- Cinder FILL -	SS-4 6.0-8.0 5"R	1 1 1		
	8.0						
	9.0			SS-5 8.5-10.0 13"R	1 8 7		
	10.0						
	11.0			SS-6 13.0 11.0-13.0 4"R	2 1 1		
	12.0						
	13.0						
	14.0			SS-7 13.5-15.0 6"R	2 4 1		
	15.0						
	16.0		End of Boring @ 15.5'	SS-8 16.0-18.0 6"R	2 2 2 2		
	17.0						
	18.0						
	19.0			SS-9 18.5-20.5 10"R	2 4 4 3		
	20.0						

DRILLING CONTRACTOR Patrick Drilling
DRILLING METHOD 3-1/4" I.D. HSA
DRILLING EQUIPMENT CME-45
DRILLING STARTED 2-2-93 ENDED 2-2-93

REMARKS Borehole was immediately backfilled with cuttings.

WATER LEVEL (ft.)
▽ 12.5 during drilling.
▼ caved to 7' immediately after drilling
▼

FEB 03 '93 10:47 CARUS ENGINEERING P.3

12.5 x 30

PATRICK ENGINEERING INC.

BORING NUMBER B-1-93 SHEET 2 OF 2
CLIENT Chemstress Consultant Co.
PROJECT & NO. Carus Chemical Co. - 1800x1
LOCATION See boring location plan.
LOGGED BY SFB
GROUND ELEVATION

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL 10 20 30 40 50 / Unconfined Compressive Strength (TSF) * 1 2 3 4 5	NOTES & TEST RESULTS
2	0.0		Black, dark brown, and dark red c-f sand, some silty clay, little c-f gravel, loose to medium dense, moist to saturated - Cinder Fill -	SS-1 24/18			
2	1.0			SS-2 10 2 1.0-2.5 0	4		
2	2.0				4		
2	3.0				8		
2	4.0				3		
2	5.0			SS-3 11 25.0-27.5 19"R	6		
2	6.0				11		
2	7.0			SS-4 C.C. 7.5	3		
2	8.0		End of Boring at 27.5'		5		
2	9.0			SS-5 8.5-10.0			
3	0.0						
	11.0						
	12.0			SS-6 11.0-12.5	6		
	13.0						
	14.0			SS-7 13.5-15.0	7		
	15.0						
	16.0		End of Boring at 15.0'				
	17.0						
	18.0						
	19.0						
	20.0						

DRILLING CONTRACTOR Patrick Drilling
DRILLING METHOD 3-1/4" I.D. HSA
DRILLING EQUIPMENT CME-45
DRILLING STARTED 2-2-93 ENDED 2-2-93

REMARKS Borehole was immediately backfilled with cuttings.

WATER LEVEL (ft.)

PATRICK ENGINEERING INC.

BORING NUMBER B-2-93 SHEET 1 OF 1
CLIENT Chemstress Consultant Co.
PROJECT & NO. Carus Chemical Co. - 1800 x 1
LOCATION See boring location plan.

LOGGED BY JFB
GROUND ELEVATION

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY (IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) ✳ (1 2 3 4 5)	NOTES & TEST RESULTS
	0.0		Gray c-f gravel, some c-f sand, little silt (3" thick), GM	AU-1 0.0-1.0			
	1.0		- FILL -	SS-2 1.0-3.0 21"R	13 16 4 4		
	2.0		Black, dark brown, and red c-f sand, some silty clay, some c-f gravel, moist				
	3.0						
	4.0		- Cinder Fill -	SS-3 3.5-5.5 5"R	1 2 3 2		
	5.0						
	6.0						
	7.0			SS-4 6.0-8.0 8"R	1 1 1 1		
	8.0						
	9.0		Reddish brown silty clay from 8.8' to 9.1'.	SS-5 8.5-10.0 7"R	5 3 4		
	10.0						
	11.0						
	11.4			SS-6A,B 11.0-11.9 11"R	5 75/5"		
	12.0		Gray clayey silt, little c-f sand, extremely dense, low plasticity, moist ML				
	12.7						
	13.0		Reddish brown silty clay, little c-f sand, trace of gravel, very stiff, low plasticity, wet CL				
	13.9			SS-7A,B 13.5-15.0 16"R	4 10 21		$q_u = 2.5^*$ (SS-7A)
	14.0		Gray and brown silty clay, little c-f sand, hard, low plasticity, moist CL				$q_u = 4.5^*$ (SS-7B)
	15.0						
	16.0		End of Boring at 15.0'.				
	17.0						
	18.0						
	19.0						
	20.0						

DRILLING CONTRACTOR Patrick Drilling
DRILLING METHOD 3-1/4" I.D. HSA
DRILLING EQUIPMENT CME-45
DRILLING STARTED 2-2-93 ENDED 2-2-93

REMARKS Borehole was immediately backfilled with cuttings.

WATER LEVEL (ft.)
None during or immediately after drilling

FEB 03 '93 10:48 CARUS ENGINEERING P.5

PATRICK ENGINEERING INC.

BORING NUMBER B-3-93 SHEET 1 OF 1
CLIENT Chemstress Consultant Co.
PROJECT & NO. Carus Chemical Co. - 1800x4
LOCATION See boring location plan.
LOGGED BY JFB
GROUND ELEVATION

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □---○---△ LL (10 20 30 40 50) / Unconfined Compressive Strength (TSF) * (1 2 3 4 5)	NOTES & TEST RESULTS
	0.0		Dark Brown and black, silty clay, and some cinders, trace roots, very stiff to stiff, medium plasticity, wet CL - Cinder FILL -	AU-1 0.0-1.0			
	1.0	1		SS-2 1.0-3.0 19"R	5 9 5 9	*	$q_u = 3.0$*
	2.0						
	3.0						
	4.0			SS-3 3.5-5.5 16"R	2 3 4 4	*	$q_u = 1.5$*
	5.0						
	6.0	54					
	7.0		Black, brown, and dark red, c-f sand, some c-f gravel, little silty clay, moist - Cinder FILL -	SS-4 6.0-7.0 7"R	3 3 2 1		
	8.0						
	9.0			SS-5 8.5-10.0 6"R	6 3 5		
	10.0						
	11.0						
	11.3			SS-6A,B 11.0-12.5 13"R	3 5 8	*	$q_u = 2.5$*
	12.0		Gray, brown, and slightly dark red, silty clay, a little c-f sand, little c-f gravel, very stiff, medium plasticity wet CL				
	13.0						
	14.0			SS-7 13.5-15.0 4"R	5 10 9		
	15.0						
	16.0		End of Boring at 15.0'.				
	17.0						
	18.0						
	19.0						
	20.0						

DRILLING CONTRACTOR Patrick Drilling
DRILLING METHOD 3-1/4" I.D. HSA
DRILLING EQUIPMENT CME-45
DRILLING STARTED 2-2-93 ENDED 2-2-93

REMARKS Borehole was immediately backfilled with cuttings.

WATER LEVEL (ft.)
▼ None during or immediately after drilling.

FEB 03 '93 10:49 CARUS ENGINEERING P.6

PATRICK ENGINEERING INC.

BORING NUMBER B-4-93 SHEET 1 OF 1
CLIENT Chemstress Consultant Co.
PROJECT & NO. Carus Chemical Co. - 1800x4
LOCATION See boring location plan.

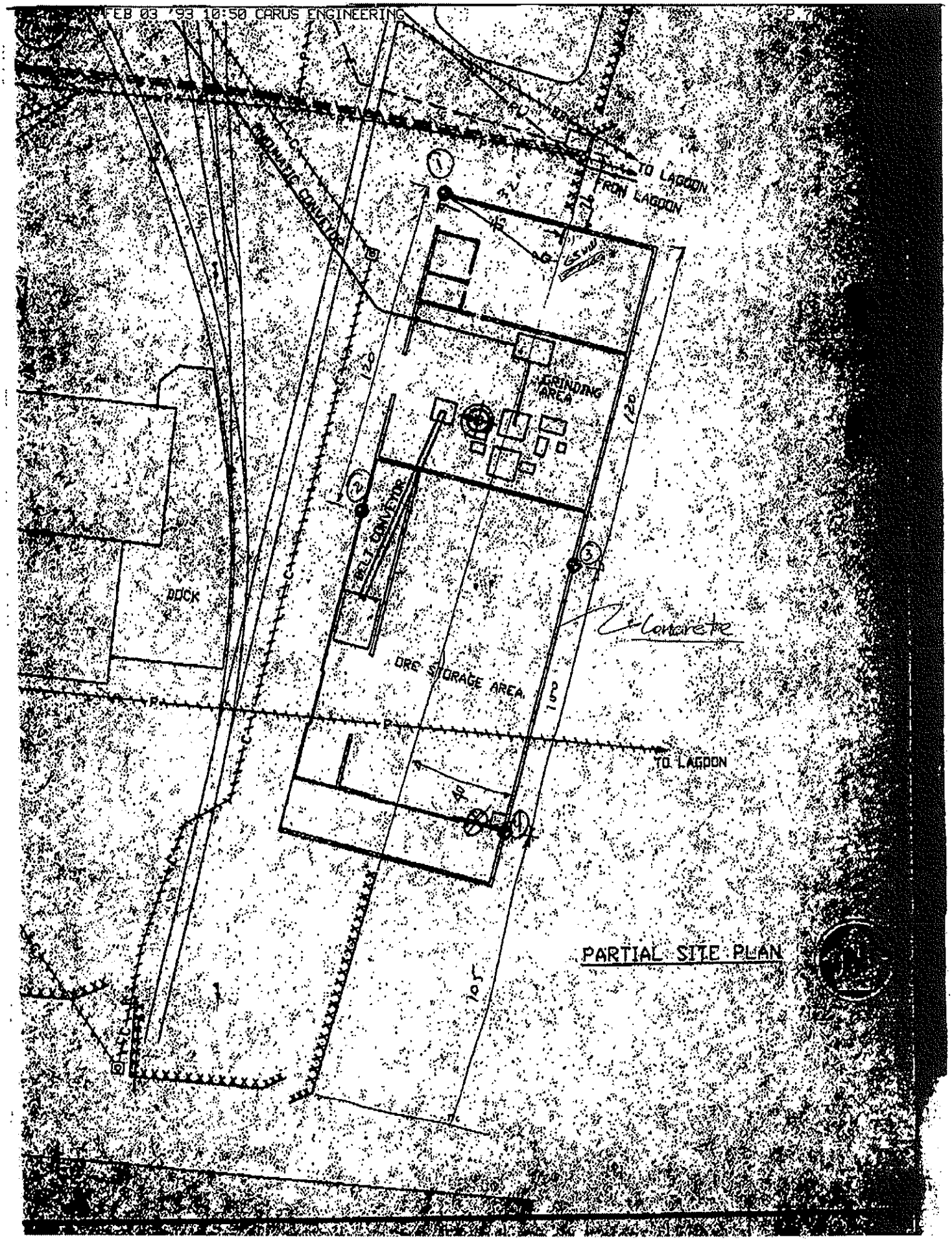
LOGGED BY SFB
GROUND ELEVATION

ELEVATION	DEPTH (FT)	STRATA	SOIL/ROCK DESCRIPTION	SAMPLE TYPE & NO. DEPTH (FT) RECOVERY(IN)	BLOW COUNTS	Water Content PL □ - - - ○ - - - △ LL (10 20 30 40 50) Unconfined Compressive Strength (TSF) * (1 2 3 4 5)	NOTES & TEST RESULTS
	0.0		Dark brown, blackish and dark red silty clay, some c-f sand, little c-f gravel, trace roots, to some, medium plasticity, wet - Cinder Fill - very stiff.	AU-1 0.0-1.0			
	1.0			SS-2 1.0-3.0 23"R	3 6 4 4		q_u = 3.0*
	2.0						
	3.0						
	4.0	4.4		SS-3A,B 3.5-5.5 20"R	3 4 4 5		q_u = 2.8* (SS-3A)
	5.0		Gray clayey silt, little c-f sand, medium dense, low plasticity, moist ML				
	6.0			A/B			
	7.0	7.1	Dark Brown to reddish brown silty clay, little c-f sand, trace roots, trace f gravel, very stiff low pl. med. plas. wet CL	SS-4 6.0-7.5 17"R	3 3 8 12		q_u = 2.5* (SS-4A)
	8.0						
	9.0		and brown to silty clay	SS-5 8.5-10.0 15"R	23 35 59		
	10.0		Gray clayey silt, little c-f sand, medium dense to extremely dense, low plasticity, moist ML-CL				
	11.0			SS-6 11.0-12.5 10"R	8 16 14		
	12.0		2" thick silty clay layer at 11.5', q_u = 3.5*				
	13.0						
	14.0			SS-7 13.5-15.0 13"R	7 15 12		q_u = 3.8*
	15.0		Some iron staining present in sample SS-7.				
	16.0		End of Boring at 15.0'.				
	17.0						
	18.0						
	19.0						
	20.0						

DRILLING CONTRACTOR Patrick Drilling
DRILLING METHOD 3-1/4" I.D. HSA
DRILLING EQUIPMENT CME-45
DRILLING STARTED 2-2-93 ENDED 2-2-93

REMARKS Borehole was immediately backfilled with cuttings.

WATER LEVEL (ft.)
▽ None during or immediately after drilling


FEB 03 '93 10:50 CARUS ENGINEERING
P. 7
TO LAGDON
FROM LAGOON
GRINDING AREA
BELT CONVEYOR
DOCK
ORE STORAGE AREA
TO LAGOON
Concrete
PARTIAL SITE PLAN

GEOSYNTEC CONSULTANTS
1200 S. Federal Hwy., Suite 204
Boynton Beach, Florida

GS FORM: SL1 3/91 2/91

BORING RECORD

BORING	BH-1	SHEET	1 OF 1
START DATE	5 OCT 92	ELEVATION	580.5 FT
FINISH DATE	5 OCT 92	DATUM	
PROJECT	LIMITED SITE INVESTIGATION		
LOCATION	CARUS CHEMICAL COMPANY		
NUMBER	2083		

LAYER DEPTH AND ELEVN. (FT)	MATERIAL DESCRIPTION	SYMBOLIC LOG	DEPTH AND ELEVN. (FT)	SAMPLES: NUMBER	SYMBOL	REC (%) OR REC & RQD (%)	SPT VALUES: BLOWS PER 6"	SPT VALUES: N	COMMENTS
0.5 580.0	**WELL GRADED GRAVEL BASE COARSE** (GW) Light grey compacted road base		0 580.5	1S1 1S2					
	CLAY (CL) Dark brown medium plasticity, moist clay with some gravel								
			5 575.5	1S3		40	1 2 2 2	4	
6.5 574.0	**GLACIAL TILL (ML)** Grey glacial till, trace sand, dry, stiff								
7.0 573.5	BOREHOLE TERMINATED AT 7 FT								

SAMPLE VALUES
GRAPHIC SYMBOLS
● SPT N-Value
☒ Core Recovery %
▲ Core RQD %
⊗ Moisture Content %
W_P W_L Atterberg Limits
20 40 60 80

CONTRACTOR	LAYNE WESTERN	NORTHING	10701.0
DRILLER	MOORE/MILES	EASTING	10193.0
DRILL RIG	ACKER TRUCK-MOUNTED	ANGLE	Vertical
DIA/METHOD	8" CFA	BEARING	—
LOGGER	NEWMAN REVIEWER	PRINTED	10 NOV 92

REMARKS: Arbitrary Northing/Easting of 10000,10000 taken at property corner of Union and 7th Streets. Elevation taken from Chamlin & Associates Map 3B-1 and USGS 7.5-minute Quad Topo Map (41089-C1-LaSalle).

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS.

GEOSYNTEC CONSULTANTS
1200 S. Federal Hwy., Suite 204
Boynton Beach, Florida

GS FORM: SL1 3/91 2/91

BORING RECORD

BORING **BH-2** SHEET **1 OF 1**
START DATE 5 OCT 92 ELEVATION 580.4 FT
FINISH DATE 5 OCT 92 DATUM
PROJECT LIMITED SITE INVESTIGATION
LOCATION CARUS CHEMICAL COMPANY
NUMBER 2083

LAYER DEPTH AND ELEVN. (FT)	MATERIAL DESCRIPTION	SYMBOLIC LOG	DEPTH AND ELEVN. (FT)	SAMPLES NUMBER	SAMPLES SYMBOL	SAMPLES REC (%) OR REC & RQD (%)	SPT VALUES BLOWS PER 6"	SPT VALUES N	COMMENTS
0.6 579.8	**WELL GRADED GRAVEL BASE COARSE** (GW) Light grey, compacted road base		0 580.4	2S1					
	CLAY (CL) Dark reddish brown, medium plasticity, moist, trace gravel			2S2					
4.7 575.7	**GLACIAL TILL (ML)** Grey, stiff, dry with trace sand		5 575.4	2S3					
5.0 575.4	BOREHOLE TERMINATED AT 5 FT								

SAMPLE VALUES
GRAPHIC SYMBOLS
● SPT N-Value
⊠ Core Recovery %
▲ Core RQD %
⊗ Moisture Content %
W_p W_l Atterberg Limits
20 40 60 80

CONTRACTOR layne western
DRILLER MOORE/MILES
DRILL RIG ACKER
DIA/METHOD 8" CFA
LOGGER NEWMAMREVIEWER

NORTHING 10633.0
EASTING 10205.5
ANGLE Vertical
BEARING ——
PRINTED 10 NOV 92

REMARKS: Arbtrary Northing/Easting of 10000/10000 taken at property corner of Union and 7th Streets. Elevation taken from Chamlin & Assocciates map 3B-1 and USGS 7.5-minute Quad Topo map (41089-C1-LaSalle).

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS.

GEOSYNTEC CONSULTANTS
1200 S. Federal Hwy., Suite 204
Boynton Beach, Florida

GS FORM: SL1 3/91 2/91

BORING RECORD

BORING **BH-3** SHEET 1 OF 1
START DATE 5 OCT 92 ELEVATION 573.0 FT
FINISH DATE 5 OCT 92 DATUM
PROJECT LIMITED SITE INVESTIGATION
LOCATION CARUS CHEMICAL COMPANY
NUMBER 2083

LAYER DEPTH AND ELEVN. (FT)	MATERIAL DESCRIPTION	SYMBOLIC LOG	DEPTH AND ELEVN. (FT)	SAMPLES NUMBER	SAMPLES SYMBOL	SAMPLES REC (%) OR REC & RQD (%)	SAMPLES SPT VALUES BLOWS PER 6"	SAMPLES SPT VALUES N	COMMENTS
0.5 572.5	**GRAVEL BASE COARSE (GW)** Well graded, light grey, compacted road base **CLAY (CL)** Dark Brown, moist, some gravel, trace sand		573.0 0	3S1 3S2					
5.0 568.0	**CINDER** Black, off-spec material from furnace operations		568.0 5	3S3		60	2 3 3 3	6	
7.0 566.0	**SLAG** Red, slag off-spec material			3S4		45	2 3 3 4	6	
9.0 564.0	**CINDER** Black off spec material from furnace operations		563.0 10	3S5		40	1 3 2 3	5	
				3S6		45	1 1 2 1	3	
				3S7		10	1 1 1 1	2	
			558.0 15	3S8		50	1 2 3 3	5	
16.8 556.2	**GLACIAL TILL (ML)** Grey, dense, wet								
17.0 556.0	BORING TERMINATED AT 17 FT.								

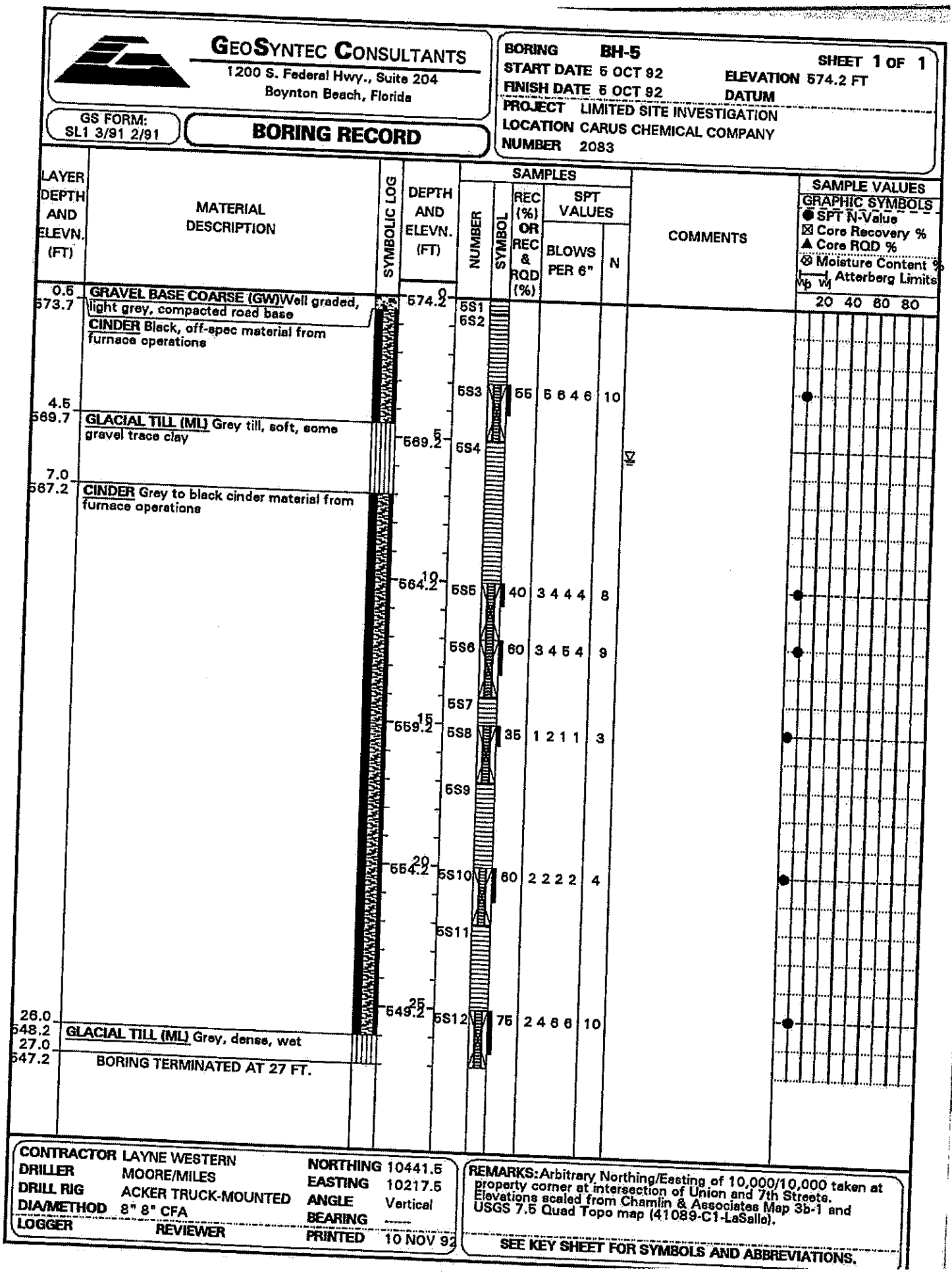
SAMPLE VALUES
GRAPHIC SYMBOLS
● SPT N-Value
☒ Core Recovery %
▲ Core RQD %
⊗ Moisture Content %
Atterberg Limits W_p W_l
20 40 60 80

CONTRACTOR LAYNE WESTERN
DRILLER MOORE/MILES
DRILL RIG ACKER TRUCK-MOUNTED
DIA/METHOD 8" 8" CFA
LOGGER REVIEWER

NORTHING 10481.0
EASTING 10327.0
ANGLE Vertical
BEARING ---
PRINTED 10 NOV 92

REMARKS: Arbitrary Northing/Easting of 10,000/10,000 taken at property corner at intersection of Union and 7th Streets. Elevation taken from Chamlin & Associates Map 3B-1 and USGS 7.5-minute Quad Topo map (41089-C1-LaSalle).

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS.


GEOSYNTEC CONSULTANTS
1200 S. Federal Hwy., Suite 204
Boynton Beach, Florida
GS FORM: SL1 3/91 2/91
BORING RECORD
BORING BH-5
SHEET 1 OF 1
START DATE 5 OCT 92
ELEVATION 574.2 FT
FINISH DATE 5 OCT 92
DATUM
PROJECT LIMITED SITE INVESTIGATION
LOCATION CARUS CHEMICAL COMPANY
NUMBER 2083
LAYER DEPTH AND ELEVN. (FT)
MATERIAL DESCRIPTION
SYMBOLIC LOG
DEPTH AND ELEVN. (FT)
SAMPLES
NUMBER
SYMBOL
REC (%) OR REC & RQD (%)
SPT VALUES
BLOWS PER 6"
N
COMMENTS
SAMPLE VALUES
GRAPHIC SYMBOLS
SPT N-Value
Core Recovery %
Core RQD %
Moisture Content %
Atterberg Limits
20 40 60 80
0.5 573.7 GRAVEL BASE COARSE (GW)Well graded, light grey, compacted road base
CINDER Black, off-spec material from furnace operations
4.5 569.7 GLACIAL TILL (ML) Grey till, soft, some gravel trace clay
7.0 567.2 CINDER Grey to black cinder material from furnace operations
26.0 548.2 GLACIAL TILL (ML) Grey, dense, wet
27.0 547.2 BORING TERMINATED AT 27 FT.
0 574.2
5 569.2
10 564.2
15 559.2
20 554.2
25 549.2
6S1
6S2
6S3 55 5 6 4 6 10
6S4
6S5 40 3 4 4 4 8
6S6 60 3 4 5 4 9
6S7
6S8 35 1 2 1 1 3
6S9
6S10 60 2 2 2 2 4
6S11
6S12 75 2 4 6 6 10
CONTRACTOR LAYNE WESTERN
DRILLER MOORE/MILES
DRILL RIG ACKER TRUCK-MOUNTED
DIA/METHOD 8" 8" CFA
LOGGER REVIEWER
NORTHING 10441.5
EASTING 10217.5
ANGLE Vertical
BEARING ----
PRINTED 10 NOV 92
REMARKS: Arbitrary Northing/Easting of 10,000/10,000 taken at property corner at intersection of Union and 7th Streets. Elevations scaled from Chamlin & Associates Map 3b-1 and USGS 7.5 Quad Topo map (41089-C1-LaSalle).
SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS.

GEOSYNTEC CONSULTANTS
1200 S. Federal Hwy., Suite 204
Boynton Beach, Florida

GS FORM: SL1 3/91 2/91

BORING RECORD

BORING **BH-6** SHEET 1 OF 1
START DATE 5 OCT 92 ELEVATION 574.2 FT
FINISH DATE 5 OCT 92 DATUM
PROJECT LIMITED SITE INVESTIGATION
LOCATION CARUS CHEMICAL COMPANY
NUMBER 2083

LAYER DEPTH AND ELEVN. (FT)	MATERIAL DESCRIPTION	SYMBOLIC LOG	DEPTH AND ELEVN. (FT)	SAMPLES NUMBER	SAMPLES SYMBOL	SAMPLES REC (%) OR REC & RQD (%)	SPT VALUES BLOWS PER 6"	SPT VALUES N	COMMENTS
0.3 573.9	**GRAVEL BASE COARSE (GW)** Well graded, light grey, compacted road base		0 574.2	6S1					
	CINDER Black cinder off spec material from furnace operations			6S2					
3.5 570.7	**CLAYEY SILT (ML)** Light Brown, slightly moist			6S3					
5.0 569.2	**SILTY GRAVEL (GM)** brown to grey, slightly moist		5 569.2	6S4					
7.0 567.2	**GLACIAL TILL (ML)** Grey, dense, wet			6S5					
8.0 566.2	BORING TERMINATED AT 8 FT.								

SAMPLE VALUES
GRAPHIC SYMBOLS
● SPT N-Value
☒ Core Recovery %
▲ Core RQD %
⊗ Moisture Content %
w_p w_l Atterberg Limits
20 40 60 80

CONTRACTOR LAYNE WESTERN
DRILLER MOORE/MILES
DRILL RIG ACKER TRUCK-MOUNTED
DIA/METHOD 8" 8" CFA
LOGGER REVIEWER

NORTHING 10747.9
EASTING 10414.0
ANGLE Vertical
BEARING
PRINTED 10 NOV 92

REMARKS: Arbitrary Northing/Easting of 10000/10000 taken at property corner at intersection of Union and 7th Streets. Elevations scaled from Chamlin & Associates Map 3b-1 and USGS 7.5-minute Topo Map(41089-C1-LaSalle).

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS.

GEOSYNTEC CONSULTANTS
1200 S. Federal Hwy., Suite 204
Boynton Beach, Florida

GS FORM: SL1 3/91 2/91

BORING RECORD

BORING BH-8 SHEET 1 OF 1
START DATE 6 OCT 92 ELEVATION 671.8 FT
FINISH DATE 6 OCT 92 DATUM
PROJECT LIMITED SITE INVESTIGATION
LOCATION CARUS CHEMICAL COMPANY
NUMBER 2083

LAYER DEPTH AND ELEVN. (FT)	MATERIAL DESCRIPTION	DEPTH AND ELEVN. (FT)	SAMPLES NUMBER	SAMPLES SYMBOL	REC (%) OR REC & RQD (%)	SPT VALUES BLOWS PER 6"	SPT VALUES N	COMMENTS
0.3 / 671.5	GRAVEL BASE COARSE (GW) Well graded, light grey, compacted road base	0 / 671.8	8S1					
	CLAY (CL) Light brown, moist, trace silt, low plasticity		8S2					
4.4 / 667.4	CINDER Black, off-spec material from furnace operations	5 / 666.8	8S3					
			8S4		10	2 3 2 3	5	
			8S5					
		10 / 661.8	8S6		10	1 2 1 1	3	
			8S7					
		15 / 656.8	8S8		40	2 2 4 3	6	
			8S9					
20.0 / 651.8	GLACIAL TILL (ML) Grey to olive, dense, wet	20 / 651.8	8S10		90	1 1 2 3	3	
22.0 / 649.8	BORING TERMINATED AT 22 FT.							

SAMPLE VALUES
GRAPHIC SYMBOLS
● SPT N-Value
⊠ Core Recovery %
▲ Core RQD %
⊗ Moisture Content %
W_p W_l Atterberg Limits
20 40 60 80

CONTRACTOR LAYNE WESTERN
DRILLER MOORE/MILES
DRILL RIG ACKER TRUCK-MOUNTED
DIA/METHOD 8" 8" CFA
LOGGER REVIEWER

NORTHING 10446.7
EASTING 10394.0
ANGLE Vertical
BEARING ----
PRINTED 10 NOV 92

REMARKS: Arbitrary Northing/Easting of 10000/10000 taken at property corner at intersection of Union and 7th Streets. Elevations scaled from Chamlin & Associates Map 3b-1 and USGS 7.5-minute Topo Map(41089-C1-LaSalle).

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS.

GEOSYNTEC CONSULTANTS
1200 S. Federal Hwy., Suite 204
Boynton Beach, Florida

GS FORM: SL1 3/91 2/91

BORING RECORD

BORING **BH-9** SHEET 1 OF 1
START DATE 5 OCT 92 ELEVATION 568.8 FT
FINISH DATE 5 OCT 92 DATUM
PROJECT LIMITED SITE INVESTIGATION
LOCATION CARUS CHEMICAL COMPANY
NUMBER 2083

LAYER DEPTH AND ELEVN. (FT)	MATERIAL DESCRIPTION	SYMBOLIC LOG	DEPTH AND ELEVN. (FT)	SAMPLES NUMBER	SAMPLES SYMBOL	SAMPLES REC (%) OR REC & RQD (%)	SPT VALUES BLOWS PER 6"	SPT VALUES N	COMMENTS
0.7 568.1	**CLAY (CL)** Light grey, firm, slightly moist, liner material in pond bed.		0 568.8	9S1					
	CLAYEY SILT (ML) Dark brown, medium plasticity, slightly moist			9S2					
5.0 563.8	**GLACIAL TILL** grey, firm, trace gravel, sand		5 563.8	9S3					
6.5 563.3	**SAND (SW)** Dark brown, uniform, sub angular, loose			9S4		40	6 8 7 6	15	
6.9 562.9									
7.0 561.8	**CLAYEY SAND (SC)** Dark brown to red, varved with light brown sand.								
	BOREHOLE TERMINATED AT 7 FT								

SAMPLE VALUES
GRAPHIC SYMBOLS
● SPT N-Value
⊠ Core Recovery %
▲ Core RQD %
⊗ Moisture Content %
Wp Wl Atterberg Limits
20 40 60 80

CONTRACTOR LAYNE WESTERN
DRILLER MOORE/MILES
DRILL RIG ACKER TRUCK-MOUNTED
DIA/METHOD 8" 8" CFA
LOGGER REVIEWER

NORTHING 10620.0
EASTING 10472.0
ANGLE Vertical
BEARING ----
PRINTED 10 NOV 92

REMARKS: Arbitrary Northing/Easting of 10000/10000 taken at property corner at intersection of Union and 7th Streets. Elevations scaled from Chamlin & Associates Map 3b-1 and USGS 7.5-minute Topo Map(41089-C1-LeSalle).

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS.

GEOSYNTEC CONSULTANTS
1200 S. Federal Hwy., Suite 204
Boynton Beach, Florida

GS FORM: SL1 3/91 2/91

BORING RECORD

BORING **BH-12** SHEET 1 OF 3
START DATE 7 OCT 92 ELEVATION 550.2 FT
FINISH DATE 7 OCT 92 DATUM
PROJECT LIMITED SITE INVESTIGATION
LOCATION CARUS CHEMICAL COMPANY
NUMBER 2083

LAYER DEPTH AND ELEVN. (FT)	MATERIAL DESCRIPTION	SYMBOLIC LOG	DEPTH AND ELEVN. (FT)	SAMPLES NUMBER	SYMBOL	REC (%) OR REC & RQD (%)	SPT VALUES BLOWS PER 6"	N	COMMENTS
	SLAG Red, brown, black and purple, glazed/vitrified, pitted, off-spec material, dry		0 550.2	12S1					
			5 545.2	12S2		60	4 6 4 4	10	
				12S3					
			10 540.2						
			15 535.2	12S4		80	5 7 6 6	13	
				12S5					
			20 530.2						
			25 525.2						

SAMPLE VALUES
GRAPHIC SYMBOLS
● SPT N-Value
☒ Core Recovery %
▲ Core RQD %
⊗ Moisture Content %
w_p w_l Atterberg Limits
20 40 60 80

CONTRACTOR LAYNE WESTERN
DRILLER MOORE/MILES
DRILL RIG ACKER TRUCK-MOUNTED
DIA/METHOD 8" 8" CFA
LOGGER REVIEWER

NORTHING 10685.0
EASTING 10975.5
ANGLE Vertical
BEARING ------
PRINTED 10 NOV 92

REMARKS: Arbitrary Northing/Easting of 10000/10000 taken at property corner at intersection of Union and 7th Streets. Elevations scaled from Chamlin & Associates Map 3b-1 and USGS 7.5-minute Topo Map(41089-C1-LaSalle).

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS.

GEOSYNTEC CONSULTANTS
1200 S. Federal Hwy., Suite 204
Boynton Beach, Florida

GS FORM: SL1 3/91 2/91

BORING RECORD

BORING **BH-12** SHEET 2 OF 3
START DATE 7 OCT 92 ELEVATION 550.2 FT
FINISH DATE 7 OCT 92 DATUM
PROJECT LIMITED SITE INVESTIGATION
LOCATION CARUS CHEMICAL COMPANY
NUMBER 2083

LAYER DEPTH AND ELEVN. (FT)	MATERIAL DESCRIPTION	SYMBOLIC LOG	DEPTH AND ELEVN. (FT)	SAMPLES: NUMBER	SAMPLES: SYMBOL	SAMPLES: REC (%) OR REC & RQD (%)	SPT VALUES: BLOWS PER 6"	SPT VALUES: N	COMMENTS
			30 520.2	12S6		80	8 12 7 8	19	
				12S7					
			35 515.2						
			40 510.2						
			45 505.2						
			50 500.2						
			55 495.2						

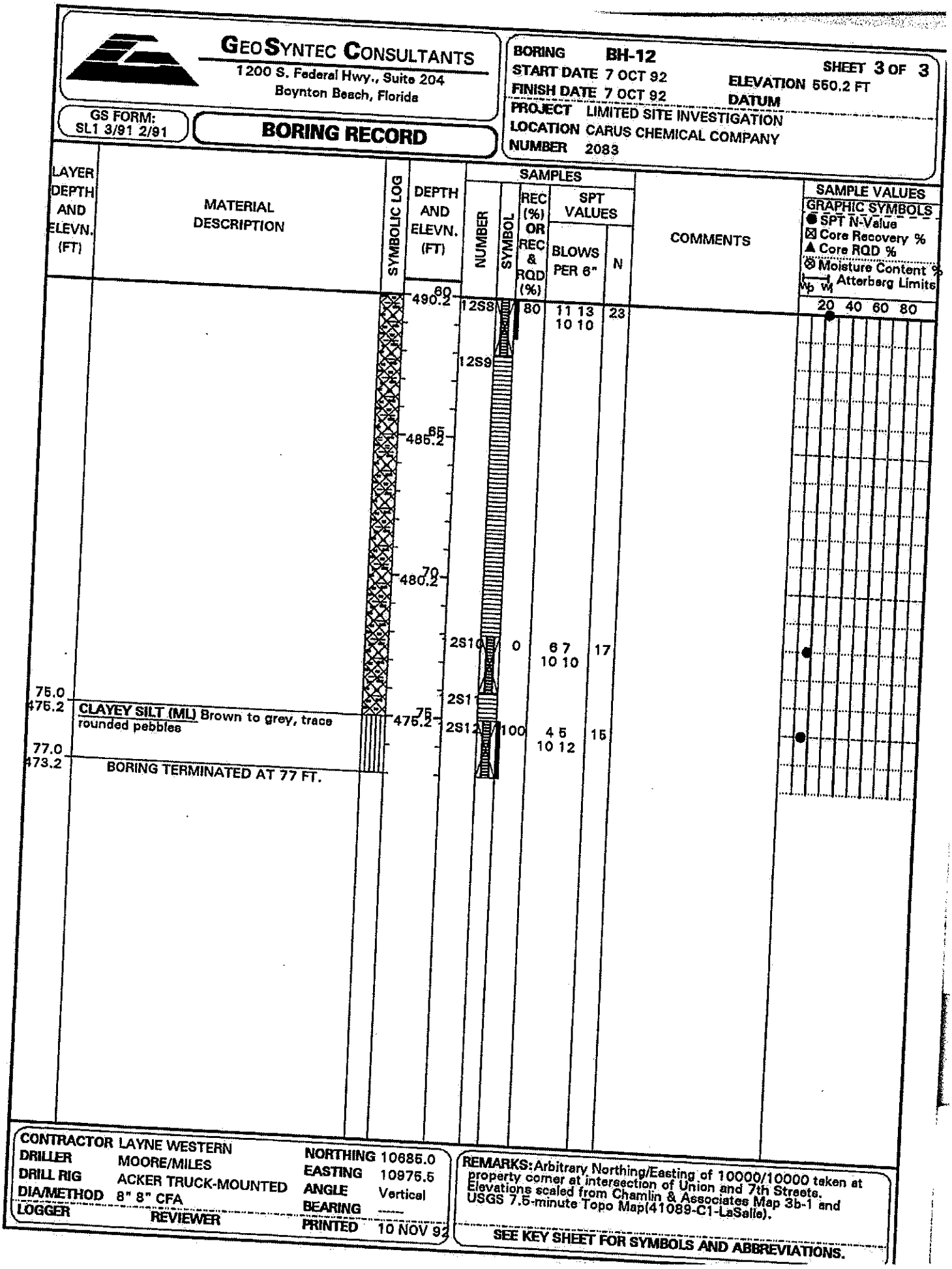
SAMPLE VALUES
GRAPHIC SYMBOLS
● SPT N-Value
☒ Core Recovery %
▲ Core RQD %
⊗ Moisture Content %
W_P W_L Atterberg Limits
20 40 60 80

CONTRACTOR LAYNE WESTERN
DRILLER MOORE/MILES
DRILL RIG ACKER TRUCK-MOUNTED
DIA/METHOD 8" 8" CFA
LOGGER REVIEWER

NORTHING 10685.0
EASTING 10975.5
ANGLE Vertical
BEARING ----
PRINTED 10 NOV 92

REMARKS: Arbitrary Northing/Easting of 10000/10000 taken at property corner at intersection of Union and 7th Streets. Elevations scaled from Chamlin & Associates Map 3b-1 and USGS 7.5-minute Topo Map(41089-C1-LaSalle).

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS.


GEOSYNTEC CONSULTANTS
1200 S. Federal Hwy., Suite 204
Boynton Beach, Florida
GS FORM: SL1 3/91 2/91
BORING RECORD
BORING BH-12
SHEET 3 OF 3
START DATE 7 OCT 92
ELEVATION 550.2 FT
FINISH DATE 7 OCT 92
DATUM
PROJECT LIMITED SITE INVESTIGATION
LOCATION CARUS CHEMICAL COMPANY
NUMBER 2083
LAYER DEPTH AND ELEVN. (FT)
MATERIAL DESCRIPTION
SYMBOLIC LOG
DEPTH AND ELEVN. (FT)
SAMPLES
NUMBER
SYMBOL
REC (%) OR REC & RQD (%)
SPT VALUES
BLOWS PER 6"
N
COMMENTS
SAMPLE VALUES
GRAPHIC SYMBOLS
SPT N-Value
Core Recovery %
Core RQD %
Moisture Content %
Atterberg Limits
Wp Wl
20 40 60 80
60
490.2
12S8
80
11 13
10 10
23
12S9
65
485.2
70
480.2
2S10
0
6 7
10 10
17
75.0
475.2
2S11
CLAYEY SILT (ML) Brown to grey, trace rounded pebbles
75
475.2
2S12
100
4 5
10 12
15
77.0
473.2
BORING TERMINATED AT 77 FT.
CONTRACTOR LAYNE WESTERN
DRILLER MOORE/MILES
DRILL RIG ACKER TRUCK-MOUNTED
DIA/METHOD 8" 8" CFA
LOGGER
REVIEWER
NORTHING 10685.0
EASTING 10975.5
ANGLE Vertical
BEARING ----
PRINTED 10 NOV 92
REMARKS: Arbitrary Northing/Easting of 10000/10000 taken at property corner at intersection of Union and 7th Streets. Elevations scaled from Chamlin & Associates Map 3b-1 and USGS 7.5-minute Topo Map(41089-C1-LaSalle).
SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS.

GEOSYNTEC CONSULTANTS
1200 S. Federal Hwy., Suite 204
Boynton Beach, Florida

GS FORM: SL1 3/91 2/91

BORING RECORD

BORING BH-13 **SHEET** 1 OF 1
START DATE 8 OCT 92 **ELEVATION** 672.2 FT
FINISH DATE 8 OCT 92 **DATUM**
PROJECT LIMITED SITE INVESTIGATION
LOCATION CARUS CHEMICAL COMPANY
NUMBER 2083

LAYER DEPTH AND ELEVN. (FT)	MATERIAL DESCRIPTION	SYMBOLIC LOG	DEPTH AND ELEVN. (FT)	SAMPLES: NUMBER	SAMPLES: SYMBOL	SAMPLES: REC (%) OR REC & RQD (%)	SAMPLES: SPT VALUES: BLOWS PER 6"	SAMPLES: SPT VALUES: N	COMMENTS
0.4 671.8	**WELL GRADED GRAVEL BASE COARSE** (GW) Light grey, compacted road base		0 672.2	13S1					
	CINDER Black, off-spec material from furnace operations, some gravel			13S2					
5.0 667.2	BOREHOLE TERMINATED AT 5 FT (Due to possible UG utilities)		5 667.2						

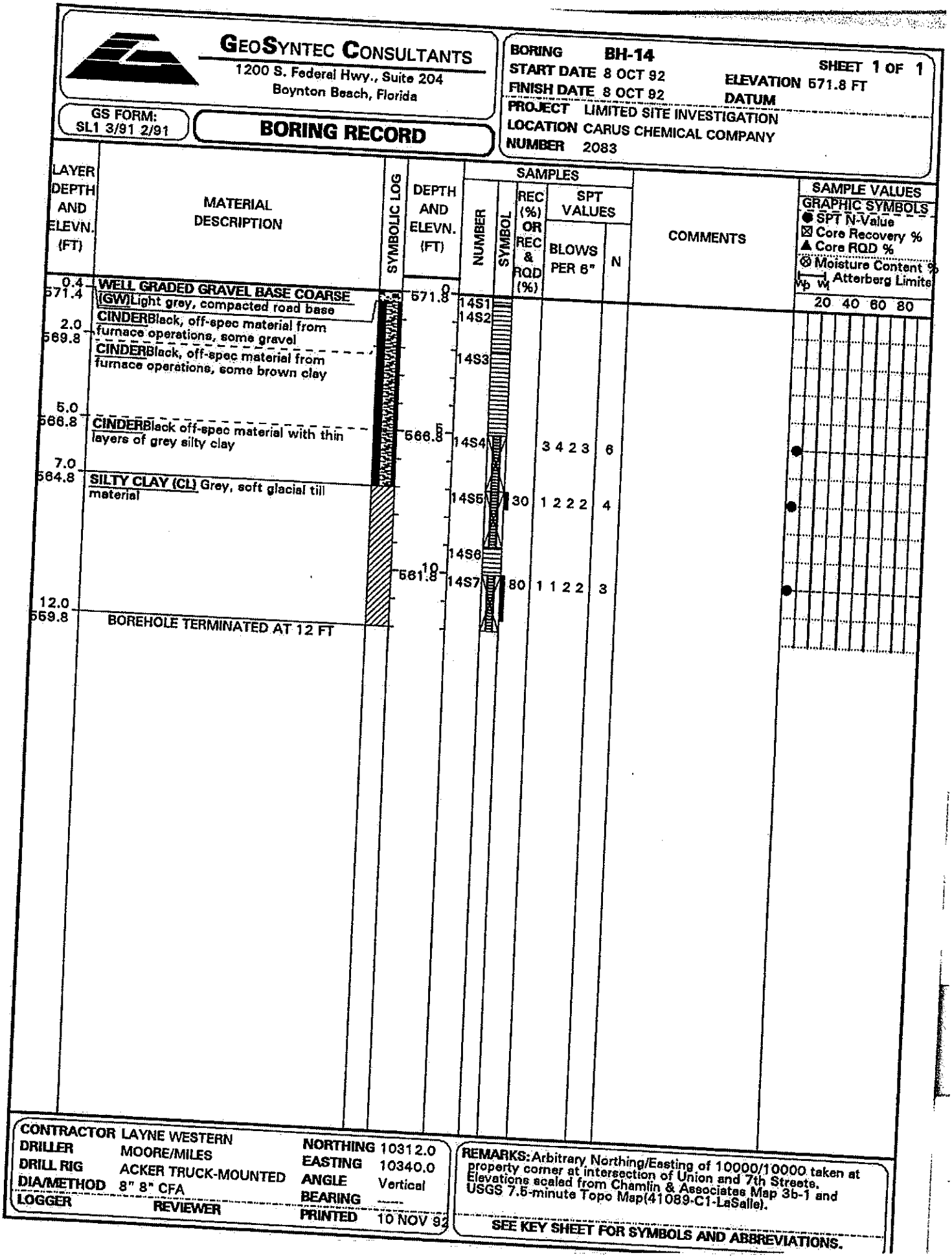
SAMPLE VALUES
GRAPHIC SYMBOLS
● SPT N-Value
⊠ Core Recovery %
▲ Core RQD %
⊗ Moisture Content %
Atterberg Limits
W_P W_L
20 40 60 80

CONTRACTOR LAYNE WESTERN
DRILLER MOORE/MILES
DRILL RIG ACKER TRUCK-MOUNTED
DIA/METHOD 8" 8" CFA
LOGGER **REVIEWER**

NORTHING 10352.0
EASTING 10340.0
ANGLE Vertical
BEARING ----
PRINTED 10 NOV 92

REMARKS: Arbitrary Northing/Easting of 10000/10000 taken at property corner at intersection of Union and 7th Streets. Elevations scaled from Chamlin & Associates Map 3b-1 and USGS 7.5-minute Topo Map(41089-C1-LaSalle).

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS.



GEOSYNTEC CONSULTANTS
1200 S. Federal Hwy., Suite 204
Boynton Beach, Florida

GS FORM: SL1 3/91 2/91

BORING RECORD

BORING BH-14 SHEET 1 OF 1
START DATE 8 OCT 92 ELEVATION 571.8 FT
FINISH DATE 8 OCT 92 DATUM
PROJECT LIMITED SITE INVESTIGATION
LOCATION CARUS CHEMICAL COMPANY
NUMBER 2083

LAYER DEPTH AND ELEVN. (FT)	MATERIAL DESCRIPTION	SYMBOLIC LOG	DEPTH AND ELEVN. (FT)	SAMPLES NUMBER	SAMPLES SYMBOL	SAMPLES REC (%) OR REC & RQD (%)	SPT VALUES BLOWS PER 6"	SPT VALUES N	COMMENTS
0.4 / 571.4	WELL GRADED GRAVEL BASE COARSE (GW) Light grey, compacted road base		0 / 571.8	14S1					
2.0 / 569.8	CINDER Black, off-spec material from furnace operations, some gravel			14S2					
	CINDER Black, off-spec material from furnace operations, some brown clay			14S3					
5.0 / 566.8	CINDER Black off-spec material with thin layers of grey silty clay		5 / 566.8	14S4			3 4 2 3	6	
7.0 / 564.8	SILTY CLAY (CL) Grey, soft glacial till material			14S5		30	1 2 2 2	4	
				14S6					
			10 / 561.8	14S7		80	1 1 2 2	3	
12.0 / 559.8	BOREHOLE TERMINATED AT 12 FT								

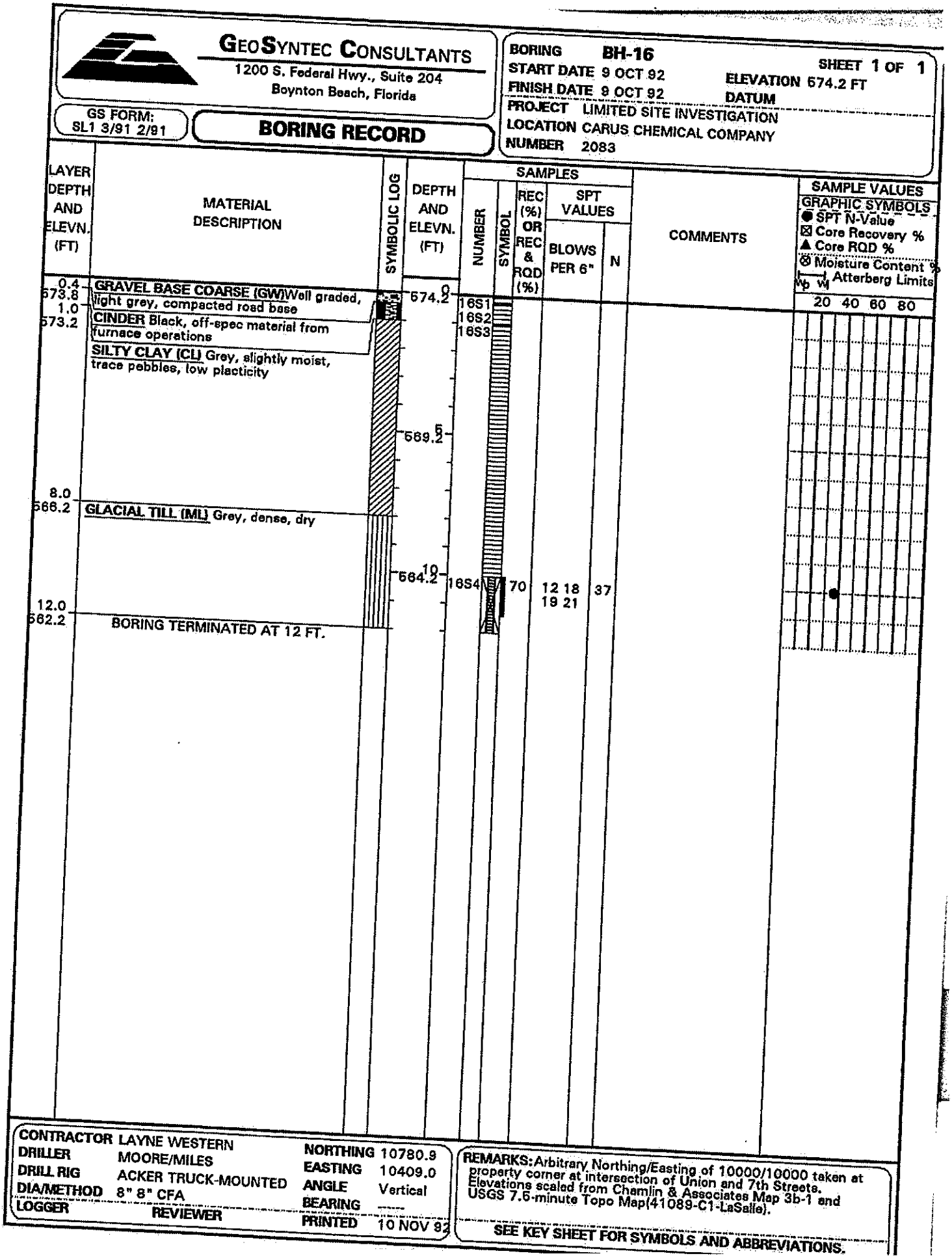
SAMPLE VALUES
GRAPHIC SYMBOLS
● SPT N-Value
☒ Core Recovery %
▲ Core RQD %
⊗ Moisture Content %
W_p W_l Atterberg Limits
20 40 60 80

CONTRACTOR LAYNE WESTERN
DRILLER MOORE/MILES
DRILL RIG ACKER TRUCK-MOUNTED
DIA/METHOD 8" 8" CFA
LOGGER REVIEWER

NORTHING 10312.0
EASTING 10340.0
ANGLE Vertical
BEARING ----
PRINTED 10 NOV 92

REMARKS: Arbitrary Northing/Easting of 10000/10000 taken at property corner at intersection of Union and 7th Streets. Elevations scaled from Chamlin & Associates Map 3b-1 and USGS 7.5-minute Topo Map(41089-C1-LaSalle).

SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS.


GEOSYNTEC CONSULTANTS
1200 S. Federal Hwy., Suite 204
Boynton Beach, Florida
GS FORM: SL1 3/91 2/91
BORING RECORD
BORING BH-16
SHEET 1 OF 1
START DATE 9 OCT 92
ELEVATION 574.2 FT
FINISH DATE 9 OCT 92
DATUM
PROJECT LIMITED SITE INVESTIGATION
LOCATION CARUS CHEMICAL COMPANY
NUMBER 2083
LAYER DEPTH AND ELEVN. (FT)
MATERIAL DESCRIPTION
SYMBOLIC LOG
DEPTH AND ELEVN. (FT)
SAMPLES
NUMBER
SYMBOL
REC (%) OR REC & RQD (%)
SPT VALUES
BLOWS PER 6"
N
COMMENTS
SAMPLE VALUES
GRAPHIC SYMBOLS
SPT N-Value
Core Recovery %
Core RQD %
Moisture Content %
Atterberg Limits
20 40 60 80
0.4
573.8
GRAVEL BASE COARSE (GW)Well graded, light grey, compacted road base
1.0
573.2
CINDER Black, off-spec material from furnace operations
SILTY CLAY (CL) Grey, slightly moist, trace pebbles, low plasticity
0
574.2
5
569.2
16S1
16S2
16S3
8.0
566.2
GLACIAL TILL (ML) Grey, dense, dry
10
564.2
16S4
70
12 18
19 21
37
12.0
562.2
BORING TERMINATED AT 12 FT.
CONTRACTOR LAYNE WESTERN
DRILLER MOORE/MILES
DRILL RIG ACKER TRUCK-MOUNTED
DIA/METHOD 8" 8" CFA
LOGGER
REVIEWER
NORTHING 10780.9
EASTING 10409.0
ANGLE Vertical
BEARING ----
PRINTED 10 NOV 92
REMARKS: Arbitrary Northing/Easting of 10000/10000 taken at property corner at intersection of Union and 7th Streets. Elevations scaled from Chamlin & Associates Map 3b-1 and USGS 7.5-minute Topo Map(41089-C1-LaSalle).
SEE KEY SHEET FOR SYMBOLS AND ABBREVIATIONS.

GeoSyntec Consultants

Atlanta, Ga; Boca Raton, Fla; Brussels, Belgium; Columbia, Md; Huntington Beach, Cal; Walnut Grove, Cal.

BORING LOG

Identification: C-2 **Page** 1 of 2

Site: Carus Chemical Company, LaSalle, Illinois **Project No.:** FE2147-1

Status: Soil boring, plugged and abandoned **Drilled:** 10 November 1993

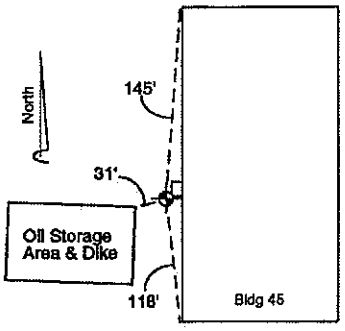
Tools & Method: 4.25 in. I.D. H.S. Auger w/ SPT **Bit Diameter:** 8 in.

Total Depth: 40.5 ft **Ground Elev.:** 579.77 ft msl **Surveyor:** Chamlin & Associates, Inc.

Drilling Co.: Layne Northwestern **Rig:** Gus Pech Brat 22R

Supervisor: Nandra Weeks **Reviewer:** J. Raymer **Driller:** Harold Waddell

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Depth Scale (feet)	Std. Pen. Test Blows	Run	Rec.	Drilling Log
580.0		***MODERN FILL:*** SANDY GRAVEL *(road pavement)*, light gray; crushed angular limestone up to mp size; loose to dense; (GW).						07:10, 10 Nov 93: boring begun.
578.0	2.0	***PENNSYLVANIAN SYSTEM:*** Weathered GREEN SHALE, pale olive, dark yellowish orange, and moderate yellowish brown; rare laminations of reddish purple and black; weathered, weakly indurated, fissile; remolded to lean SILTY CLAY, medium plasticity, low toughness (CL).		5	10 12 19 7	1	1.0'	@5ft: weathered shale (clay) in dry state.
572.0	8.0	GREEN SHALE, pale olive with rare laminations of reddish purple; calcareous, fissile, high natural dry strength, hard.		10	18 31 46 42	2	1.3'	@10ft: clay in dry state; shale dry.
566.0		@~14ft: becoming darker, light olive gray with light brown ochreous stains on some parting surfaces; rare very thin beds of reddish purple; remolded to CLAYEY SILT, medium plasticity (MH).		15	3 17 51 21	3	1.0'	
562.0		@~18ft: possible thin bed of limestone.		20	56	4	0.5'	@20ft: shale dry.
557.0	23.0	GRAY SHALE, light gray; very hard, fissile; becoming darker with depth.						@23ft: softer drilling. @24ft: harder drilling.
556.0		@24ft: possible thin to medium bed of limestone.		25	28 62 72	5	0.8'	
551.0		@~29ft: becoming DARK SHALE, greenish black; slightly calcareous with rare limestone nodules; fissile, well indurated; remolded to fat CLAY, high plasticity (CH).		30	33 60	6	0.9'	
				35	33 82	7	0.8'	@35ft: shale dry.
542.0	38.0	RED SHALE, grayish red with nodules of light gray; hard, fissile.						

Identification: C-2 **Site:** Carus Chemical **Proj. No.:** FE2147-1 **Page** 2 **of** 2

Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Depth (feet)	Std. Pen. Blows	Test Run	Test Rec.	Drilling Log
539.5		**Total Depth: 40.5 ft.**			88	8	0.3'	@40ft: shale dry.
								10:00, 10 Nov 93: boring terminated; borehole dry.
								11 Nov 93: water measured @ 16.7ft in open borehole.
								11 Nov 93: borehole plugged and abandoned.
				45				
				50				
				55				
				60				
				65				
				70				
				75				
				80				
				85				

GeoSyntec Consultants

Atlanta, Ga; Boca Raton, Fla; Brussels, Belgium; Columbia, Md; Huntington Beach, Cal; Walnut Grove, Cal.

BORING LOG

Identification: C-3 **Page** 1 of 1

Site: Carus Chemical Company, LaSalle, Illinois **Project No.:** FE2147-1

Status: Soil boring, plugged and abandoned **Drilled:** 9 Nov 93

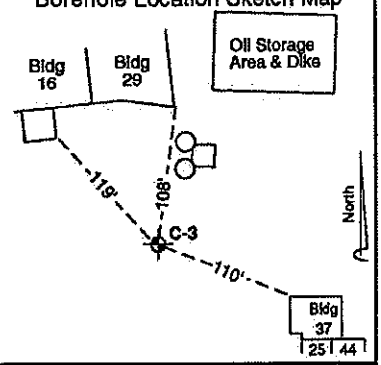
Tools & Method: 4.25 in. I.D. H.S. Auger w/ SPT, automatic hammer **Bit Diameter:** 8 in.

Total Depth: 17 ft **Ground Elev.:** 577.56 ft msl **Surveyor:** Chamlin & Associates, Inc.

Drilling Co.: Layne Northwestern **Rig:** Mobil B-57

Supervisor: J. Raymer **Reviewer:** Nandra Weeks **Driller:** Mark Backhaus

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std. Pen. Test Blows	Run	Rec.	Drilling Log
577.5		***MODERN FILL:*** SANDY GRAVEL *(road pavement)*, light gray; crushed angular limestone up to mp size; loose to dense; (GW).							07:40, 9 Nov 93: boring begun, ground dry; plant sewer pipe beginning to leak large amounts of water nearby.
560.0	1.5	SILTY RUBBLE *(debris from building demolition)*, black; brick, wire, metal.							@2ft: water on top of concrete.
575.0	2.5	CONCRETE *(former building foundation)*.							
574.5	3.0	SILTY GRAVEL *(former building foundation)*, greenish gray (GM).							
572.5	5.0	REWORKED SHALE, light olive gray with abundant, jumbled, pieces of dusky yellow; reworked to CLAY, medium toughness, high plasticity (CL-CH).			5	11 5 6 6	1	1.6'	@5-11ft: clay fill in plastic state throughout.
						4 4 6 4	2	1.6'	
		@10.5ft: becoming with abundant cobbles and large pebbles of sandstone.			10	3 5 5 3	3	1.9'	
566.5	11.0	ORGANIC CLAY *(pond sediment)*, black; some organic fibers, organic odor; high plasticity, very low toughness (OH).							@11ft: organic clay in plastic state.
565.5	12.0	***PENNSYLVANIAN SYSTEM:*** Weathered GREEN SHALE *(residual soil)*, light olive gray with disturbed *(bioturbated)* laminations of dusky yellow and rare moderate brown; modern rootlets; stiff; remolded to CLAY, high toughness, high plasticity (CH).				5 7 12 15	4	1.8'	
						11 18 26 36	5	1.8'	
562.5	15.0	GREEN SHALE, light olive gray with rare laminations of grayish green and very dusky red; weakly indurated, fissile, very stiff, silty; remolded to SILTY CLAY, low toughness, low plasticity (CL).			15				@15ft: shale in dry state.
						27 54/1"	6	0.6'	09:00, 9 Nov 93: boring terminated @17ft.
560.5		**Total Depth: 17 ft.**							11 Nov 93: water @3.5ft in open borehole; sewer pipe under repair and leaking large amounts of water (estimated at a few hundred gallons per minute), water flowing over pavement.
					20				11 Nov 93: boring plugged with bentonite chips.
									Note: boring originally begun 2 ft to south of present location on 8 Nov 93 using 5ft-long CME sampler. Due to insufficient recovery, boring was redrilled after terminating at 15ft.
					25				
					30				
					35				

GeoSyntec Consultants

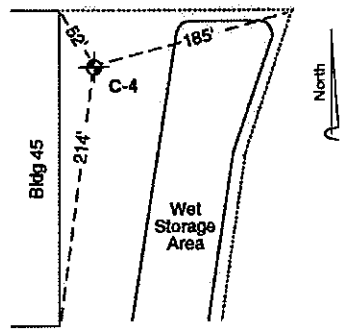
Atlanta, Ga; Boca Raton, Fla; Brussels, Belgium; Columbia, Md; Huntington Beach, Cal; Walnut Grove, Cal.

BORING LOG

Identification: C-4 **Page** 1 of 1
Site: Carus Chemical Company, LaSalle, Illinois **Project No.:** FE2147-1

Status: Soil boring, plugged and abandoned **Drilled:** 9 November 1993
Tools & Method: 4.25 in. I.D. H.S. Auger w/ SPT, automatic hammer **Bit Diameter:** 8 in.
Total Depth: 31 ft **Ground Elev.:** 574.72 ft msl **Surveyor:** Chamlin & Associates, Inc.
Drilling Co.: Layne Northwestern **Rig:** Gus Pech Brat 22R
Supervisor: Nandra Weeks **Reviewer:** J. Raymer **Driller:** Harold Waddell

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std. Pen. Test Blows	Run	Rec.	Drilling Log
575.0									10:45, 9 Nov 93: boring begun; ground dry.
574.0	1.0	***MODERN FILL:*** SANDY GRAVEL *(road pavement)*, light gray; crushed angular limestone up to mp size; loose to dense; (GW).							
		SILTY CLAY, some possible sinter.							
572.5	2.5	***PENNSYLVANIAN SYSTEM:*** Weathered GREEN SHALE, yellowish gray with some dark yellowish orange stains; weathered, fissile with rare ochre stains on partings, moderately indurated; remolded to CLAY, moderate toughness, high plasticity (CL); gradually becoming less weathered with depth;							
					5	11 15 21 13	1	1.0'	@5ft: clay in dry state; slightly moist.
570.0		@~5--7ft: rare very thin beds of black, organic sandy silt;							
567.0		@~8ft: becoming calcareous and unweathered; very fissile; rare very thin beds of limestone.							
					10	2 6 22 21	2	0.9'	
560.0		@~15ft: thin beds of limestone; jumbled, angular fragments of hard shale; *possible paleosol.*							
					15	50/6"	3	0.4'	
555.0		@20ft: medium bed of SHALEY LIMESTONE, very light gray; very hard; followed by... SHALE, dark gray; calcareous with rare brachiopods; very fissile.							@20ft: very hard drilling; grinding noise.
					20	20 31 29 33	4	0.8	
551.0		@~24ft: shale becoming black; intermittantly fissile, very hard; remolded to semi-fat CLAY, high plasticity, medium toughness, very high remolded dry strength (CL-CH).							
					25	1 2 28 50	5	1.1'	11:45: boring suspendened @25ft (lunch). 12:45: boring resumed; water in bottom of borehole. @25ft: low blow counts probably due to hydration of shales during break; source of water unknown.
547.0	28.0	GREEN SHALE, greenish gray, with some light olive brown and rare laminations of grayish red; moderately indurated with high natural dry strength; non-calcareous.							
					30	22 50/6"	6	0.9'	
544.0		**Total Depth: 31 ft.**							13:30, 9 Nov 93: auger refusal @31ft; boring terminated. 11 Nov 93: water @12.3ft in open borehole. 11 Nov 93: borehole plugged with volclay grout; grout settled; topped off with bentonite chips.
					35				

GeoSyntec Consultants

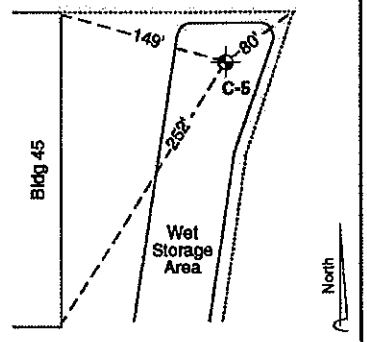
Atlanta, Ga; Boca Raton, Fla; Brussels, Belgium; Columbia, Md; Huntington Beach, Cal; Walnut Grove, Cal.

BORING LOG

Identification: C-5 **Page** 1 of 1
Site: Carus Chemical Company, LaSalle, Illinois **Project No.:** FE2147-1

Status: Soil boring, plugged and abandoned **Drilled:** 11 November 1993
Tools & Method: 4.25 in. I.D. H.S. Auger w/ 3-in. SPT, auto. hammer **Bit Diameter:** 8 in.
Total Depth: 14 ft **Ground Elev.:** 570.47 ft msl **Surveyor:** Chamlin & Associates, Inc.
Drilling Co.: Layne Northwestern **Rig:** Mobil B-57
Supervisor: J. Raymer **Reviewer:** Nandra Weeks **Driller:** Mark Backhaus

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std. Pen. Test Blows	Run	Rec.	Drilling Log
570.5									12:45, 11 Nov 93: boring began; ground dry.
569.5	1.0	***MODERN FILL:*** SANDY GRAVEL *(road pavement)*, light gray; crushed angular limestone up to mp size; loose to dense; (GW). CLAY *(compacted clay liner)*, light olive brown; very uniform texture and color; stiff; high toughness, medium plasticity (CL).							@2ft: clay in dry state.
						24 17 14 14	1	2.0'	Sample #1 collected for chemical analysis.
567.5	3.0	***PLEISTOCENE SERIES:*** CLAY, dark yellowish brown; massive, very stiff; high toughness, high plasticity (CL-CH).							
567.0	3.5	SAND (ws, fg, sr to sa quartz) with some fine silt, trace of charcoal, dark yel. brown; silt content increases downward; grading into...							
		@5ft: CLAYEY SAND, very stiff (SC); grading into...			5	10 9 11 14	2	2.0'	@5ft: clayey sand in plastic state.
565.0	5.5	SILTY CLAY, little sand and gravel *(paleosol)*; blocky structure with weathered fractures and some carbonized rootlets; medium toughness, high plasticity (CL).							
564.0	6.5	FINE TILL; matrix is sandy silty clay, grayish red with abundant dark yellowish orange ochre; gravel (medium to fine pebbles, very poorly sorted) is dusky yellow siltstone frags, dark green shale frags, ang. limestone pebbles, and iron-stained quartz (very well-rounded medium pebbles); moderately indurated, very stiff; sampled as GRAVELLY SILTY CLAY, some sand (GC-GM).							@7ft: hard drilling.
						10 21 34 24	3	2.0'	Sample #3: faint petroleum odor; HNU=4ppm.
560.5		@10ft: some strongly cemented hematite nodules becoming present within matrix of till.			10	10 22 27 22	4	2.0'	Sample #4: faint petroleum odor; HNU=4ppm.
559.5		@11ft: limestone pebbles becoming very common.							
558.0		@12.5ft: gravel component becoming almost exclusively local material, especially limestone pebbles and reworked shale.				11 20 30 23	5	2.0'	@13ft: clayey matrix in dry state. Sample #4: faint petroleum odor; HNU=8ppm.
557.0	13.5	***PENNSYLVANIAN SYSTEM:*** GREEN SHALE, light olive gray, abundant small brachiopods and bryozoans; hard.							@15ft: shale dry.
556.5		@14ft: becoming black and without visible fossils.			15				14:00, 11 Nov 93: boring terminated @14ft; borehole dry.
556.5		**Total Depth: 14 ft.**							16:00, 11 Nov 93: plugged and abandoned with bentonite chips; compacted clay liner restored by placing and compacting layers of granular bentonite mixed with bentonite powder under optimal moisture conditions.
					20				
					25				
					30				
					35				

GeoSyntec Consultants

Atlanta, Ga; Boca Raton, Fla; Brussels, Belgium; Columbia, Md; Huntington Beach, Cal; Walnut Grove, Cal.

BORING LOG

Identification: C-6 **Page** 1 of 1

Site: Carus Chemical Company, LaSalle, Illinois **Project No.:** FE2147-1

Status: Soil boring, plugged and abandoned **Drilled:** 11 November 1993

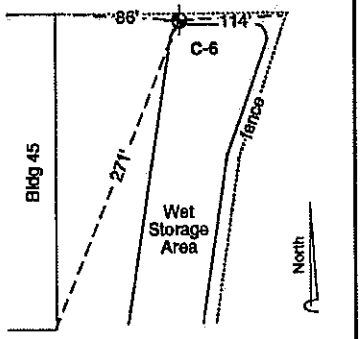
Tools & Method: 4.25 in. I.D. H.S. Auger w/ SPT, automatic hammer **Bit Diameter:** 8 in.

Total Depth: 12 ft **Ground Elev.:** 575.55 ft msl **Surveyor:** Chamlin & Associates, Inc.

Drilling Co.: Layne Northwestern **Rig:** Mobil B-57

Supervisor: J. Raymer **Reviewer:** Nandra Weeks **Driller:** Mark Backhaus

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std. Pen. Test Blows	Run	Rec.	Drilling Log
575.5									11:45, 11 Nov 93: boring begun; ground dry.
574.5	1.0	***MODERN FILL:*** SANDY GRAVEL *(road pavement)*, light gray; crushed angular limestone up to mp size; loose to dense; (GW). ***PLEISTOCENE SERIES:*** SILTY CLAY *(Residual soil)*, grayish green, light olive brown, and pale olive; granular texture (CL).							
571.5	4.0	FINE TILL; matrix is sandy silty clay, moderate brown; gravel (vps, mp-vlp) is dark green shale frags, ang. limestone pebbles, rare reworked crinoid columnals; moderately indurated, very stiff; SANDY SILTY CLAYEY GRAVEL (GC-GM).			5	10 13 17 19	1	2.0'	Sample #1: chemical analysis for UST parameters. No odor; HNU=0ppm.
						4 7 11 12	2	2.0'	Sample #2: no odor; HNU=0ppm.
568.5	7.0	***PENNSYLVANIAN SYSTEM:*** Weathered GREEN SHALE, pale olive, little dusky yellow, rare grayish red; fissile with coatings of dark yellowish brown on laminae; weathering decreases downward.			10				
						6 14 28 29/2"	3	1.7'	Sample #2: no odor; HNU=0ppm.
564.5	11.0	SILTSTONE, pale olive with some moderate reddish brown; non-fissile, blocky, dusky yellowish brown stain on fractures; very hard, high natural dry strength some calcite cement; contains some thin beds of calcareous siltstone and finely crystalline, silty limestone; uncemented material reworked to SILT (MH).							12:00, 11 Nov 93: boring terminated @ 12ft; borehole dry.
									16:30, 11 Nov 93: plugged and abandoned.
563.5		**Total Depth: 12 ft.**			15				
					20				
					25				
					30				
					35				

GeoSyntec Consultants

Atlanta, Ga; Boca Raton, Fla; Brussels, Belgium; Columbia, Md; Huntington Beach, Cal; Walnut Grove, Cal.

BORING LOG

Identification: C-7 **Page** 1 of 1

Site: Carus Chemical Company, LaSalle, Illinois **Project No.:** FE2147-1

Status: Soil Boring, plugged and abandoned **Drilled:** 11 Nov 93

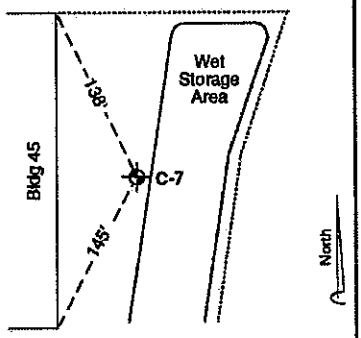
Tools & Method: 4.25 in. I.D. H.S. Auger w/ SPT, 300 lb. Hammer **Bit Diameter:** 8 in.

Total Depth: 16 ft **Ground Elev.:** 574.38 ft msl **Surveyor:** Chamlin & Associates, Inc.

Drilling Co.: Layne Northwestern **Rig:** Gus Pech 22R

Supervisor: Brian Tindell **Reviewer:** J. Raymer **Driller:** Harold Waddell

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std. Pen. Test Blows	Run	Rec.	Drilling Log
574.5		***MODERN FILL:*** SANDY GRAVEL *(road pavement)*, light gray; crushed angular limestone up to mp size; loose to dense; (GW).							08:00, 11 Nov 93: boring begun; ground dry.
572.5	2.0	SINTER, brownish black, granular cinder-like material (vfg-vcg, very angular); some interstitial silt and fine sand; light-weight, loose (SW).				6 4 3 nr	1	2.0'	
571.5	3.0	thin bed of (SC) CLAYEY SAND; followed by... REWORKED SHALE, intermixed light olive gray, and grayish red clay, high plasticity and toughness, a few carbonate nodules and pebbles of limestone. @5ft: sandstone pebbles (vcg), moderately cemented (vfg, wa).							@4ft: clay in dry state, near plastic limit.
569.0	5.5	***PLEISTOCENE SERIES:*** FINE TILL, reddish brown and green, very stiff. @6ft: thin bed of some very well-rounded, medium pebbles of iron-stained quartz.			5	4 4 10 14	2	1.5'	
						7 8 13 14	3	2'.0	
					10				
561.5	13.0	***PENNSYLVANIAN SYSTEM:*** GREEN SHALE, yellowish gray; silty with rare, brachiopods; moderately indurated, fissile; remolded to CLAYEY SILT, low toughness, low plasticity (MH).							@13ft: harder drilling; slight vibrations.
						7 8 12 35	4	1.0'	@14ft: much harder; difficult drilling
					15				
558.5		**Total Depth: 16ft.**							1030, 11Nov93: boring terminated at 16ft.
									12 Nov93: boring plugged and abandoned
					20				
					25				
					30				
					35				

GeoSyntec Consultants

Atlanta, Ga; Boca Raton, Fla; Brussels, Belgium; Columbia, Md; Huntington Beach, Cal; Walnut Grove, Cal.

BORING LOG

Identification: C-9 **Page** 1 **of** 1

Site: Carus Chemical Company, LaSalle, Illinois **Project No.:** FE2147-1

Status: Soil boring, plugged and abandoned **Drilled:** 9 November 1993

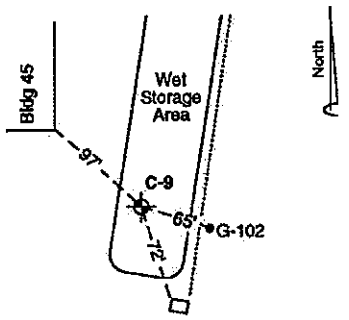
Tools & Method: 4.25 in. I.D. H.S. Auger w/ SPT, automatic hammer **Bit Diameter:** 8 in.

Total Depth: 31 ft **Ground Elev.:** 569.16 ft msl **Surveyor:** Chamlin & Associates, Inc.

Drilling Co.: Layne Northwestern **Rig:** Mobil B-57

Supervisor: J. Raymer **Reviewer:** Nandra Weeks **Driller:** Mark Backhaus

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std. Pen. Test Blows	Run	Rec.	Drilling Log
569.0						10 6 7 7	1	1.5'	13:45, 9 Nov 93: boring begun; ground moist.
568.0	1.0	*MODERN FILL:* SANDY GRAVEL *(road pavement)*, with cobbles (angular limestone) (GW). CLAY *(compacted clay liner)*, light olive brown; very uniform texture and color; very stiff; high toughness, medium plasticity (CL).							
566.5	2.5	SINTER, brownish black, granular cinder-like material (vfg-vcg, very angular); some interstitial silt and fine sand; light-weight, loose (SW).				7 10 11 9	2	2.0'	
566.0	3.0	SLAG, moderate red to blackish red, vesicular; boulder to silt size, commonly welded texture.				7 10 13 14	3	1.0'	
					5	6 5 9 9	4	1.6'	
						6 2 2 3	5	0.8'	
					10	7 4 4 4	6	0.6'	
						9 13 7 6	7	0.2'	@13ft: water in slag.
					15	8 9 5 3	8	0'	
					20	9 7 5 6	9	0'	
547.0	22.0	*PENNSYLVANIAN SYSTEM:* Weathered GRAY SHALE, medium gray; moderately fissile, crumbly; remolded to CLAY, medium plasticity, medium toughness (CL).							@22ft: harder drilling.
					25	6 18 28 29	10	1.3'	
539.0	30.0	RED SHALE, dark reddish brown; massive and blocky, hard; remolded to CLAY, medium plasticity and medium toughness (CL).			30	15 26 53/3"	11	1.2'	15:45, 9 Nov 93: boring terminated @31ft.
538.0		**Total Depth: 31 ft.**							11 Nov 93: water measured @ 12.3ft.
					35				12 Nov 93: borehole plugged and abandoned with 100 gals of very thick volclay grout. Grout immediately settled to 15ft; thereby indicating extremely high hydraulic conductivity in slag. Borehole topped with 350 lbs bentonite chips. Compacted clay liner restored over upper 2 ft by placing and compacting layers of granular bentonite and bentonite powder at optimal moisture content.

GeoSyntec Consultants

Atlanta, Ga; Boca Raton, Fla; Brussels, Belgium; Columbia, Md; Huntington Beach, Cal; Walnut Grove, Cal.

BORING LOG

Identification: C-10 **Page** 1 of 2

Site: Carus Chemical Company, LaSalle, Illinois **Project No.:** FE2147-1

Status: Soil boring, plugged and abandoned **Drilled:** 10 November 1993

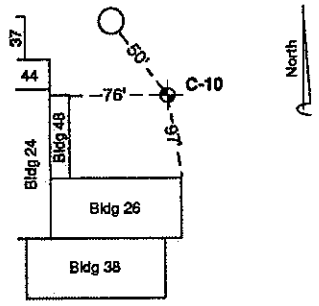
Tools & Method: 4.25 in. I.D. H.S. Auger w/ SPT, automatic hammer **Bit Diameter:** 8 in.

Total Depth: 41.5 ft **Ground Elev.:** 572.51 ft msl **Surveyor:** Chamlin & Associates, Inc.

Drilling Co.: Layne Northwestern **Rig:** Mobil B-57

Supervisor: J. Raymer **Reviewer:** Nandra Weeks **Driller:** Mark Backhaus

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Blows	Run	Rec.	Drilling Log
572.5						5 6 6 8	1	2.0'	06:35, 10 Nov 93: boring begun; ground dry, cold.
571.5	1.0	***MODERN FILL:*** SANDY GRAVEL *(road pavement)*, light gray; crushed angular limestone up to mp size; loose to dense; (GW).							Sample #1 for chemical analysis.
		REWORKED SHALE, mostly grayish olive with some light olive brown, very dark red, and pale olive; some granular material (vfg-cp) small amounts of sinter; a few plant seeds; jumbled fissility, firm; remolded to semi-fat CLAY, medium to high toughness, high plasticity (CL-CH).				3 4 6 6	2	2.0'	@2ft: clays in dry state, near plastic limit. Sample #2 for chemical analysis.
					5	5 6 5 4	3	2.0'	
						4 5 5 4	4	1.5'	
564.5		@8ft: becoming more massive and silty with more rocks (limestone, fp-vcp, angular to round), more uniformly light olive gray; still jumbled.				4 4 5 5	5	1.5'	
					10	5 5 5 5	6	1.5'	
						4 5 6 7	7	0'	Sample #7 probably hit a rock.
					15	7 9 9 8	8	0'	@15ft: water in borehole.
553.5		@19ft: isolated pieces of rounded river gravel and glass.				6 9 10 7	9	2.0'	@19ft: clay in plastic state.
					20				
549.5		@23ft: rocks in fill *(lag in bottom of gully)*.				9 9 13 13	10	0'	@23ft: hard drilling; probably rocks at base of fill.
548.5	24.0	***PENNSYLVANIAN SYSTEM:*** Weathered CLAYSTONE *(weathered underclay, residual soil)*, olive gray with white nodules (cg); massive with small (cg) white carbonate nodules, some modern rootlets; remolded to FAT CLAY, high toughness, high plasticity (CH).							
		@24-26ft: higher organic content (CH-OH), dark greenish gray to olive black.			25	9 7 10 9	11	2.0'	
544.5		@~28-30ft: more organic matter, black to dark greenish gray; small flecks of coal in clay.							
		@30ft: becoming siltier, light olive gray and dusky yellow with white carbonate nodules.			30	13 9 23 25	12	2.0'	
541.5	31.0	CLAYSTONE *(paleosol, bedrock)*, dark reddish brown with veinlets of grayish green; massive (non-fissile), hard; remolded to semi-fat CLAY, medium toughness, high plasticity (CL-CH).							@32ft: clay in dry state.
537.5		@35ft: Becoming hard and fissile *(base of paleosol)*.			35	13 22 40 50/2"	13	1.7'	@35ft: very slow drilling.

Identification: C-10 **Site:** Carus Chemical **Proj. No.:** FE2147-1 **Page** 2 **of** 2

Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth (feet)	Std. Pen. Blows	Run	Rec.	Drilling Log
531.0		Total Depth: 41.5 ft.				9 40 51/2"	14	1.0'	1000, 10 Nov 93: auger refusal @41.5ft, boring terminated. 11 Nov 93: water measured @10.6ft. 12 Nov 93: plugged and abandoned with voidlay slurry.

45
50
55
60
65
70
75
80
85

GeoSyntec Consultants

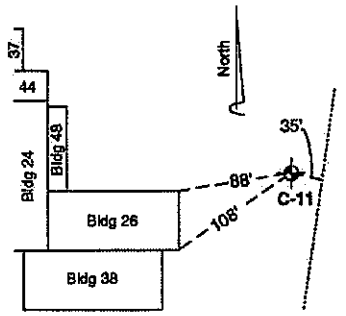
Atlanta, Ga; Boca Raton, Fla; Brussels, Belgium; Columbia, Md; Huntington Beach, Cal; Walnut Grove, Cal.

BORING LOG

Identification: C-11 **Page** 1 **of** 1
Site: Carus Chemical Company, LaSalle, Illinois **Project No.:** FE2147-1

Status: Soil boring, plugged and abandoned **Drilled:** 9 November 1993
Tools & Method: 4.25 in. I.D. H.S. Auger w/ SPT, automatic hammer **Bit Diameter:** 8 in.
Total Depth: 27 ft **Ground Elev.:** 569.79 ft msl **Surveyor:** Chamlin & Associates, Inc.
Drilling Co.: Layne Northwestern **Rig:** Gus Pech Brat 22R
Supervisor: Nandra Weeks **Reviewer:** J. Raymer **Driller:** Harold Waddell

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std. Pen. Test Blows	Run	Rec.	Drilling Log
570.0		*MODERN FILL:* SANDY GRAVEL *(road pavement)*, light gray; crushed angular limestone up to mp size; loose to dense; (GW).							14:45, 9 Nov 93: boring begun.
569.0	1.0	SILTY GRAVELLY SAND, some sinter, dark yellowish brown to black; includes reworked topsoil; loose (SW).							
565.0	5.0	SLAG, moderate red to blackish red, vesicular; boulder to silt size, commonly welded texture.			5	5 4 4 3	1	0.4'	
					10	10 28	2	1.0'	Sample #2 analyzed for metals. @11ft: split spoon bounced on rock.
557.0	13.0	*PENNSYLVANIAN SYSTEM:* DARK SHALE, dark gray with a few dark reddish brown and dusky yellow laminations; some intervals organic rich, some intervals calcareous; becoming more organic rich downward with some very thin beds of coal.			15	4 3 7 8	3	0.8'	
550.0		@~20-22ft: sample is medium gray.			20	8 14 21	4	1.1'	
545.0		@~25-27ft: sample is dark olive gray and calcareous with a trace of euhedral gypsum; reworked to fat organic CLAY, high plasticity, medium toughness (CH-OH).			25	3 10 16 30	5	1.4'	@25ft: clay in dry state, near plastic limit.
543.0		**Total Depth: 27 ft.**			30				16:30, 9 Nov 93: boring terminated @27 ft. 11 Nov 93: water in borehole measured @12.6ft. 12 Nov 93: plugged and abandoned with bentonite chips.
					35				

GeoSyntec Consultants

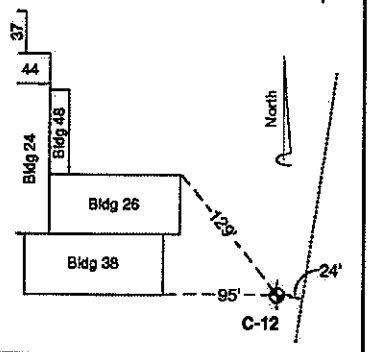
Atlanta, Ga; Boca Raton, Fla; Brussels, Belgium; Columbia, Md; Huntington Beach, Cal; Walnut Grove, Cal.

BORING LOG

Identification: C-12 **Page** 1 of 1
Site: Carus Chemical Company, LaSalle, Illinois **Project No.:** FE2147-1

Status: Soil boring, plugged and abandoned **Drilled:** 9 November 1993
Tools & Method: 4.25 in. I.D. H.S. Auger w/ SPT **Bit Diameter:** 8 in.
Total Depth: 27 ft **Ground Elev.:** 568.07 ft msl **Surveyor:** Chamlin & Associates, Inc.
Drilling Co.: Layne Northwestern **Rig:** Gus Pech Brat 22R
Supervisor: Nandra Weeks **Reviewer:** J. Raymer **Driller:** Harold Waddell

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std. Pen. Test Blows	Run	Rec.	Drilling Log
568.0									07:45, 9 Nov 93: boring begun; ground dry.
567.0	1.0	*MODERN FILL:* SANDY GRAVEL *(road pavement)*, light gray; crushed angular limestone up to mp size; loose to dense; (GW). REWORKED SHALE, dusky yellow to olive gray; some gravel (mp-cp); remolded to SILTY CLAY (CL).							@2ft: clay in dry state.
564.0	4.0	SLAG, moderate red to blackish red, vesicular; boulder to silt size, commonly welded texture.			5	3 6 8 13	1	0.3'	
558.0	10.0	*PENNSYLVANIAN SYSTEM:* @10ft: thick bed of SILTY CLAY *(topsoil)*, mod. yel. brown (CL); followed by... Weathered GREEN SHALE, yellowish gray to light olive gray; slightly calcareous, some Strophemenid brachiopods; remolded to CLAY, high plasticity, medium toughness, low to medium remolded dry strength (CL);			10	20 60 100	2	1.0'	@10ft: silty clay in plastic state. @12ft: clay in dry state.
555.0		@~13ft: becoming increasingly dark and organic; some pieces and laminations of coal; a few Strophemenid brachiopods.			15	3 9 16 36	3	1.0'	
550.0		@~18ft: becoming greenish black with a few very thin beds of coal; intermittantly fissile; remolded to semi-fat CLAY, high plasticity, medium toughness, very high remolded dry strength (CH-OH); possible thin bed of sandstone (vfg, moderately cemented).			20	8 27 51 39	4	1.0'	@20ft: sample barrel wet. @21ft: clay in dry state.
543.0	25.0	GREEN SHALE, grayish green and greenish blue gray; very stiff, moderately indurated, high natural dry strength, non-organic.			25	5 19 41 45	5	1.0'	@~18-25ft: possible layers of clay in plastic state; source of water in borehole unknown; most likely possibilities include drainage from overlying slag or flow through fractures. Compare with boring G-02.
541.0		**Total Depth: 27 ft.**			30				10:30, 9 Nov 93: auger boring terminated @25ft; last SPT to 27ft. 11 Nov 93: water in borehole measured @11.6ft. 12 Nov 93: borehole plugged and abandoned with bentonite chips.
					35				

GeoSyntec Consultants

Atlanta, Ga; Boca Raton, Fla; Brussels, Belgium; Columbia, Md; Huntington Beach, Cal; Walnut Grove, Cal.

BORING LOG

Identification: C-13 **Page** 1 of 1

Site: Carus Chemical Company, LaSalle, Illinois **Project No.:** FE2147-1

Status: Soil boring, plugged and abandoned **Drilled:** 9 November 1993

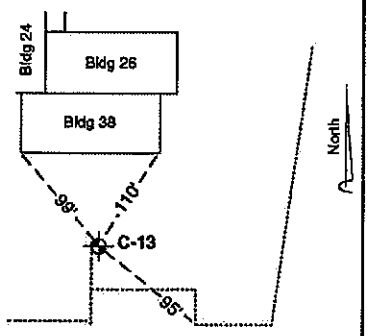
Tools & Method: 4.25 in. I.D. H.S. Auger w/ SPT **Bit Diameter:** 8 in.

Total Depth: 14.5 ft **Ground Elev.:** 569.97 ft msl **Surveyor:** Chamlin & Associates, Inc.

Drilling Co.: Layne Northwestern **Rig:** Gus Pech Brat 22R

Supervisor: Nandra Weeks **Reviewer:** J. Raymer **Driller:** Harold Waddell

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std. Pen. Test Blows	Run	Rec.	Drilling Log
570.0									11:00, 9 Nov 93: boring begun.
569.0	1.0	***SURFICAL DEPOSITS:*** SILTY CLAY with some road gravel (angular limestone), dark yellowish brown (CL). ***PENNSYLVANIAN SYSTEM:*** GREEN SHALE, light olive gray with mottles and laminations of grayish red; calcareous with some possible brachiopods, moderately indurated; remolded to CLAY, medium toughness, high plasticity (CL-CH).			5	6 10 24 22	1	0.9'	
563.0		@ ~7ft: becoming dusky red and greenish gray; rare chert nodules (fg-fp), some nodules (cp) of dark yellowish orange ochre; remolded to fat CLAY, high plasticity, high toughness (CH).			10	NR	2	1.1'	
556.0		@ 14ft: SHALEY LIMESTONE, greenish gray; very hard, strongly cemented.			15	36/2"	3	0.2'	@ 14ft: water in borehole.
555.5		**Total Depth: 14.5 ft.**			20				13:00, 9 Nov 93: auger refusal @ 14.5ft, boring terminated.
					25				11 Nov 93: water in borehole measured @ 10.1ft.
					30				12 Nov 93: borehole plugged and abandoned with bentonite chips.
					35				

GeoSyntec Consultants

Atlanta, Ga; Boca Raton, Fla; Brussels, Belgium; Columbia, Md; Huntington Beach, Cal; Walnut Grove, Cal.

BORING LOG

Identification: G-01 **Page** 1 of 2

Site: Carus Chemical Company, LaSalle, Illinois **Project No.:** FE2147-1

Status: Soil boring, plugged & abandoned **Drilled:** 10 November 1993

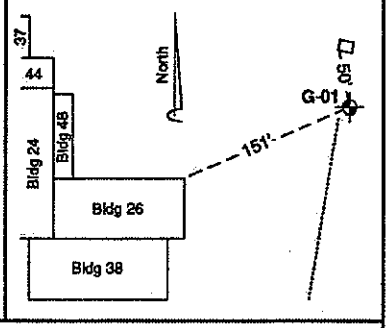
Tools & Method: 4.25 in. I.D. H.S. Auger w/ SPT **Bit Diameter:** 8 in.

Total Depth: 51 ft **Ground Elev.:** 568.60 ft msl **Surveyor:** Chamlin & Associates, Inc.

Drilling Co.: Layne Northwestern **Rig:** Gus Pech Brat 22R

Supervisor: J. Raymer **Reviewer:** Nandra Weeks **Driller:** Harold Waddelll

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std. Pen. Test Blows	Run	Rec.	Drilling Log
568.5		***MODERN FILL:*** SILTY CLAY, greenish gray, some small rock fragments (vfp or smaller); hard to very stiff; medium plasticity (CL).							12:30, 10 Nov 93: boring begun; ground dry.
						4 3 5 3	1	0.3'	
					5				
558.5	10.0	SLAG, moderate red to blackish red, vesicular; boulder to silt size, commonly welded texture.			10				
					15				
									@18ft: water on rods.
					20				
543.0	25.5	***PENNSYLVANIAN SYSTEM:*** GREEN SHALE (*residual topsoil*), light olive gray with laminations of dusky yellow, rare laminations of very dark red; weathered, a few calcareous nodules, some modern rootlets; remolded to semi-fat CLAY, stiff, high to medium toughness, high plasticity (CL/CH).			25	4 6 15 17	2	0'	
									@27ft: clay in dry state.
539.5	29.0	RED SHALE (*similar to shale at C-10*), partially weathered with disturbed laminations, dark reddish brown; very stiff; remolded to CLAY, medium toughness, medium plasticity (CL).				16 11 7 12	3	1.0'	Sample #3: piece of slag wedged in end of spoon.
					30	12 27 38 36	4	1.0'	
535.5		@33ft: shale becoming fissle and much harder, unweathered.				8 5 50 50	5	1.0'	
					35				
						34 100	6	1.0'	

Identification: G-01 **Site:** Carus Chemical **Proj. No.:** FE2147-1 **Page** 2 **of** 2

Elev. (feet)	Top (feet)	Lithology Log	Depth (feet)
494.5		@41ft: mold of Rhynconellid brachiopod found in shelby tube; no carbonate material remaining in rock.	
521.5	47.0	CALCAREOUS SHALE, grayish green, some carbonate material, with rare, visible (vfg-fg) crystals and masses of sulfides (probably pyrite).	45
520.5		@48-49 ft: LIMESTONE, coarsely crystalline, light olive gray.	
517.5	51.0	LIMESTONE.	50
517.5		**Total Depth: 51 ft.**	55
			60
			65
			70
			75
			80
			85

Graphic Log | Well | Depth (feet) | Std. Pen. Test: Blows NA | Run st1 | Rec. 0.5'

Drilling Log

@40-41ft: attempted shelby tube; pushed 0.5ft before refusal; recovered 0.3ft of undisturbed shale.

@42ft: softer drilling.

@43ft: very hard drilling.

@43.5ft: slightly softer drilling.

@47ft: harder drilling.

@48ft: very hard drilling, grinding.

@49ft: hard drilling, no grinding.

@51ft: very hard drilling, grinding, negligible penetration.

16:00, 10 Nov 93: auger refusal @51ft; boring terminated; water on rods at 18ft.

11 Nov 93: water @11.9ft.

11:30, 12 Nov 93: measured cave in to 28ft; plugged and abandoned with 40 sacks (200 lbs) of bentonite chips.

GeoSyntec Consultants

Atlanta, Ga; Boca Raton, Fla; Brussels, Belgium; Columbia, Md; Huntington Beach, Cal; Walnut Grove, Cal.

BORING LOG

Identification: G-02 **Page** 1 **of** 1

Site: Carus Chemical Company, LaSalle, Illinois **Project No.:** FE2147-1

Status: Ground-Water Monitoring Well **Drilled:** 11 November 1993

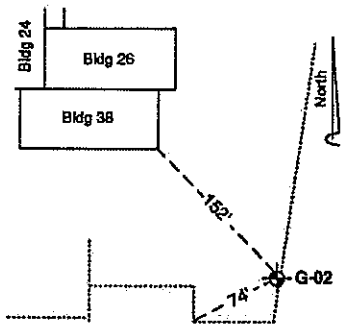
Tools & Method: 4.25 in. I.D. H.S. Auger w/ SPT, 300 lb. hammer **Bit Diameter:** 8 in.

Total Depth: 22 ft **Ground Elev.:** 565.69 ft msl **Surveyor:** Chamlin & Associates, Inc.

Drilling Co.: Layne Northwestern **Rig:** Gus Pech Brat 22R

Supervisor: J. Raymer **Reviewer:** Brian Tindell **Driller:** Harold Waddell

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std. Pen. Test Blows	Run	Rec.	Drilling Log
565.5		***MODERN FILL:*** SANDY GRAVEL *(road pavement)*, light gray; crushed angular limestone up to mp size; loose to dense; (GW).							12:21, 11 Nov 93: Boring begun, ground dry.
562.5	3.0	SLAG, moderate red to blackish red, vesicular; boulder to silt size, commonly welded texture.				3 3 3 3	1	1.0'	
559.5	6.0	***PENNYLVANIAN SYSTEM:*** CLAY *(residual soil)*, dark brown, some organic matter, high toughness, high plasticity (CH-CL).			5	3 2 4 3	2	0.5'	@6ft: clay in plastic state.
558.5	7.0	Weathered GREEN SHALE, grayish green with laminations of dusky yellow, pale olive, and moderate brown, fine veins of dusky brown; laminated and fissile with low natural dry strength; remolded to SILTY CLAY, medium plasticity, (CL); gradually becoming calcareous and less weathered downward.				1 7 7 8	3	1.5'	@7ft: shale in dry state.
							4	1.3'	Sample #4: shelby tube for permeability analysis.
554.0		@11.5-12.0ft: medium bed of MARLSTONE, followed by... medium bed of CALCAREOUS SHALE, light olive gray, fossiliferous; hard with very high natural dry strength; trace of coal.			10	3 7 12 11	5	1.0'	@11.5ft: harder drilling.
		@12ft: as above 11.5ft; coal content increasing.				2 4 5 8	6	2.0'	@13ft: water in fractured coal.
552.5	13.0								
552.0	13.5	COAL, black, brittle, highly fractured.				3 6 10 14	7	1.5'	
		GRAY CLAYSTONE *(underclay)*, light olive gray with small (vcg) white nodules; some sandy material (silt-vcg, very angular limestone fragments, trace siliceous material), some carbonized organic matter; non-fissile, hard; remolded to fat CLAY, high toughness, high plasticity (CH-OH).			15				@16.5ft: organic-rich clay in plastic state.
		grading into...				4 9 10 14	8	2.0'	@17ft: clay in dry state
548.5	17.0	DARK SHALE, dark gray; rare sand-sized and pebble-sized calcareous nodules; gradually becoming more fissile downward.				4 10 21 24	9	2.0'	@19ft: clay in plastic state.
					20	3 5 8 19	10	2.0'	@20ft: clay in dry state.
543.5		**Total Depth: 22 ft.**							15:05, 11 Nov 93: boring terminated @22ft.
									Set well: 2-in. stainless steel; 10ft of no. 10 wire- wrapped screen from 22-12ft.
					25				Annular material: 22–10 ft: filter pack, Global Sand Co. no. 7, 400 lbs. 10–2 ft: bentonite chips, 250 lbs. 2ft–top: concrete surface pad.
									15:20, 17 Nov 93: water measured in well @13.0ft below ground surface (water elevation 552.70 ft msl).
					30				
					35				

GeoSyntec Consultants

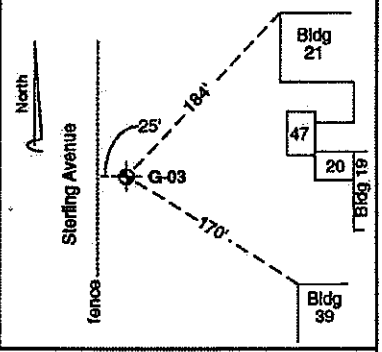
Atlanta, Ga; Boca Raton, Fla; Brussels, Belgium; Columbia, Md; Huntington Beach, Cal; Walnut Grove, Cal.

BORING LOG

Identification: G-03 **Page** 1 of 1
Site: Carus Chemical Company, LaSalle, Illinois **Project No.:** FE2147-1

Status: Soil boring, plugged and abandoned **Drilled:** 9 November 1993
Tools & Method: 4.25 in. I.D. H.S. Auger w/ SPT, automatic hammer **Bit Diameter:** 8 in.
Total Depth: 16 ft **Ground Elev.:** 582.87 ft msl **Surveyor:** Chamlin & Associates, Inc.
Drilling Co.: Layne Northwestern **Rig:** Mobil B-57
Supervisor: J. Raymer **Reviewer:** Nandra Weeks **Driller:** Mark Backhaus

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std. Pen. Test Blows	Run	Rec.	Drilling Log
583.0		***MODERN FILL:*** SANDY GRAVEL *(road pavement)*, light gray; crushed angular limestone up to mp size; loose to dense; (GW).							1030, 9 Nov 93: boring begun; ground dry.
581.0	2.0	***PENNSYLVANIAN SYSTEM:*** Weathered GREEN SHALE *(residual soil)*, intermixed and jumbled olive brown, dark reddish brown, dusky yellow, and pale olive; some pebbles (vfp-cp, round to angular limestone and chert); jumbled laminations and bedding; remolds to CLAY (CL), medium toughness, medium plasticity.				5 6 7 9	1	2.0'	@2.5ft: clay in dry state.
					5	5 7 8 10	2	2.0'	
						7 11 17 24	3	2.0'	
		@8.5ft: thin bed of SAND (fg, ws qtz).				8 21 54 49/3"	4	2.0'	
574.0	9.0	GREEN SILTSTONE *(bedrock)*, dusky greenish yellow; massive, (non-laminated, non-fissile), fractured, trace calcite cement, no fossils; remolds to high toughness, high plasticity PLASTIC SILT (MH).			10	17 54 51/3"	5	1.2'	
570.0	13.0	RED SHALE, very dusky red with some layers of grayish green; a few thin to very thin beds of limestone (finely crystalline).							@13ft: very hard drilling.
567.0		**Total Depth: 16ft.**			15	20 69/3"	6	0.8'	1200, 9 Nov 93: auger refusal @16ft; boring terminated; borehole dry.
									10 Nov 93: borehole dry; plugged and abandoned.
					20				
					25				
					30				
					35				

GeoSyntec Consultants

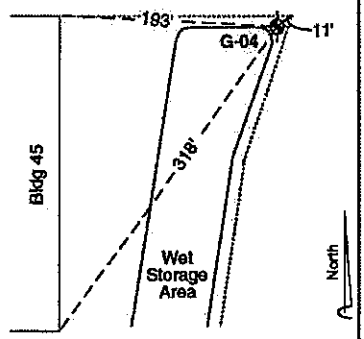
Atlanta, Ga; Boca Raton, Fla; Brussels, Belgium; Columbia, Md; Huntington Beach, Cal; Walnut Grove, Cal.

BORING LOG

Identification: G-04 **Page** 1 of 1
Site: Carus Chemical Company, LaSalle, Illinois **Project No.:** FE2147-1

Status: Ground-Water Monitoring Well **Drilled:** 11 November 1993
Tools & Method: 4.25 in. I.D. H.S. Auger w/ SPT, automatic hammer **Bit Diameter:** 8 in.
Total Depth: 20 ft **Ground Elev.:** 572.63 ft msl **Surveyor:** Chamlin & Associates, Inc.
Drilling Co.: Layne Northwestern **Rig:** Mobil B-57
Supervisor: J. Raymer **Reviewer:** Nandra Weeks **Driller:** Mark Backhaus

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std. Pen. Test Blows	Run	Rec.	Drilling Log
572.5		***MODERN FILL:*** CLAY *(developing topsoil)*, dusky yellowish brown, some sand and silt, little organic material including rootlets and charcoal, trace gravel (vfp); firm; medium toughness, medium plasticity (CL).				1 5 5 4	1	2.0'	07:30, 11 Nov 93: boring begun, ground dry. @1ft: clay in plastic state. Sample #1 analyzed for UST parameters; HNU=0ppm.
571.5	1.0	REWORKED SHALE, pale olive with laminae of dusky yellowish brown and light olive gray; primarily consisting of jumbled pieces of weathered shale with some organic matter and a trace of gravel (vfp); weathered, firm; remolded to semi-fat CLAY, medium toughness, high plasticity (CL-CH).				3 4 5 7	2	2.0'	Sample #2 analyzed for UST parameters; HNU=0ppm.
566.0	6.5	Sharp base.			5	3 4 5 5	3	1.6'	
		PLEISTOCENE SERIES: SILTY CLAY, moderate yellowish brown, massive, stiff, medium toughness, medium plasticity (CL). @7.5ft: becoming coarser downward, grading into...							
654.5	8.0	SANDY CLAY, moderate yellowish brown (SC).							
		FINE TILL (jumbled, well-graded mixture of rocks in a dense matrix): rocks consist sand and pebble sizes of rounded and angular, light gray limestone, dark yellowish orange ochre nodules, and very well rounded quartz pebbles (mp); matrix is firm and consists of moderate yellowish brown silty clay; GRAVELLY SANDY CLAYEY SILT (GC-GM).			10	7 8 10 8	4	2.0'	
									@12ft: slightly faster, uniform drilling.
599.0	13.5	COARSE TILL, primarily consisting of well-graded gravel with some fines; gravel ranges to cobble size, consists mostly of rounded pebbles of andesite, granite, limestone, hematite-cemented sandstone, and well-sorted quartz pebbles (vwr, iron-stained); loose, non-cohesive, permeable, well- graded GRAVEL (GW).							@13.5ft: noisy, rock. @14ft: gravel wet.
					15	7 42 50/3"	5	1.0'	Samples #5 and #6 composited and analyzed for UST parameters; hydrocarbon odor; HNU=50ppm; appears to be fuel oil or diesel fuel
556.5		@16ft: 3-in. diameter cobble.				13 67 84/3"	6	0.5'	
554.5		@18ft: till becoming finer downward; grading into...				9 13 13 9	7	1.5'	
553.5	19.0	SILTY CLAY, grayish orange and moderate yellowish brown, some layers of wood charcoal or carbonized organic matter; massive, low toughness, low plasticity (CL).			20				10:00, 11 Nov 93: auger boring terminated @19ft; last split spoon taken to 20ft.
552.5		**Total Depth: 20 ft.**							Set well: 2-in. stainless steel with no. 10 wire wrapped screen from 19-9 ft. Annular material 19–7 ft: filter gravel, Global Sand Co. no. 7; 7–2 ft: bentonite chips; 2 ft–top: concrete pad. 15:54, 17 Nov 93: water measured in well @13.0ft below ground surface (water elevation 559.58ft msl).
					25				
					30				
					35				

GeoSyntec Consultants

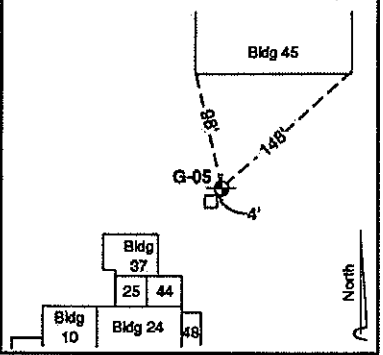
Atlanta, Ga; Boca Raton, Fla; Brussels, Belgium; Columbia, Md; Huntington Beach, Cal; Walnut Grove, Cal.

BORING LOG

Identification: G-05 **Page** 1 of 1
Site: Carus Chemical Company, LaSalle, Illinois **Project No.:** FE2147-1

Status: Ground-Water Monitoring Well **Drilled:** 10 November 1993
Tools & Method: 4.25 in. I.D. H.S. Auger w/ SPT **Bit Diameter:** 8 in.
Total Depth: 25 ft **Ground Elev.:** 574.89 ft msl **Surveyor:** Chamlin & Associates, Inc.
Drilling Co.: Layne Northwestern **Rig:** Mobil B-57
Supervisor: Nandra Weeks **Reviewer:** J. Raymer **Driller:** Mark Backhaus

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std. Pen. Test Blows	Run	Rec.	Drilling Log
575.0		***MODERN FILL:*** SANDY GRAVEL *(road pavement)*, light gray; crushed angular limestone up to mp size; loose to dense; (GW).							12:30, 10 Nov 93: Boring begun; ground dry.
574.0	1.0	REWORKED SHALE, jumbled chips of weathered shale with a little miscellaneous fill debris, including small pieces of coal, grayish red pale olive, and dusky yellow; firm, poorly compacted; remolded to CLAY, high remolded dry strength, medium toughness, high plasticity (CL-CH).							
					5	4 5 6 6	1	0.8'	
567.0		@~8ft: becoming with a little gravel and other miscellaneous fill debris, including brick and glazed tile.							
					10	6 2 6 3	2	0.3'	
562.0		@~13ft: becoming somewhat more uniform greenish gray.							
					15	4 6 6 8	3	1.5'	
557.0	18.0	SANDY GRAVELLY CLAY with abundant beds of clayey sandy gravel *(pond sediment)*: soft to very soft, permeable (GC).							
					20	3 2 3 2	4	1.8'	
552.5	22.5	***PENNSYLVANIAN SYSTEM:*** Weathered GREEN SHALE *(residual soil)*, greenish gray; contains some coal fragments and a little gravel; fissile, firm, becoming stiffer downwards, less permeable than above unit; remolded to CLAY (CL).							
					25	8 10 13 9	5	1.5'	
549.5		**Total Depth: 25.5 ft.**							13:25, 10 Nov 93: auger boring terminated @23.5ft; last split spoon to 25.5ft. Set well: 2-in. stainless steel casing; no. 10 wire-wrapped screen from 23.5–13.5ft. Annular material: 23.5–12ft: filter gravel, Global no. 7, 425 lbs 12–10ft: bentonite chips, 50 lbs. 10–2ft: volclay slurry grout. 15:54, 17 Nov 93: water measured in well @12.5ft below ground surface (water elevation 562.33ft msl).
					30				
					35				

Geosyntec consultants

BORING NUMBER SB-301

CLIENT Carus Chemical Corporation
PROJECT NUMBER FR1347
DATE STARTED 10/9/07 COMPLETED 10/9/07
DRILLING CONTRACTOR Stearns
DRILLING METHOD Rotosonic
LOGGED BY McKinnon/Evans/Hayter CHECKED BY
NOTES

PROJECT NAME M&H Site
PROJECT LOCATION LaSalle, Illinois
GROUND ELEVATION 539.7 ft HOLE SIZE 6in
GROUND WATER LEVELS:
AT TIME OF DRILLING ---
AT END OF DRILLING ---
AFTER DRILLING ---

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
	SLAG, reddish brown to black, fine sand to gravel size, loose, dry	0		PID = 0.9
				PID = 0.4
				PID = 0
535				PID = 0
		5		
530		10		
				PID = 0
				PID = 0
525		15		
				PID = 0
				PID = 0
520		20		PID = 0
				PID = 0
515		25		PID = 0
510		30		
				PID = 0
				PID = 0
505		35		

(Continued Next Page)

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:27 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

Geosyntec consultants

BORING NUMBER SB-301

CLIENT Carus Chemical Corporation
PROJECT NAME M&H Site
PROJECT NUMBER FR1347
PROJECT LOCATION LaSalle, Illinois

ELEVATION (ft)		MATERIAL DESCRIPTION		DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
		SLAG, reddish brown to black, fine sand to gravel size, loose, dry *(continued)*		35		PID = 0
500				40		PID = 0
						PID = 0
495				45		
	490.7		49.0			
490		CLAYEY SILT (ML), greenish gray to reddish brown, dense, dry		50		PID = 0
						PID = 0
485				55		PID = 0
						PID = 0
	480.7		59.0			
480		SILTY CLAY (CL), greenish gray, stiff to medium stiff, dry, trace siltstone fragments		60		PID = 0
						PID = 0.9
475				65		PID = 1.8
						PID = 0
	470.7		69.0			PID = 2.2
470		CLAY (CL), light gray to greenish gray, medium stiff to stiff, dry		70		PID = 0
						PID = 2.2
465				75		PID = 2.7

(Continued Next Page)

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:27 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

Geosyntec consultants

BORING NUMBER SB-301

CLIENT Carus Chemical Corporation
PROJECT NAME M&H Site
PROJECT NUMBER FR1347
PROJECT LOCATION LaSalle, Illinois

ELEVATION (ft)		MATERIAL DESCRIPTION		DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
		CLAY (CL), light gray to greenish gray, medium stiff to stiff, dry *(continued)*		75		PID = 5
		@ ~77' - 79' Little silt, crumbly and stiff				PID = 0.9
460				80		PID = 0.4
						PID = 6.4
						PID = 4.5
455				85		
	453.7		86.0			PID = 9.1
		SHALE, dark gray				PID = 2.1
	450.7		89.0			
450		Total Depth: 89 ft				PID = 0.9
445						
440						
435						
430						
425						

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:27 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

Geosyntec consultants

BORING NUMBER SB-302

CLIENT Carus Chemical Corporation
PROJECT NUMBER FR1347
DATE STARTED 10/9/07 COMPLETED 10/9/07
DRILLING CONTRACTOR Stearns
DRILLING METHOD Rotosonic
LOGGED BY McKinnon/Evans/Hayter CHECKED BY
NOTES

PROJECT NAME M&H Site
PROJECT LOCATION LaSalle, Illinois
GROUND ELEVATION 547.3 ft HOLE SIZE 6in
GROUND WATER LEVELS:
AT TIME OF DRILLING ---
AT END OF DRILLING ---
AFTER DRILLING ---

ELEVATION (ft)		MATERIAL DESCRIPTION		DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
		SLAG, reddish brown, fine sand to gravel, very loose, conchoidal fracturing, vesicular, subangular to angular, dry; trace CLAY		0		
545				5		
540						PID = 1.5
	537.3		10.0	10		PID = 0
		SANDY CLAY (CL), reddish brown, soft, moist; little GRAVEL, fine				PID = 0
	535.3		12.0			PID = 0.2
535		SAND (SP), yellowish-brown, medium to coarse sand, very loose, dry; little to some GRAVEL, fine, subangular				PID = 0
						PID = 0
				15		
530						PID = 0
	528.3		19.0			
		SILY SAND (SM), orangish brown, fine, dry; little to some GRAVEL, subangular; trace CLAY		20		
525						PID = 3.2
	524.3		23.0			
		CLAYEY SILT (ML), brownish gray, very stiff, little SAND, fine; trace GRAVEL, fine				PID = 0.2
				25		
	521.3		26.0			PID = 0
		LIMESTONE, light brown, weathered				
520	519.3		28.0			PID = 0
	518.3	LIMESTONE, white	29.0			PID = 0
		Total Depth: 29 ft				
515						

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:27 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

Geosyntec consultants

BORING NUMBER SB-303

CLIENT Carus Chemical Corporation
PROJECT NUMBER FR1347
DATE STARTED 10/11/07 COMPLETED 10/11/07
DRILLING CONTRACTOR Stearns
DRILLING METHOD Rotosonic
LOGGED BY McKinnon/Evans/Bodine CHECKED BY
NOTES

PROJECT NAME M&H Site
PROJECT LOCATION LaSalle, Illinois
GROUND ELEVATION 551.34 ft HOLE SIZE 6in
GROUND WATER LEVELS:
▽ AT TIME OF DRILLING 108.00 ft / Elev 443.34 ft
AT END OF DRILLING ---
AFTER DRILLING ---

ELEVATION (ft)		MATERIAL DESCRIPTION		DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
550	549.3	SILTY SOIL (PT), brown, roots, organics, very loose, dry	2.0	0		
	548.3	SILTY FILL, white, loose dry; trace COBBLE; trace GRAVEL	3.0			PID = 4.2
		SILTY SOIL (PT), black, loose, organics, dry; little coarse SAND, little GRAVEL		5		PID = 14
545						
	541.8	SLAG and MODERN FILL (GP-GC); black to red with orange/brown/yellow/gray variation, clay to cobble size, poor sorting, stiff to very loose, dry	9.5	10		
540						
				15		
535						PID = 9
				20		PID = 9
530						PID = 96
				25		PID = 146
525						PID = 11
						PID = 1.4
				30		PID = 1.8
520		@ ~33' SLAG boulder				PID = 5.2
				35		PID = 0.5

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:27 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

(Continued Next Page)

Geosyntec consultants

BORING NUMBER SB-303
PAGE 2 OF 4

CLIENT Carus Chemical Corporation
PROJECT NAME M&H Site
PROJECT NUMBER FR1347
PROJECT LOCATION LaSalle, Illinois

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
515	SLAG and MODERN FILL (GP-GC); black to red with orange/brown/yellow/gray variation, clay to cobble size, poor sorting, stiff to very loose, dry *(continued)*	35		PID = 0
		40		PID = 3.1
510	@ ~42' SLAG boulder			PID = 1.6
				PID = 6.5
		45		PID = 0.5
505				
		50		PID = 1
500				PID = 2.7
				PID = 2.2
		55		PID = 2
495				PID = 1
		60		PID = 3.5
490				PID = 4.2
				PID = 7
		65		PID = 2.9
485				
	@ ~52' - 88' Brick fill	70		PID = 3.7
480				PID = 4.4
				PID = 6.1
		75		

(Continued Next Page)

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:27 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

Geosyntec consultants

BORING NUMBER SB-303

CLIENT Carus Chemical Corporation
PROJECT NAME M&H Site
PROJECT NUMBER FR1347
PROJECT LOCATION LaSalle, Illinois

ELEVATION (ft)		MATERIAL DESCRIPTION		DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
475		SLAG and MODERN FILL (GP-GC); black to red with orange/brown/yellow/gray variation, clay to cobble size, poor sorting, stiff to very loose, dry *(continued)*		75		PID = 3.7
				80		PID = 2.5
470						PID = 6.3
						PID = 2.7
				85		
465						
	462.3					
		SILTY CLAY (CL), brown, stiff, moist; trace GRAVEL/TILL, rounded	89.0	90		PID = 1
460						PID = 5.9
				95		PID = 4.8
455						PID = 5
						PID = 3.1
				100		PID = 2.5
450						PID = 6.7
						PID = 4.6
				105		
445						PID = 2
	443.3 ▽					
	442.3	SANDY GRAVEL (GW), brown, rounded, loose, wet; trace SILT	108.0			PID = 3.5
		SAND (SW), brown, medium-grained, rounded, well sorted, loose, wet	109.0	110		PID = 1
440	439.3					
		CLAYEY GRAVEL (GC), brown, stiff, rounded, moist; some COBBLE, rounded	112.0			PID = 4.8
	437.3					PID = 1.8
		SILTY CLAY (CL), greenish-brown to brown, hard, dry; trace TILL	114.0	115		

(Continued Next Page)

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:27 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

Geosyntec consultants

BORING NUMBER SB-303

CLIENT Carus Chemical Corporation **PROJECT NAME** M&H Site

PROJECT NUMBER FR1347 **PROJECT LOCATION** LaSalle, Illinois

ELEVATION (ft)		MATERIAL DESCRIPTION		DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
		SILTY CLAY (CL), greenish-brown to brown, hard, dry; trace TILL *(continued)*		115		
435						PID = 6.1
				120		PID = 0.2
	430.3		121.0			
430		CLAY (CL), gray, very stiff				
	427.3		124.0			
		Total Depth: 124 ft				
425						
420						
415						
410						
405						
400						

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:28 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

Geosyntec consultants

BORING NUMBER SB-304

CLIENT Carus Chemical Corporation
PROJECT NUMBER FR1347
DATE STARTED 10/10/07 COMPLETED 10/10/07
DRILLING CONTRACTOR Stearns
DRILLING METHOD Rotosonic
LOGGED BY McKinnon/Evans/Bodine CHECKED BY
NOTES

PROJECT NAME M&H Site
PROJECT LOCATION LaSalle, Illinois
GROUND ELEVATION 555.31 ft HOLE SIZE 6in
GROUND WATER LEVELS:
AT TIME OF DRILLING ---
AT END OF DRILLING ---
AFTER DRILLING ---

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
555	SLAG and MODERN FILL material (GP-GC), black to red, fine-gravel size, dry, loose	0		
550		5		
545		10		
540		15		
535		20		
530		25		
525		30		
		35		

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:28 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

(Continued Next Page)

Geosyntec consultants

BORING NUMBER SB-304

CLIENT Carus Chemical Corporation **PROJECT NAME** M&H Site

PROJECT NUMBER FR1347 **PROJECT LOCATION** LaSalle, Illinois

ELEVATION (ft)		MATERIAL DESCRIPTION		DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
520		SLAG and MODERN FILL material (GP-GC), black to red, fine-gravel size, dry, loose *(continued)*		35		
		@ ~13' - 59' Brick-like, clay to cobble sized FILL present, loose to stiff				
515				40		
510				45		
505				50		
500				55		
	496.3		59.0			
		CLAY (CL), brown, stiff; trace GRAVEL; weathered LIMESTONE transition zone		60		
495	493.3		62.0			
		LIMESTONE, light gray				
490				65		
	487.3		68.0			
		Total Depth: 68 ft				
485						

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:28 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

Geosyntec consultants

BORING NUMBER SB-305

CLIENT Carus Chemical Corporation
PROJECT NUMBER FR1347
DATE STARTED 10/18/07 COMPLETED 10/18/07
DRILLING CONTRACTOR Stearns
DRILLING METHOD Rotosonic
LOGGED BY McKinnon CHECKED BY
NOTES

PROJECT NAME M&H Site
PROJECT LOCATION LaSalle, Illinois
GROUND ELEVATION 552.87 ft HOLE SIZE 6in
GROUND WATER LEVELS:
AT TIME OF DRILLING ---
AT END OF DRILLING ---
AFTER DRILLING ---

ELEVATION (ft)		MATERIAL DESCRIPTION		DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
	551.9	SOIL (PT), black, loose, roots, organics, dry	1.0	0		
	550.9	SANDY CLAY (CL), light brown, dry	2.0			PID = 0
550		SLAG and MODERN FILL (GP-GC), brown to red with some orange/yellow/gray color variation, clay to cobble size		5		
545		@ ~7.5' - 8' Brick fill		10		PID = 0
540				15		
535				20		PID = 0
530		@ ~21' - 25' Brick fill		25		
525				30		PID = 0
520				35		

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:28 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

(Continued Next Page)

Geosyntec consultants

BORING NUMBER SB-305

CLIENT Carus Chemical Corporation
PROJECT NAME M&H Site
PROJECT NUMBER FR1347
PROJECT LOCATION LaSalle, Illinois

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
515	SLAG and MODERN FILL (GP-GC), brown to red with some orange/yellow/gray color variation, clay to cobble size *(continued)*	35		
510		40		PID = 0
505		45		
500		50		PID = 0
495	@ ~39' - 77' Brick fill	55		
490		60		
485		65		PID = 0
480		70		
		75		PID = 0

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:28 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

(Continued Next Page)

Geosyntec consultants

BORING NUMBER SB-305

CLIENT Carus Chemical Corporation **PROJECT NAME** M&H Site

PROJECT NUMBER FR1347 **PROJECT LOCATION** LaSalle, Illinois

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
	SLAG and MODERN FILL (GP-GC), brown to red with some orange/yellow/gray color variation, clay to cobble size *(continued)*	75		
475				
	@ ~80' Slag boulder	80		PID = 0
470				
		85		
465				
		90		PID = 0
461.9		91.0		
	SILTY CLAY (CL), grayish-brown, stiff, dry			
460		95		
455				
453.9		99.0		
	SANDY CLAY (CL), light brown, fine-medium grained sand, soft, angular clasts, dry; little GRAVEL, rounded; little COBBLE	100		
450				
		105		
445				
		110		
440				
		115		

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:28 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

(Continued Next Page)

Geosyntec consultants

BORING NUMBER SB-305

CLIENT Carus Chemical Corporation **PROJECT NAME** M&H Site

PROJECT NUMBER FR1347 **PROJECT LOCATION** LaSalle, Illinois

ELEVATION (ft)		MATERIAL DESCRIPTION		DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
	436.9		116.0	115		
435		CLAY (CL) with weathered LIMESTONE, grayish-brown, stiff, dry		120		
	430.9		122.0			
430		LIMESTONE, gray, dry		125		PID = 0
	426.9		126.0			PID = 0
425		SHALE, brownish-gray		130		PID = 0
420						PID = 0
				135		PID = 0
415						PID = 0
	413.9		139.0			
410		SHALE in CLAY matrix, dark gray, soft, sub-angular sub-rounded shale fragments, moist to wet		140		
				145		
405						
				150		
	400.9		152.0			
400		Total Depth: 152 ft				

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:28 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

Geosyntec consultants

BORING NUMBER SB-306

CLIENT Carus Chemical Corporation
PROJECT NAME M&H Site
PROJECT NUMBER FR1347
PROJECT LOCATION LaSalle, Illinois
DATE STARTED 10/16/07 COMPLETED 10/16/07
GROUND ELEVATION 540.87 ft HOLE SIZE 6in
DRILLING CONTRACTOR Stearns
GROUND WATER LEVELS:
DRILLING METHOD Rotosonic
AT TIME OF DRILLING ---
LOGGED BY McKinnon/Evans CHECKED BY
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
540	SLAG and MODERN FILL material (GP-GC), black to red, fine to cobble size, dry, loose	0		PID = 1.4
				PID = 0
		5		PID = 0
535				
		10		
530				PID = 1
				PID = 0.5
		15		
525				PID = 0.5
		20		PID = 3.3
520				PID = 3.1
				PID = 4.4
		25		
515				
		30		PID = 3.5
510				PID = 3.6
				PID = 4.5
		35		

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:28 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

(Continued Next Page)

Geosyntec consultants

BORING NUMBER SB-306

CLIENT Carus Chemical Corporation **PROJECT NAME** M&H Site

PROJECT NUMBER FR1347 **PROJECT LOCATION** LaSalle, Illinois

ELEVATION (ft)		MATERIAL DESCRIPTION		DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
505		SLAG and MODERN FILL material (GP-GC), black to red, fine to cobble size, dry, loose *(continued)* @ ~10' - 59' Brick-like, clay to cobble sized FILL present with SLAG, loose to stiff		35		
				40		PID = 15.7
500						PID = 11.4
				45		PID = 9.5
495						PID = 1
				50		PID = 2
490						PID = 16.6
						PID = 16.4
				55		PID = 10.4
485						PID = 4.6
				60		PID = 0
480						PID = 1.4
		@ ~59' - 66' Black, boulder sized SLAG				
				65		PID = 1
475						
	473.9	@ ~65' - 67' Transition from SLAG/FILL to CLAY	67.0			PID = 3.5
		CLAY (CL), reddish-orange, stiff				
	471.9		69.0			PID = 6.1
		SANDY CLAY (CL), brown, stiff, dry		70		
470						PID = 0
						PID = 0.5
				75		

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:28 - H:\GIS\GIS\PROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

(Continued Next Page)

Geosyntec consultants

BORING NUMBER SB-306

CLIENT Carus Chemical Corporation
PROJECT NAME M&H Site
PROJECT NUMBER FR1347
PROJECT LOCATION LaSalle, Illinois

ELEVATION (ft)		MATERIAL DESCRIPTION		DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
465		SANDY CLAY (CL), brown, stiff, dry *(continued)*		75		PID = 0.8
	461.9		79.0			PID = 0.8
		Total Depth: 79 ft				
460						
455						
450						
445						
440						
435						
430						

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:28 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

Geosyntec consultants

BORING NUMBER SB-307

CLIENT Carus Chemical Corporation
PROJECT NUMBER FR1347
DATE STARTED 10/24/07 COMPLETED 10/24/07
DRILLING CONTRACTOR Stearns
DRILLING METHOD Rotosonic
LOGGED BY McKinnon CHECKED BY
NOTES

PROJECT NAME M&H Site
PROJECT LOCATION LaSalle, Illinois
GROUND ELEVATION 528.56 ft HOLE SIZE 6in
GROUND WATER LEVELS:
AT TIME OF DRILLING ---
AT END OF DRILLING ---
AFTER DRILLING ---

ELEVATION (ft)		MATERIAL DESCRIPTION		DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
		SANDY SOIL, black, medium-fine sand grains, very loose, dry, with organics and road fill; trace GRAVEL		0		PID = 0
		@ ~2.5' Wet				PID = 2
525	524.6	LIMESTONE, white, dry	4.0	5		PID = 1.9
						PID = 2.6
520	518.6	Total Depth: 10 ft	10.0	10		
515						
510						
505						
500						
495						

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:28 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

Geosyntec consultants

BORING NUMBER SB-308

CLIENT Carus Chemical Corporation
PROJECT NAME M&H Site
PROJECT NUMBER FR1347
PROJECT LOCATION LaSalle, Illinois
DATE STARTED 10/17/07 COMPLETED 10/17/07
GROUND ELEVATION 489.7 ft HOLE SIZE 6in
DRILLING CONTRACTOR Stearns
GROUND WATER LEVELS:
DRILLING METHOD Rotosonic
▽ AT TIME OF DRILLING 31.40 ft / Elev 458.30 ft
LOGGED BY McKinnon/Evans CHECKED BY
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
	SLAG and MODERN FILL (brick-like) material (GP-GC), red to brown, fine-cobble size, dry, loose	0		PID = 1.8
485		5		PID = 5.4 PID = 1.8 PID = 0.5 PID = 0.8
480		10		PID = 1
475		15		PID = 3 PID = 0
470		20		PID = 0 PID = 0
465		25		PID = 0 PID = 0
460	▽ @ ~31.4' Wet	30		PID = 0 PID = 0
455		35		PID = 0

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:28 - H:\GIS\GIS\PROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

(Continued Next Page)

Geosyntec consultants

BORING NUMBER SB-308

CLIENT Carus Chemical Corporation
PROJECT NAME M&H Site
PROJECT NUMBER FR1347
PROJECT LOCATION LaSalle, Illinois

ELEVATION (ft)		MATERIAL DESCRIPTION		DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
				35		
	453.2	SLAG and MODERN FILL (brick-like) material (GP-GC), red to brown, fine-cobble size, dry, loose *(continued)*	36.5			PID = 0
	452.2	SILTY, SANDY GRAVEL (GM), brown, poor-sorting, loose, sub-rounded, wet; trace SLAG	37.5			PID = 0
450		SANDY, CLAYEY GRAVEL (GC), light brown, medium dense, poor sorting, sub-rounded, moist; little COBBLE size		40		
	445.7		44.0			
445		GRAVELLY CLAY (CL), brownish-gray, dense		45		
	440.7		49.0			
440		Total Depth: 49 ft				
435						
430						
425						
420						
415						

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:28 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

Geosyntec consultants

BORING NUMBER SB-309

CLIENT Carus Chemical Corporation
PROJECT NUMBER FR1347
DATE STARTED 10/17/07 COMPLETED 10/17/07
DRILLING CONTRACTOR Stearns
DRILLING METHOD Rotosonic
LOGGED BY McKinnon/Evans CHECKED BY
NOTES

PROJECT NAME M&H Site
PROJECT LOCATION LaSalle, Illinois
GROUND ELEVATION 487.28 ft HOLE SIZE 6in
GROUND WATER LEVELS:
AT TIME OF DRILLING ---
AT END OF DRILLING ---
AFTER DRILLING ---

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
485	SLAG and MODERN FILL (GP-GC), reddish brown to black, fine to cobble size, loose to very loose, dry	0		
480		5		
475		10		
470		15		
465		20		
460		25		
455		30		
		35		

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:28 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

(Continued Next Page)

Geosyntec consultants

BORING NUMBER SB-309
PAGE 2 OF 2

CLIENT Carus Chemical Corporation
PROJECT NAME M&H Site
PROJECT NUMBER FR1347
PROJECT LOCATION LaSalle, Illinois

ELEVATION (ft)		MATERIAL DESCRIPTION		DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
		SLAG and MODERN FILL (GP-GC), reddish brown to black, fine to cobble size, loose to very loose, dry *(continued)*		35		
450	448.3		39.0			
	447.3	SILTY GRAVEL (GM), brown, very loose, sub-rounded, dry; trace COBBLE size; trace SLAG	40.0	40		
	446.3	CLAYEY SILT (ML), brown, medium-dense, dry; trace GRAVEL	41.0			
445		CLAYEY GRAVEL (GC), brown, loose, poor sorting, sub-rounded, dry; some SILT; trace COBBLE size		45		
440	438.3		49.0			
		SILTY GRAVEL (GM), brown, loose, poor sorting, dry; little COBBLE size; little CLAY		50		
435	433.8		53.5			
	432.3	SILTY CLAY (CL), light brown, dense, dry	55.0	55		
430		LIMESTONE, white, dry				
	428.3		59.0			
		Total Depth: 59 ft				
425						
420						
415						

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:28 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

Geosyntec consultants

BORING NUMBER SB-311

CLIENT Carus Chemical Corporation
PROJECT NUMBER FR1347
DATE STARTED 10/26/07 COMPLETED 10/26/07
DRILLING CONTRACTOR Stearns
DRILLING METHOD Rotosonic
LOGGED BY McKinnon CHECKED BY
NOTES

PROJECT NAME M&H Site
PROJECT LOCATION LaSalle, Illinois
GROUND ELEVATION 584.29 ft HOLE SIZE 6in
GROUND WATER LEVELS:
AT TIME OF DRILLING ---
AT END OF DRILLING ---
AFTER DRILLING ---

ELEVATION (ft)		MATERIAL DESCRIPTION		DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
	583.3	SANDY GRAVEL (Modern Fill) (GP)		0		
		SILTY CLAY (CH), light brown, soft, dry; trace GRAVEL	1.0			
	580.3					
580		CLAY (CL), light brown, medium stiff, dry; trace GRAVEL; trace SAND, fine-coarse	4.0	5		
	576.3					
		GRAVELLY SILTY CLAY (CL), light brown, medium stiff, dry	8.0			
575				10		
	573.3					
		SILTY CLAY (CL), light brown, stiff, dry	11.0			
	570.3	@ ~13' - 14' Some weathered LIMESTONE, gray				
570		LIMESTONE, light gray	14.0	15		
565				20		
560				25		
555	554.3					
		Total Depth: 30 ft	30.0	30		
550						

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:28 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

Geosyntec consultants

BORING NUMBER SB-317

PAGE 1 OF 1

CLIENT Carus Chemical Corporation
PROJECT NUMBER FR1347
DATE STARTED 10/25/07 COMPLETED 10/25/07
DRILLING CONTRACTOR Stearns
DRILLING METHOD Rotosonic
LOGGED BY McKinnon CHECKED BY
NOTES

PROJECT NAME M&H Site
PROJECT LOCATION LaSalle, Illinois
GROUND ELEVATION 578.34 ft HOLE SIZE 6in
GROUND WATER LEVELS:
AT TIME OF DRILLING ---
AT END OF DRILLING ---
AFTER DRILLING ---

ELEVATION (ft)		MATERIAL DESCRIPTION		DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
		SANDY GRAVEL (modern fill) (GP)		0		
	576.3					PID = 6.6
		CLAY (CH), orangish brown, soft, dry	2.0			PID = 0
575	573.8					
		SHALE (CL), red to light rown, reworked to CLAY, dense, dry; trace SAND, coarse	4.5	5		PID = 0.2
						PID = 0
570				10		
565	563.3					
		LIMESTONE, gray	15.0	15		
		@ ~15' - 18' Weathered				
560				20		
555						
				25		
550	548.3					
		Total Depth: 30 ft	30.0	30		
545						

CARUS ENVIRONMENTAL.BH - GINT STD US.GDT - 5/20/10 15:28 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

Geosyntec consultants

BORING NUMBER SB-320H

CLIENT Carus Chemical Corporation
PROJECT NUMBER FR1347
DATE STARTED 12/17/07 COMPLETED 12/17/07
DRILLING CONTRACTOR Stearns
DRILLING METHOD Hollow Stem Auger
LOGGED BY Evans/McKinnon CHECKED BY
NOTES

PROJECT NAME M&H Site
PROJECT LOCATION LaSalle, Illinois
GROUND ELEVATION 559.85 ft HOLE SIZE 2in
GROUND WATER LEVELS:
AT TIME OF DRILLING ---
AT END OF DRILLING ---
AFTER DRILLING --

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
	SLAG and MODERN FILL material (GP-GC), red/black, fine to cobble size, poor sorting, loose, dry	0		
555		5		
550		10		
545		15		
540		20		
535	@ ~24' - 29' Moist	25		
530		30		
		35		

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:28 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

(Continued Next Page)

Geosyntec consultants

BORING NUMBER SB-320H
PAGE 2 OF 3

CLIENT Carus Chemical Corporation
PROJECT NAME M&H Site
PROJECT NUMBER FR1347
PROJECT LOCATION LaSalle, Illinois

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
	SLAG and MODERN FILL material (GP-GC), red/black, fine to cobble size, poor sorting, loose, dry *(continued)*	35		
520		40		
515		45		
510		50		
505	@ ~54' - 54.25' Perched wet zone	55		
500		60		
	@ ~59' - 64' Perched wet zone			
495		65		
490		70		
		75		

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:28 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

(Continued Next Page)

Geosyntec consultants

BORING NUMBER SB-320H

CLIENT Carus Chemical Corporation
PROJECT NAME M&H Site
PROJECT NUMBER FR1347
PROJECT LOCATION LaSalle, Illinois

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
	SLAG and MODERN FILL material (GP-GC), red/black, fine to cobble size, poor sorting, loose, dry *(continued)*	75		
480		80		
475		85		
470.9	SILTY CLAY (CL), brown, stiff	89.0		
470		90		
465		95		
460		100		
455.9	SHALE	104.0		
455		105		
453.9	Total Depth: 106 ft	106.0		
450				

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:28 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

Geosyntec consultants

BORING NUMBER SB-321H

CLIENT Carus Chemical Corporation
PROJECT NAME M&H Site
PROJECT NUMBER FR1347
PROJECT LOCATION LaSalle, Illinois
DATE STARTED 12/19/07 COMPLETED 12/19/07
GROUND ELEVATION 545.68 ft HOLE SIZE 6in
DRILLING CONTRACTOR Stearns
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Evans/McKinnon CHECKED BY
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
545	SLAG and MODERN FILL material, red to reddish brown/black, clay to cobble size, loose, poor sorting, dry	0		
540		5		PID = 0
535		10		PID = 0
530		15		PID = 0
	@ ~19' White, crystalline substance	20		PID = 0
525				
520		25		PID = 0
515		30		PID = 0
	@ ~29' - 36' Brick fill	35		

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:28 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

(Continued Next Page)

Geosyntec consultants

BORING NUMBER SB-321H
PAGE 2 OF 3

CLIENT Carus Chemical Corporation
PROJECT NAME M&H Site
PROJECT NUMBER FR1347
PROJECT LOCATION LaSalle, Illinois

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
510	SLAG and MODERN FILL material, red to reddish brown/black, clay to cobble size, loose, poor sorting, dry *(continued)*	35		PID = 0
505		40		PID = 0
500		45		PID = 0
495	@ ~44' - 61' Brick fill	50		PID = 0
490		55		PID = 0
485		60		PID = 0
480		65		PID = 0.3
475	@ ~69' - 71' Brick fill	70		PID = 0.3
471.7	CLAY (CL), grayish brown, stiff, dry (with 0.5 ft wet zone); some SLAG; little GRAVEL	74.0 75		

(Continued Next Page)

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:28 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

Geosyntec consultants

BORING NUMBER SB-321H

CLIENT Carus Chemical Corporation **PROJECT NAME** M&H Site

PROJECT NUMBER FR1347 **PROJECT LOCATION** LaSalle, Illinois

ELEVATION (ft)		MATERIAL DESCRIPTION		DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
470	469.7	CLAY (CL), grayish brown, stiff, dry (with 0.5 ft wet zone); some SLAG; little GRAVEL *(continued)*	76.0	75		PID = 0.3
		CLAY (CL), gray, stiff; little SLAG, gravel size				
465				80		
	461.7		84.0			
		SILTY CLAY with weathered LIMESTONE (GC), brown, medium stiff, dry		85		PID = 0
460						
				90		
455						PID = 0.1
	450.7		95.0	95		
450		LIMESTONE, light gray				
	447.7		98.0			
		Total Depth: 98 ft				
445						
440						
435						

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:28 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

Geosyntec consultants

BORING NUMBER SB-322H

CLIENT Carus Chemical Corporation
PROJECT NUMBER FR1347
DATE STARTED 12/19/07 COMPLETED 12/19/07
DRILLING CONTRACTOR Stearns
DRILLING METHOD Hollow Stem Auger
LOGGED BY Evans/McKinnon CHECKED BY
NOTES

PROJECT NAME M&H Site
PROJECT LOCATION LaSalle, Illinois
GROUND ELEVATION 550.35 ft HOLE SIZE 6in
GROUND WATER LEVELS:
▽ AT TIME OF DRILLING 99.00 ft / Elev 451.35 ft
AT END OF DRILLING ---
AFTER DRILLING ---

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
550	SLAG and MODERN FILL material (GP-GC), red with black/brown/orange banding, silt to gravel size, loose, poor sorting, dry	0		
545	@ ~4' - 6' Brick fill	5		PID = 0
540		10		PID = 0
535		15		PID = 0
530		20		PID = 0
				PID = 0
525		25		
520		30		PID = 0
		35		

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:28 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

(Continued Next Page)

Geosyntec consultants

BORING NUMBER SB-322H
PAGE 2 OF 3

CLIENT Carus Chemical Corporation
PROJECT NAME M&H Site
PROJECT NUMBER FR1347
PROJECT LOCATION LaSalle, Illinois

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
515	SLAG and MODERN FILL material (GP-GC), red with black/brown/orange banding, silt to gravel size, loose, poor sorting, dry *(continued)*	35		PID = 0
510	@ ~29' - 51' Brick fill	40		PID = 0
505		45		PID = 0
500		50		PID = 0
495		55		PID = 0
490		60		PID = 0
485		65		PID = 0
480		70		PID = 0.1
		75		

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:28 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINTCARUS.GPJ

(Continued Next Page)

Geosyntec consultants

BORING NUMBER SB-322H

CLIENT Carus Chemical Corporation
PROJECT NAME M&H Site
PROJECT NUMBER FR1347
PROJECT LOCATION LaSalle, Illinois

ELEVATION (ft)	MATERIAL DESCRIPTION	DEPTH (ft)	GRAPHIC LOG	ENVIRONMENTAL DATA
475	SLAG and MODERN FILL material (GP-GC), red with black/brown/orange banding, silt to gravel size, loose, poor sorting, dry *(continued)*	75		PID = 0
	@ ~74' - 76' Brick fill			
470		80		PID = 0
465		85		PID = 0
	@ ~84' - 91' Brick fill			
460		90		PID = 0
456.4	GRAVELLY SILTY CLAY (GM), brownish-gray, soft, moist; some SLAG, gravel; trace fines/alluvium	94.0		
455		95		PID = 0.1
451.4 ▽	GRAVELLY SILTY CLAY (GM), brown, soft, sub-rounded (gravel), wet	99.0		
450		100		PID = 0.5
445.4	@ ~105' Limestone fragments			
445	Total Depth: 105 ft	105.0 105		PID = 0.5
440				

CARUS ENVIRONMENTAL BH - GINT STD US.GDT - 5/20/10 15:28 - H:\GIS\GISPROJECTS\CWR1710-CARUS\GINT\CARUS.GPJ

SKS shaffer·krimmel·silver
& ASSOCIATES, INC. CONSULTING ENGINEERS

2900 N. Broadway • P.O. Box 2233 • Decatur, Illinois, 62526 • 217/877-2100

HAROLD S. SHAFFER, PE-SE
ROBERT G. KRIMMEL, PE-LS
VAN A. SILVER, PE

August 13, 1980

SKS #01400

Mr. J. Douglas Andrews, P.E.
Environmental Engineering, Inc.
1320 South Fifth Street
Springfield, Illinois 62703

Subject: Monitor Wells/Permeability Testing
Temproary Storage Areas
Carus Chemical Company
LaSalle, Illinois

Dear Doug:

Submitted herewith are three copies each of logs and installation data sheets for five groundwater monitor wells installed at the subject site.

The results of permeability tests made on two undisturbed samples obtained from the compacted bottom liner are as follows:

North End	$k = 4 \times 10^{-9}$ cm/sec
South End	$k = 2 \times 10^{-8}$ cm/sec

We have appreciated performing this work for you. Please call if you have any questions.

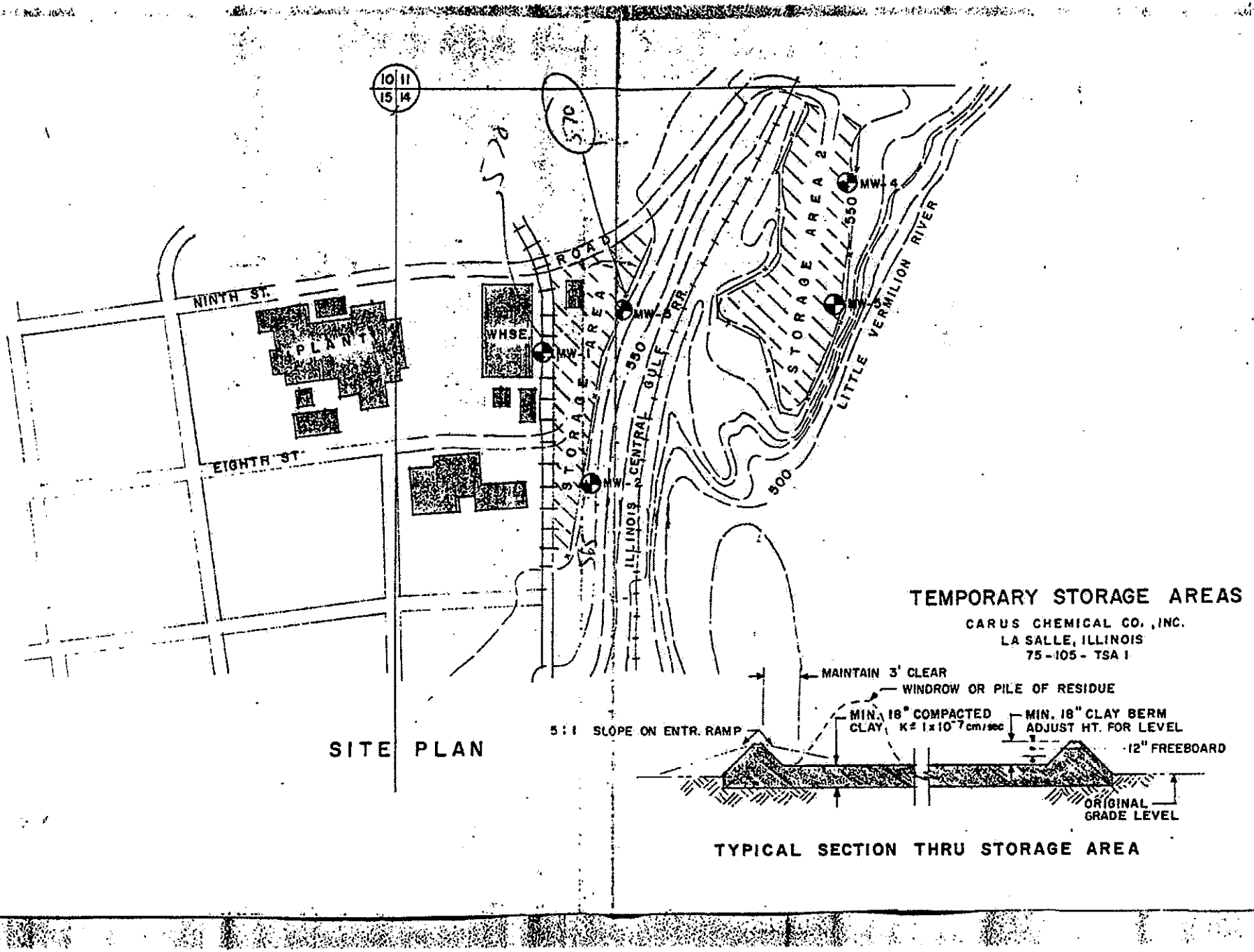
Very truly yours,

SHAFFER, KRIMMEL, SILVER & ASSOCIATES, INC.

BY: Van A. Silver
Van A. Silver, P.E.

VAS/sap

Enclosures: As noted


10 11
15 14
NINTH ST.
EIGHTH ST.
PLANT
WHSE.
MW-1
MW-2
MW-3
MW-4
STORAGE AREA 1
STORAGE AREA 2
ROAD
RR
ILLINOIS CENTRAL GULF
LITTLE VERMILION RIVER
570
550
500
SITE PLAN
TEMPORARY STORAGE AREAS
CARUS CHEMICAL CO., INC.
LA SALLE, ILLINOIS
75-105 - TSA 1
MAINTAIN 3' CLEAR
WINDROW OR PILE OF RESIDUE
MIN. 18" COMPACTED CLAY, K≤ 1x10⁻⁷ cm/sec
MIN. 18" CLAY BERM ADJUST HT. FOR LEVEL
12" FREEBOARD
5:1 SLOPE ON ENTR. RAMP
ORIGINAL GRADE LEVEL
TYPICAL SECTION THRU STORAGE AREA

shaffer·krimmel·silver
& ASSOCIATES, INC. CONSULTING ENGINEERS

2500 N. Broadway • P.O. Box 2233 • Decatur, Illinois, 62526 • 217/877-2100

TEST BORING LOGS

PROJECT Carus Chem Monitor Wells
PROJECT NO. I8-01400-7
FOR Andrews Environmental Engrg.
DATE August 7, 1980
WEATHER Partly Cloudy, Hot
DEPTH TO WATER * @ HRS.
DEPTH TO WATER @ HRS.
*See Well Data Sheet

BORING NO. P-1
LOCATION As per Andrews
SURFACE ELEV. Existing Ground

S	DEPTH; FT. FROM	TO	SAMPLE DESCRIPTION
	0	5.0	Black, moist to very moist, silty clay, little gravel, trace sand, trace tile, trace cinders - FILL
	5.0	7.5	Light brown, moist, silty clay, trace fine sand
	7.5	10.0	Reddish brown, moist, silty clay, trace fine sand
	10.0	13.0	Light brown, moist, silty clay, trace fine sand
	13.0	16.0	Brown, moist to very moist, silty clay, trace fine sand, trace to little gravel
	16.0	24.5	Gray, moist, clay

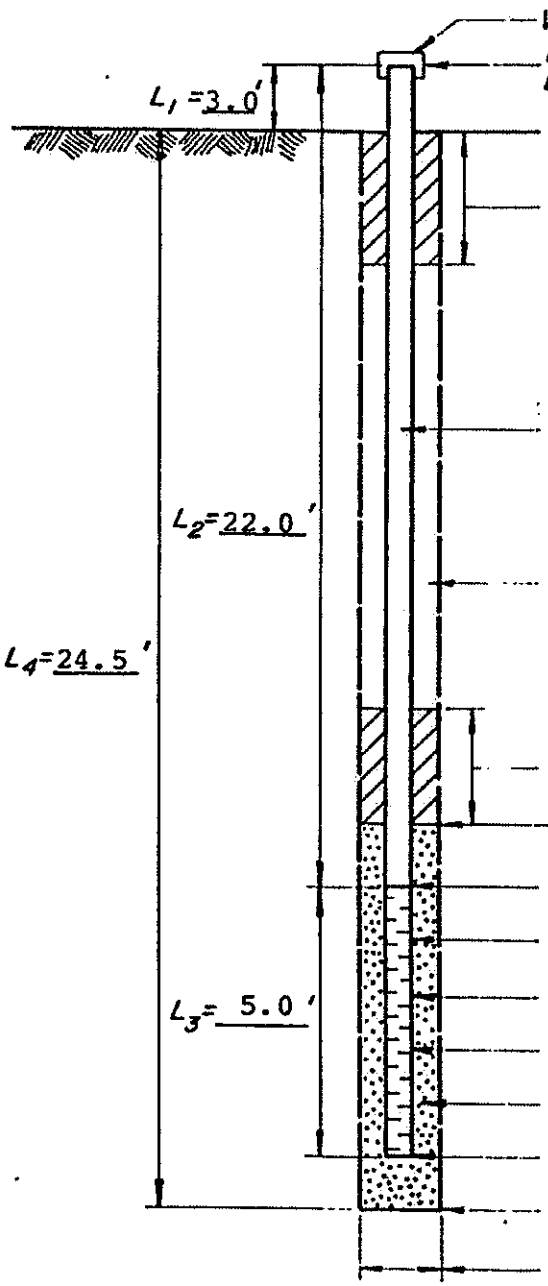
DATE August 7, 1980
WEATHER Partly Cloudy, Hot
DEPTH TO WATER * @ HRS.
DEPTH TO WATER @ HRS.
*See Well Data Sheet

BORING NO. P-2
LOCATION As per Andrews
SURFACE ELEV. Existing Ground

S	DEPTH; FT. FROM	TO	SAMPLE DESCRIPTION
	0	12.0	Black, red, brown, cinders mixed w/gravel and little clay - FILL
	12.0	14.5	Light brown, moist, silty clay, trace fine sand

Date Installed: August 7, 1980

Ground Elevation and Datum: Existing Ground



Elevation of top of riser pipe Determined by: ☐ Survey ☐ Estimated	---
Thickness of surface seal	2'
Type of surface seal	Readi-Mix Concrete
I.D. of riser pipe	2"
Type of riser pipe	P.V.C.
Type of backfill around riser	Mixed Clay & Bentonite
Elevation of top of filter sand	18.5'*
Elevation of bottom of riser	19.0'*
Type of piezometer	Slotted 2" P.V.C. Pipe
Size of openings	Hacksaw Slits
Diameter of piezometer tip	2"
Type of filter around tip	Pea Gravel
Elevation of bottom of piezometer	24.0'*
Elevation of bottom of borehole	24.5'*
Diameter of borehole	8"

NOTES: *Indicates depth from ground surface.

0 hr. water level 13.5' from surface

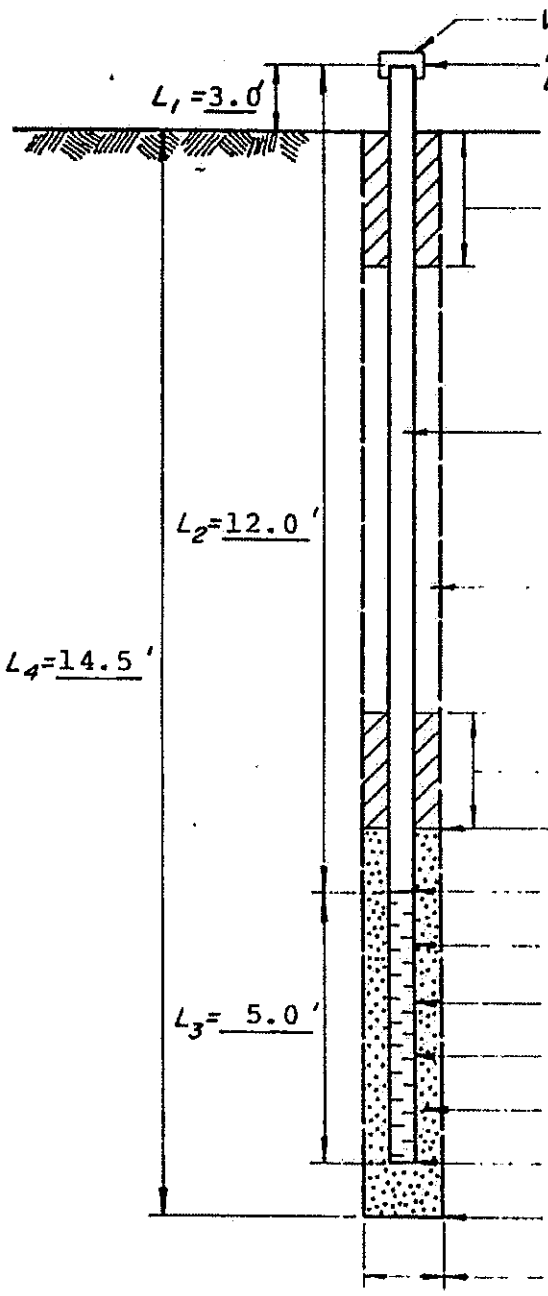
Temporary Storage Areas
Carus Chemical Co., Inc
LaSalle, Illinois

INSTALLATION DATA SHEET
OBSERVATION/MONITOR WELL
NO. P-1
PROJ. NO. 01400

SEC & ASSOCIATES CONSULTING ENGINEERS

Date Installed: August 7, 1980

Ground Elevation and Datum: Existing Ground



Vented Cap	
Elevation of top of riser pipe	---
Determined by:	
☐ *Survey*	
☐ *Estimated*	
Thickness of surface seal	2'
Type of surface seal	Readi-Mix Concrete
I.D. of riser pipe	2" P.V.C.
Type of riser pipe	
Type of backfill around riser	Mixed Clay & Bentonite
2' Bentonite	
Elevation of top of filter sand	8.5'*
Elevation of bottom of riser	9.5'*
Type of piezometer	Slotted 2" P.V.C. Pipe
Size of openings	Hacksaw Slits
Diameter of piezometer tip	2"
Type of filter around tip	Pea Gravel
Elevation of bottom of piezometer	14.0'*
Elevation of bottom of borehole	14.5'*
Diameter of borehole	8"

NOTES: *Indicates depth from ground surface.

Well dry at 0 hr.

Temporary Storage Areas
Carus Chemical Co., Inc
LaSalle, Illinois

INSTALLATION DATA SHEET
OBSERVATION/MONITOR WELL
NO. P-2
PROJ. NO.01400

SBS & ASSOCIATES CONSULTING ENGINEERS

shaffer·krimmel·silver
& ASSOCIATES, INC. CONSULTING ENGINEERS

2900 N. Broadway • P.O. Box 2233 • Decatur, Illinois, 62526 • 217/877-2100

TEST BORING LOGS

PROJECT Carus Chem. Monitor Wells
PROJECT NO. I8-01400-7
FOR Andrews Environmental Engrg.
DATE September 3, 1980
WEATHER Clear, Hot
DEPTH TO WATER 20' @ 0 HRS.
DEPTH TO WATER _____ @ _____ HRS.

BORING NO. P-3
LOCATION As per Andrews
SURFACE ELEV. Existing Ground

S	DEPTH; FT. FROM	DEPTH; FT. TO	SAMPLE DESCRIPTION
	0	3	Black, moist, silty clay and cinders
	3	7.5	Brown, moist, silty clay, some cinders
	7.5	12	Brown, very moist, silty clay
	12	24	Brown, moist, silty clay, little to some sand & gravel; occasional sand seams and thin layers (typical weathered till)

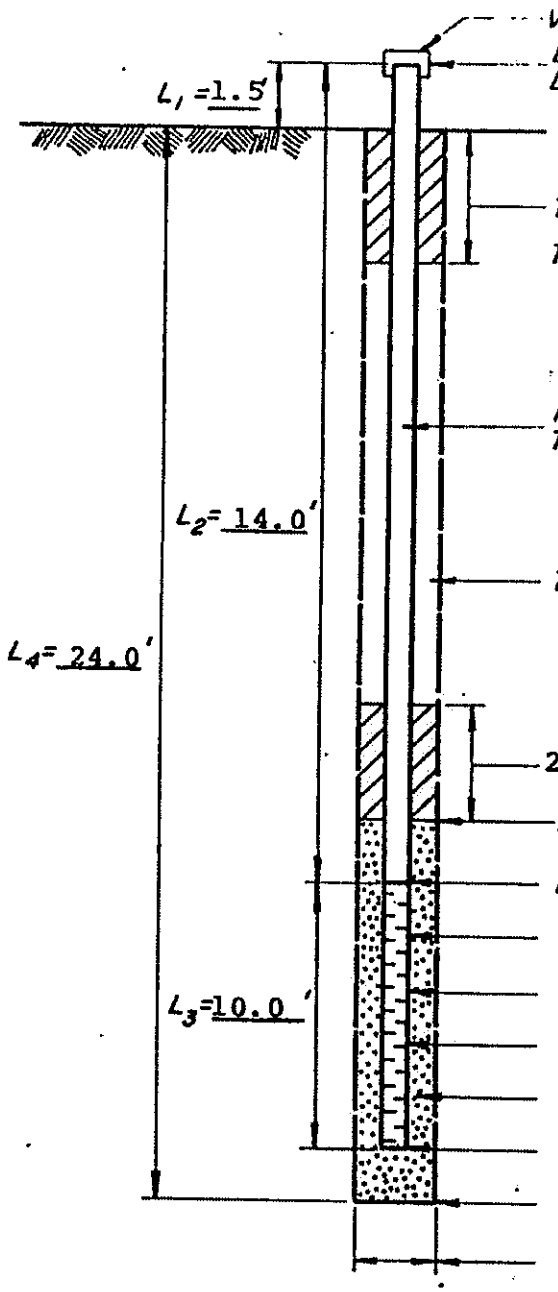
BORING NO. _____
LOCATION _____
SURFACE ELEV. _____

DATE _____
WEATHER _____
DEPTH TO WATER _____ @ _____ HRS.
DEPTH TO WATER _____ @ _____ HRS.

S	DEPTH; FT. FROM	DEPTH; FT. TO	SAMPLE DESCRIPTION

Date Installed: September 3, 1980

Ground Elevation and Datum: Existing Ground



Elevation of top of riser pipe Determined by: ☐ Survey ☐ Estimated	----
Thickness of surface seal	2'
Type of surface seal	Readi-Mix Concrete
I.D. of riser pipe	2"
Type of riser pipe	P.V.C.
Type of backfill around riser	Mixed Clay & Bentonite
Elevation of top of filter sand	13.0'*
Elevation of bottom of riser	14.0'*
Type of piezometer	Slotted 2" P.V.C.
Size of openings	Hacksaw Slits
Diameter of piezometer tip	2"
Type of filter around tip	Pea Gravel
Elevation of bottom of piezometer	24.0'*
Elevation of bottom of borehole	24.0'*
Diameter of borehole	8"

NOTES: *Indicates depth from ground surface

0 hr. water level 20' from surface

Temporary Storage Areas
Carus Chemical Co., Inc
LaSalle, Illinois

INSTALLATION DATA SHEET
OBSERVATION/MONITOR WELL
NO. P-3
PROJ. NO. 01400

& ASSOCIATES CONSULTING ENGINEERS

shaffer·krimmel·silver
& ASSOCIATES, INC. CONSULTING ENGINEERS

2900 N. Broadway • P.O. Box 2233 • Decatur, Illinois, 62526 • 217/877-2100

TEST BORING LOGS

PROJECT Carus Chem. Monitor Wells
PROJECT NO. I8-01400-7
FOR Andrews Environmental Engrg.
DATE August 7, 1980
WEATHER Partly Cloudy, Hot
DEPTH TO WATER * @ HRS.
DEPTH TO WATER @ HRS.
*See Well Data Sheet

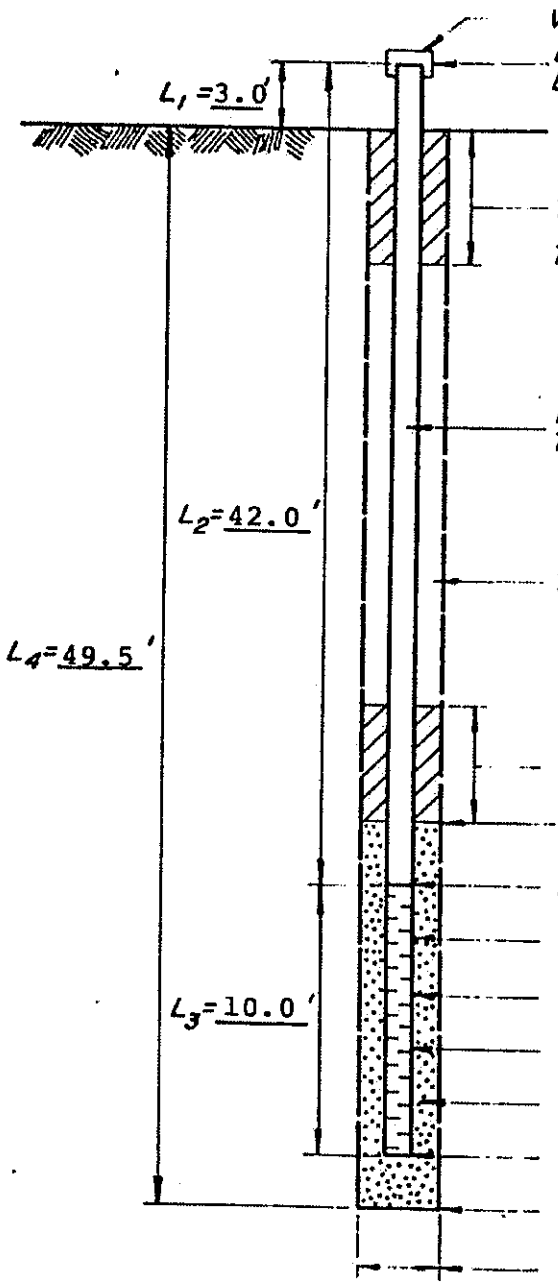
BORING NO. P-4
LOCATION As per Andrews
SURFACE ELEV. Existing Ground

DATE August 8, 1980
WEATHER Clear, Hot
DEPTH TO WATER * @ HRS.
DEPTH TO WATER @ HRS.
*See Well Data Sheet

S	DEPTH; FT. FROM	DEPTH; FT. TO	SAMPLE DESCRIPTION
	0	49.5	Black, brown, moist, cinders & ash w/gravel, broken concrete, sand

Date Installed: August 8, 1980

Ground Elevation and Datum: Existing Ground



Elevation of top of riser pipe Determined by: ☐ *Survey* ☐ *Estimated*	---
Thickness of surface seal	2'
Type of surface seal	Readi-Mix Concrete
I.D. of riser pipe	2"
Type of riser pipe	P.V.C.
Type of backfill around riser	Mixed Clay & Bentonite
Elevation of top of filter sand	37.0'*
Elevation of bottom of riser	39.0'*
Type of piezometer	Slotted 2" P.V.C. Pipe
Size of openings	Hacksaw Slits
Diameter of piezometer tip	2"
Type of filter around tip	Pea Gravel
Elevation of bottom of piezometer	49.0'*
Elevation of bottom of borehole	49.5'*
Diameter of borehole	8"

NOTES: *Indicates depth from ground surface.

Well dry at 0 hr.

Temporary Storage Areas
Carus Chemical Co., Inc
LaSalle, Illinois

INSTALLATION DATA SHEET
OBSERVATION/MONITOR WELL
NO. P-4
PROJ. NO. 01400

SKE & ASSOCIATES CONSULTING ENGINEERS

shaffer-krimmel-silver
& ASSOCIATES, INC. CONSULTING ENGINEERS

2900 N. Broadway • P.O. Box 2233 • Decatur, Illinois, 62526 • 217/877-2100

TEST BORING LOGS

PROJECT Carus Chem Monitor Wells
PROJECT NO. I8-01400-7
FOR Andrews Environmental Engrg.
DATE August 8, 1980
WEATHER Clear, Hot
DEPTH TO WATER * @ HRS.
DEPTH TO WATER @ HRS.
*See Well Data Sheet

BORING NO. P-5
LOCATION As per Andrews
SURFACE ELEV. Existing Ground

S	DEPTH; FT. FROM	DEPTH; FT. TO	SAMPLE DESCRIPTION
	0	40.0	Black, brown, moist, cinders & ash w/gravel, sand, clay
	40.0	49.5	Pinkish brown, very moist to wet, ash, cinders & clay

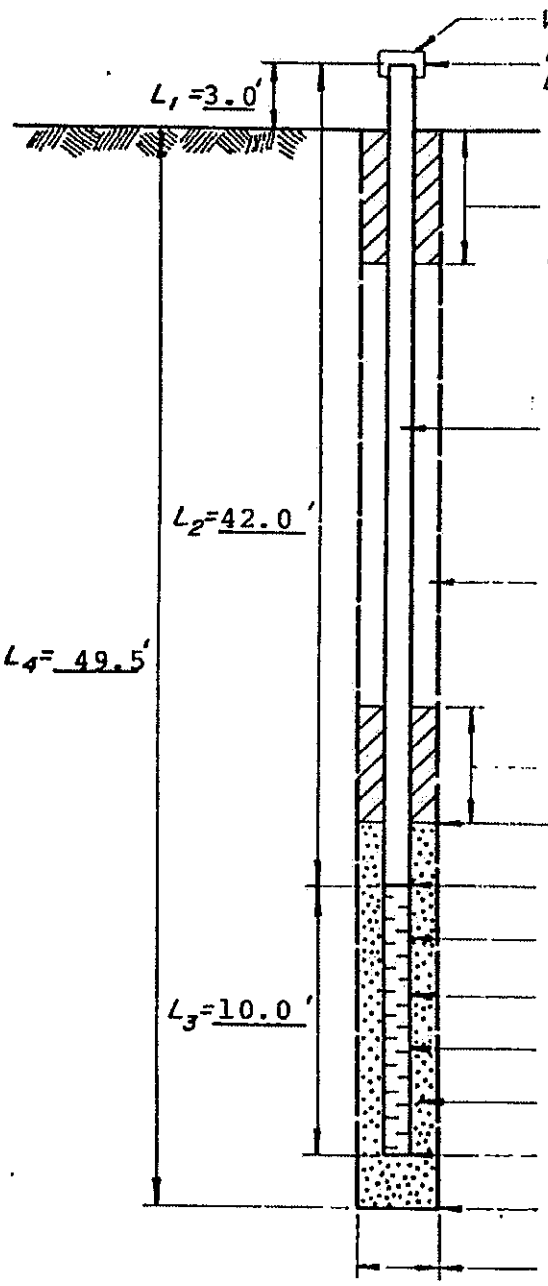
DATE
WEATHER
DEPTH TO WATER @ HRS.
DEPTH TO WATER @ HRS.

BORING NO.
LOCATION
SURFACE ELEV.

S	DEPTH; FT. FROM	DEPTH; FT. TO	SAMPLE DESCRIPTION

Date Installed: August 8, 1980

Ground Elevation and Datum: Existing Ground



Elevation of top of riser pipe Determined by: ☐ *Survey* ☐ *Estimated*	---
Thickness of surface seal	2'
Type of surface seal	Readi-Mix Concrete
I.D. of riser pipe / *Type of riser pipe*	2" P.V.C.
Type of backfill around riser	Mixed Clay & Bentonite
Elevation of top of filter sand	37.5'*
Elevation of bottom of riser	39.0'*
Type of piezometer	Slotted 2" P.V.C. Pipe
Size of openings	Hacksaw Slits
Diameter of piezometer tip	2"
Type of filter around tip	Pea Gravel
Elevation of bottom of piezometer	49.0'*
Elevation of bottom of borehole	49.5'*
Diameter of borehole	8"

NOTES: *Indicates depth from ground surface.

Well dry at 0 hr.

Temporary Storage Areas
Carus Chemical Co., Inc
LaSalle, Illinois

INSTALLATION DATA SHEET
OBSERVATION/MONITOR WELL
NO. P-5
PROJ. NO. 01400

& ASSOCIATES CONSULTING ENGINEERS

GeoSyntec Consultants

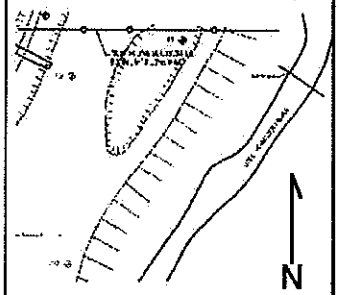
BORING LOG

Identification: P-1 **Page** 1 **of** 2

Site: Carus Chemical Company, La Salle, Illinois - Phase II **Project No.:** FE 2167-1

Status: Ground-Water Monitoring Well **Drilled:** 3 October 1994
Tools & Method: 4.25 in. I.D. H.S. Auger w/SPT, automatic hammer **Bit Diameter:** 8 in.
Total Depth: 90 ft. **Ground Elevation:** 546.95 **Surveyor:** Chamlin & Associates, Inc.
Drilling Company: Layne Northwest. **Rig:** CME 850
Supervisor: T. Pelte. **Reviewer:** J. Raymer. **Driller:** Vince Meindel.

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std. Pen. Blows	Run	Test Rec.	Drilling Log
547.0		***MODERN DEPOSITS***: SLAG, dark reddish brown to grayish blue, very dusky red, and dusky brown; gravelly sand (fine sand to boulder), loose, and dry (except below 82.0 ft); vesicular texture or vitrified slag.			5				11:25, 3 Oct. 94: boring begun, ground dry. @ 2.0 ft: hard drilling, crushing sounds.
					10				
					15				
528.0		@ 19.0 ft: organic silt, dark gray (topsoil)(OL).			20	8 9 13 29	1	1.8'	
		@ 20.5 ft: reworked red shale and slag, grayish orange pink; clayey sand (slag) with some gravel (very stiff red shale and slag as gravel), loose, dry.			25				@ 20.5 ft: sample collected for chemical analysis.
					30				
					35				@ 37.0 to 38.0 ft: hard drilling due to boulders.
						7 6	2	1.5'	

Identification: P-1 Site: Carus Chemical Company, Phase II Proj. No.: FE 2167-1 Page 2 of 2

Elev. (feet)	Top (feet)	Lithology Log	Drilling Log
		@ 39.0 to 40.5 ft: sandy gravel, grayish red to dark gray; abundant slag (medium sand to coarse gravel sized), some hard red shale pieces (fine and medium gravel sized), and trace of coal (coarse gravel sized); dry, loose, poorly sorted.	
			@ 48.0 to 49.0 ft: hard drilling, crushing sounds.
			@ 64.0 ft: boring hole dry; hard drilling, crushing sounds.
			@ 69.0 ft: boring hole dry.
			@ 74.0 ft: boring hole dry.
			@ 75.0 ft: hard drilling, crushing sounds.
			@ 79.0 ft: sample collected for chemical analysis.
		@ 82.0 to 83.0 ft: clayey gravel, dark reddish brown; slag (coarse sand to coarse gravel) with a little clay in liquid state; loose, wet.	@ 82.5 ft: water in borehole.
462.8	84.2	CLAYEY SILT, dark gray (alluvium); soft, with low toughness, and low dry strength (MH); trace of mica (may be a steady water alluvium deposit).	@ 83.0 ft: 1 ft of slough in borehole (slag and liquid-state silt) before spooning.
459.0	88.0	CLAY, dark greenish gray; in plastic state, firm, with trace of well rounded fine to coarse silicous gravel; remolded in a fat clay, with high plasticity, medium toughness, and high dry strength (CH); fissile clay with brown coating on fractures (may be reworked clay or colluvial material).	@ 84.2 ft: silt in plastic state.
457.0		Total Depth: 90.0 ft.	17:00, 3 Oct. 94: auger boring terminated @ 88.0 ft; last split spoon sample taken to 90.0 ft; water @ 75.0 ft in boerhole. 10:45.10 Oct 94: water level in well @ 81.2 ft below TOC.

Graphic Log | Well | Depth Scale | Std. Blows | Pen. Run | Test Rec.

Depth Scale	Std. Blows	Pen. Run	Test Rec.
	9 10		
45			
50			
55			
	10 13 15 16	3	1.0'
60			
65			
70			
75			
	60 >75	4	0.7'
80			
	20 25 32 22	5	1.8'
85			
	9 19 30 39	6	2.0'

GeoSyntec Consultants

BORING LOG

Identification: P-2 **Page** 1 **of** 2

Site: Carus Chemical Company, La Salle, Illinois - Phase II **Project No.:** FE 2167-1

Status: Boring Hole **Drilled:** 3 October 1994

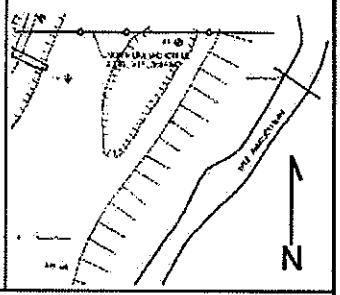
Tools & Method: 4.25 in. I.D. H.S. Auger w/SPT, automatic hammer **Bit Diameter:** 8 in.

Total Depth: 72 ft. **Ground Elevation:** 556.72 **Surveyor:** Chamlin & Associates, Inc.

Drilling Company: Layne Northwest. **Rig:** Mobil B-57/CME 850

Supervisor: J. Raymer **Reviewer:** **Driller:** Mark Backhaus

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std. Pen. Blows	Run	Rec.	Drilling Log
556.7		***MODERN DEPOSITS (SLAG PILE):*** SANDY SILT (topsoil), dark yellowish brown, some plants roots (SM/ML).							14:30, 3 Oct. 94: boring begun with Mobile B-57, ground dry, 70°F, steady drilling from top.
555.2	1.5	GRANULAR FILL, black; fine sand to fine gravel, poorly sorted; mostly angular, slightly harder than glass, conchoidal fracture, weakly vitreous, rarely with tiny vesicles; also contains some quartz sand (medium sand), a little silt to very fine sand material in bulk, appears like coal pieces (previously called sinter); non-cohesive, loose; also well graded sand (S			5	10 32 25 17	1		2.0'	@ 5.0 ft: good return of cuttings.
545.7	11.0	SLAG, moderate red, very dark red, and dark reddish brown.			10				@ 11.0 ft: very hard drilling; boulders.
									@ 13.0 ft: slag-like, jerky, griding, moderately easy drilling; no return of cuttings.
		@ 15.0 ft: dust on outside of spoon is moderate red, possible slag or brick.			15	19 30 50/3"	2		0 @ 15.0 ft: auger blockage; hard grinding; steady drilling.
538.2		@ 18.5 ft: thick bed of SANDY SILT CLAY *(topsoil)*, dusky brown to dark yellowish brown; contains plant roots, pieces of slag, pieces of granular fill; medium plasticity, medium toughness (CL).							@ 18.0 ft: slag wet.
						20 29 19 13	3		2.0' @ 19.0 ft: clay at plastic limit.
					20				@ 20.0 ft: slag dry; pulled auger and replaced basket in head auger. Soil sampling for metal analysis.
531.2		@ 25.5 ft: becoming mostly black granular fill as @ 4.0 ft; base uncertain; intermixed quartz sand and silt common.			25	7 11 11 10	4		2.0' 15:30, 3 Oct 94: boring suspended @ 25.0 ft (breakdown). 7:15, 4 Oct 94: boring resumed; borehole dry; slow steady drilling.
526.2		@ 30.5 to 31.5 ft: boulders of welded slag and shale material, very dark red slag welded to dark shale; black shale is redeposited; contains mineralized fractures; fracture filling is golden brown, crystalline, hardness is about 2, crystal faces strongly twinned, probably sphalerite.			30	17 50/3"	5		@ 30.0 ft: fill dry. 0.8' 7:45, 4 Oct 94: boring suspended after sample #5 (breakdown); switched rigs; same tools. 12:35, 4 Oct 94: boring resumed with CME 850; borehole dry.
					35	10 13 12 7	6		2.0'

Identification: P-2 Site: Carus Chemical Company, Phase II Proj. No.: FE 2167-1 Page 2 of 2

Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale	Std. Blows	Pen. Run	Test Rec.	Drilling Log
515.7		@ 41.0 to 43.0 ft: layer of SHALE SAND, moderate yellowish brown; silt to fine gravel, thin fragments of hard shale (possibly scale or similar fissile material), some pieces of slag (medium sand to very fine gravel); fluffy texture due to platelet nature of shale fragments; classified as SILTY WELL-GRADED SAND (SW).				6 11 11 10	7	2.0'	@ 40.0 ft: slag dry. @ 41.5 to 42.0 ft: sample for metal analysis. @ 42.0 ft: soil dry; soil sample for metal analysis.
		@ 46.0 to 47.0 ft: slag is gravelly, little to no silt sized particles in sample, blackish red, very dark red, or dark reddish brown color.			45	7 11 11 8	8	1.2'	
					50				@ 49.0 ft: little easier drilling.
					55	7 9 9 10	9	1.4'	@ 56.0 ft: slag is moist but not saturated.
		@ 56.0 to 57.0 ft: slag is weathered to SILTY SAND, dark reddish brown; slag particles, silt to fine gravel size, poorly sorted (SM).							
		@ 60.0 to 62.0 ft: slag is coarser.			60	6 11 10 8	10	1.2'	
493.7	63.0	REWORKED TILL, moderate brown; medium sand (Saint Peter) mixed with limestone gravel (fine and medium gravel, angular), shale fragments, and silt; fine fraction has low plasticity; SANDY SILT with GRAVEL (SM), contains layers of silty clay, dark yellowish brown (CL).							@ 62.0 ft: slower drilling; slag dry. @ 62.5 ft: hard drilling. @ 63.0 ft: faster drilling.
					65	11 9 12 12	11	1.2'	@ 66.0 ft: sandy silt fraction near plastic limit.
486.7	70.0	***PENNSYLVANIAN SYSTEM***: CLAYSTONE, medium gray with streaks of moderate reddish brown (root molds), contains white phosphate nodules of very coarse sand to very fine gravel size; very stiff; non fissile; remolded to CLAY, medium plasticity, and medium toughness (CL).			70	7 14 26 19	12	1.6'	@ 70.0 ft: very slow drilling. @ 72.0 ft: extremely slow drilling; soft refusal.
484.7		**Total Depth: 72.0 ft.**			75				14:30, 4 Oct 94: auger boring terminated @ 72.0 ft; borehole dry; plugged and abandoned with medium bentonite chips.
					80				
					85				

GeoSyntec Consultants

BORING LOG

Identification: P-3 **Page** 1 **of** 1

Site: Carus Chemical Company, La Salle, Illinois - Phase II **Project No.:** FE 2167-1

Status: Boring Hole **Drilled:** 29 September 1994

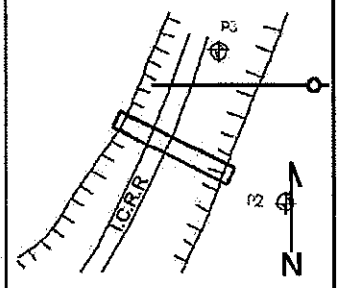
Tools & Method: 4.25 in. I.D. H.S. Auger w/SPT, automatic hammer **Bit Diameter:** 8 in.

Total Depth: 15.5 ft. **Ground Elevation:** 535.64 **Surveyor:** Chamlin & Associates, Inc.

Drilling Company: Layne Northwest **Rig:** Mobil B-57

Supervisor: J. Raymer **Reviewer:** T. Pelte **Driller:** Mark Backhaus

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std. Pen. Blows	Run	Test Rec.	Drilling Log
535.6		***MODERN DEPOSITS:*** *(ICRR GRADE)*, GRAVELLY SANDY CLAY, dark yellowish brown; gravel (very coarse sand to very fine gravel) is coal and cinders; firm, medium plasticity (CL).							12:45, 29 Sep. 94: boring begun, ground dry to moist; clear, 70°F.
		@ 2.0 ft: becoming less clayey; SILTY GRAVEL.				3 4 3 2	1	2.0"	
532.6	3.0	GRANULAR FILL, black; mixture of medium to very fine rounded pebbles (reworked Pleistocene), coal, and cinders (medium to very coarse sand), non-cohesive (SP).							@ 3.5 ft: granular fill dry.
		@ 5.0 ft: brick.			5				@ 5.0 ft: hard drilling.
530.6	5.0	***PLEISTOCENE SERIES:*** FINE TILL,moderate yellowish brown; continuously graded from silt to coarse pebble size, pebbles consist of limestone and shale, little chert; sand is angular; weakly indurated; classified as WELL GRADED SILTY GRAVELLY SAND (SW).				12 12 13 13	2	1.5"	@ 7.0 ft: slow drilling; till dry.
									@ 9.5 to 10.0 ft: little noisier; gravel pieces.
					10	12 13 20 21	3	2.0"	
		@ 12.0 ft: medium to thick bed of SAND, moderate yellowish brown; medium sand, well sorted (SP).							@ 12.0 ft: easier drilling.
		@ 14.5 ft: sharp base.							
521.1	14.5	***PENNSYLVANIAN SYSTEM:*** GREEN SHALE, light olive brown, rare organic-rich layers; poorly developed fissility; stiff; remolded to *CLAY*, medium toughness, high plasticity (CL).			15	15 17 50/4"	4	1.5"	
520.1	15.5	LIMESTONE, light olive gray; finely crystalline.							Note: all samples dry.
		Total depth: 15.5 ft.							13:15, 29 Sep. 94: auger boring terminated @ 14.0 ft (split spoon sample taken to 15.5 ft); borehole dry; borehole left open; still dry after two days; then plugged and abandoned with bentonite chips.
					20				
					25				
					30				
					35				

*Shale @ 14.5 ft colors: light olive brown, light olive gray, dark yellowish orange, black.

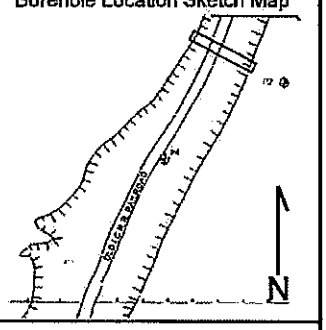
GeoSyntec Consultants

BORING LOG

Identification: P-4 **Page** 1 **of** 1
Site: Carus Chemical Company, La Salle, Illinois - Phase II **Project No.:** FE 2167-1

Status: Boring Hole **Drilled:** 29 September 1994
Tools & Method: 4.25 in. I.D. H.S. Auger w/SPT, automatic hammer **Bit Diameter:** 8 in.
Total Depth: 12.1 ft. **Ground Elevation:** 533.74 **Surveyor:** Chamlin & Associates, Inc.
Drilling Company: Layne Northwest **Rig:** Mobil B-57
Supervisor: J. Raymer **Reviewer:** T. Pelte **Driller:** Mark Backhaus

Borehole Location Sketch Map



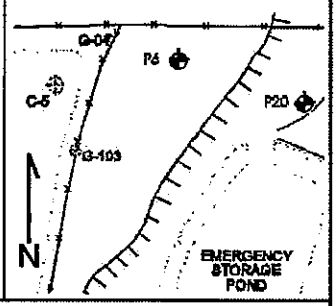
Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std. Pen. Blows	Run	Test Rec.	Drilling Log
533.7		***MODERN DEPOSITS:*** *(ICRR GRADE)* GRAVELLY SANDY CLAY, dark yellowish brown.							10:15, 29 Sep. 94: boring begun, ground dry ; clear, 60°F.
531.7	2.0	***PLEISTOCENE SERIES:*** GRAVELLY SANDY SILT (topsoil), black; organic-rich; loose (SP-SM-GM).				6 8 10 9	1	2.0'	@ 2.0 to 4.0 ft: sample dry.
531.2	2.5	WEATHERED TILL (residual soil), mottled dark yellowish brown, moderate brown, grayish brown; continuously graded from silt to fine pebbles; some organic matter; weakly indurated; classified as GRAVELLY SILTY SAND (SW-SP).			5				
		@ 6.5 ft: medium bed of medium to coarse gravel, well rounded (GW).				5 9 11 10	2	2.0'	
527.2	6.5	SAND, moderate brown; medium sand, very well sorted, well rounded, quartzic, little chert; some planar laminations, some silty layers (probably reworked Saint Peter Sandstone; sorting due to provenance); weakly indurated to loose (SP).							@ 8.0 ft: sand dry
									@ 9.0 ft: little noisier; jerky drilling.
		@ 10.5 ft: becoming coarser, poorly sorted by addition of a little coarse sand and some fine to very fine gravel (SP-SW).			10	6 10 7 10	3	2.0'	@ 10.5 ft: sand dry.
522.2	11.5	FINE TILL, moderate brown; continuously graded from silt to medium pebbles; pebbles consist of well rounded red shale, angular limestone and chert.				50/1'	4	0.1'	
521.7	12.0	***PENNSYLVANIAN SYSTEM*** : LIMESTONE.							11:30, 29 Sep. 94: auger boring terminated @ 12 ft (split spoon sample taken to 12.1 ft); dry boring hole; boring left open then plugged and abandoned with bentonite chips.
521.6		**Total depth: 12.1 ft.**			15				
					20				
					25				
					30				
					35				

GeoSyntec Consultants

BORING LOG

Identification: P-6 **Page** 1 **of** 1
Site: Carus Chemical Company, La Salle, Illinois **Project No.:** FE 2167-1
Status: Ground-Water Monitoring Well **Drilled:** 6 October 1994
Tools & Method: 4.25 in. I.D. H.S. Auger w/SPT, automatic hammer **Bit Diameter:** 8 in.
Total Depth: 25.5 ft. **Ground Elevation:** 571.31 **Surveyor:** Chamlin & Associates, Inc.
Drilling Company: Layne Northwest. **Rig:** CME 850
Supervisor: T. Pelte **Reviewer:** **Driller:** Mark Backhaus.

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std.Pen. Blows	Run	Test Rec.	Drilling Log
571.3		***MODERN DEPOSITS***: TOPSOIL, organic sandy silt, moderate dusky brown to dusky brown, trace of clay (ML).							8:30, 6 Oct. 94: boring begun, ground dry.
568.3	3.0	FILL, moderate brown to dark moderate brown; gravelly silt with some sand and trace of clay; fine silt (reworked till) and fine to coarse gravel (slag); dry to plastic state, soft to firm, low dry strength (ML).			5	1 0 1 1	1	0.4	@ 5.0 ft: cuttings wet.
						5 3 2 2	2	1.2'	
						3 3 5 10	3	2.0'	
		@10.0 to 12.0 ft: SILTY CLAY, dark gray to black; in dry state; trace of medium gravel (metallic luster); wet at the top of spoon; remolded to low-plasticity clay, low toughness, and low dry strength (CL).			10	3 5 6 4	4	1.8'	@ 10.0 ft: easy drilling.
						3 2 2 6	5	1.4'	
555.8	15.5	***PLEISTOCENE SERIES***: FINE TILL, moderate brown to brownish black; gravelly sandy silt with trace to some clay, fine silt to coarse sand and coarse gravels (increasing size with depth); continuously graded from silt to coarse pebble size, pebbles consist of limestone and quartz; weakly indurated; remolded to a medium-plasticity silt, low toughness (MH).			15	1 2 3 3	6	1.5'	
						1 3 5 5	7	1.8'	
						2 3 2 3	8	1.5'	
					20	2 2 5 5	9	1.5'	@ 20.0 to 24.0 ft: cuttings wet, in liquid state.
		Till bottom is much coarser with coarse quartzic gravels in silty matrix (GM-GW); low recovery.				7 9 10 11	10	0.2'	
548.3	23.0	***PENNSYLVANIAN SYSTEM***: WEATHERED SHALE, grayish yellow green; clay with some medium sand, dry state, stiff; remolded in a low-plasticity clay, medium dry strength and medium toughness (CL).				4 7 11 161	11	1.5'	
545.8		**Total depth: 25.5 ft..**			25				10:00, 6 Oct. 94: auger boring terminated @ 24.0 ft (split spoon sample taken to 25.5 ft); boring hole left open; water level rose with time; 12:45, 12 Oct. 94: water level @ 18.0 ft.
					30				
					35				

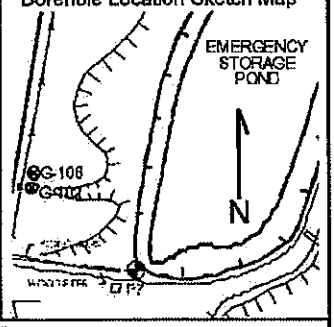
GeoSyntec Consultants

BORING LOG

Identification: P-7 **Page** 1 **of** 1
Site: Carus Chemical Company, La Salle, Illinois **Project No.:** FE 2167-1

Status: Ground-Water Monitoring Well **Drilled:** 28 September 1994
Tools & Method: 4.25 in. I.D. H.S. Auger w/SPT, automatic hammer **Bit Diameter:** 8 in.
Total Depth: 22.5 ft. **Ground Elevation:** 542.55 **Surveyor:** Chamlin & Associates, Inc.
Drilling Company: Layne Northwest. **Rig:** Mobil B-57
Supervisor: J. Raymer **Reviewer:** **Driller:** Mark Backhaus.

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std.Pen. Blows	Run	Test Rec.	Drilling Log
542.5		***MODERN DEPOSITS:*** GRAVELLY SILTY SANDY CLAY (*topsoil*) dark yellowish brown (CL-GC).							15:00, 28 Sep. 94: boring begun; ground moist
540.5	2.5	GRANULAR FILL, black; mixture of quartz sand (fine to medium sand), organic matter, rounded gravel (fine gravel), and coal (fine gravel); low density due to coal and organic matter; non-cohesive (SP).				5 10 8 6	1	2.0'	@ 2.0 ft: topsoil in plastic state. @ 4.0 ft: granular fill dry.
535.5	7.0	REWORKED SHALE, grayish brown with pieces of grayish olive green, grayish yellow green, and dusky yellow; little sand, few pebbles (reworked till), pieces of weathered green shale in silty clay matrix; remolded to SILTY CLAY, low toughness, medium plasticity (CL).			5	3 6 3 5	2	2.0'	@ 8.0 ft: silty clay near plastic limit.
531.2	11.0 11.3	ORGANIC CLAY, black, visible plant material (OH).			10	2 2 2 4	3	2.0'	
	13.0	***PENNSYLVANIAN:*** WEATHERED GREEN SHALE (residual soil), mottled olive gray to olive black; some roots; highly disturbed, non-fissile, firm; remolded to CLAY, medium toughness, high plasticity (CL).							
		WEATHERED RED AND GRAY SHALE (residual soil), finely mottled moderate grayish brown, medium gray, and dark reddish brown; pieces of red shale, rare calcareous nodules, stiff; remolded to CLAY, medium toughness, medium plasticity (CL).			15	2 6 8 11	4	2.0'	@ 14.0 ft: clay in plastic state.
525.5	17.0	WEATHERED GREEN SHALE (residual soil), as at 11.3 ft except less roots, some coal, and stiff (CL); gradually becoming less weathered downward.			20	3 6 9 11	5	2.0'	
520.0	22.5	@ 22.0 ft: grayish green, tree roots, very stiff. LIMESTONE, pale yellowish gray; finely crytalline fossiliferous grainstone; crinoids.				4 50/4"	6	0.8'	15:45, 28 Sep. 94: auger boring terminated @ 22.0 ft, split spoon sample taken to 22.7 ft.
		Total Depth: 22.5 ft.			25 30 35				

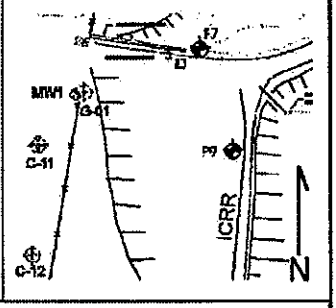
GeoSyntec Consultants

BORING LOG

Identification: P-9 **Page** 1 **of** 1
Site: Carus Chemical Company, La Salle, Illinois **Project No.:** FE 2167-1

Status: Ground-Water Monitoring Well **Drilled:** 27 September 1994
Tools & Method: 4.25 in. I.D. H.S. Auger w/SPT, automatic hammer **Bit Diameter:** 8 in.
Total Depth: 12.0 ft. **Ground Elevation:** 531.86 **Surveyor:** Chamlin & Associates, Inc.
Drilling Company: Layne Northwest. **Rig:** Mobil B-57
Supervisor: J. Raymer **Reviewer:** **Driller:** Mark Backhaus.

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std. Pen. Blows	Run	Test Rec.	Drilling Log
531.9		***MODERN DEPOSITS*** (Illinois Central Rail Road grade): SILTY CLAY (topsoil), dusky brown; some organic matter, some very fine gravel, in medium-plasticity state (CL). @1.0 ft: becoming with pieces (very fine to medium gravel) of REWORKED SHALE, grayish green, old concrete and rounded pebbles.				3 7 8 7	1	2.0'	15:40, 27 Sep. 94: boring begun; ground damp from recent rains. @ 1.0 ft: some water. @ 3.0 ft: clay in plastic state.
528.9	3.5	GRANULAR FILL, black; to dusky brown; mixture of quartz sand and silt, coal, and cinders, with some clay; well-graded SAND with silt (SW).							@ 4.0 ft: granular fill dry; clay clods in plastic state.
526.9	5.0	REWORKED SHALE, olive gray with lumps of grayish green, moderated, and yellowish green; some very finepebbles.			5				
524.9	7.0	REWORKED COARSE TILL, moderate brown; very fine sand to medium pebbles,some pieces of coal, well-graded SAND (SW). @ 7.8 ft: very thin bed of black organic clay (OH).				5 5 6 5	2	2.0'	
523.9	8.0	***PENNSYLVANIAN SYSTEM:*** WEATHERED SHALE (residual soil), medium gray with pieces of moderate reddish brown; some carbonized root molds; firm; remolded to FAT CLAY, high toughness, high plasticity (CH).				2 4 10 10	3	2.0'	@ 8.5 ft: weathered shale in plastic state. @ 10.0 ft: red shale in dry state.
522.9	9.0	RED SHALE, dark grayish red; partially weathered, locally fissile; very stiff; remolded to FAT CLAY (CH).			10				@ 11.0 ft: harder drilling.
519.9	12.0	@ 11.0 ft: becoming calcareous shale. LIMESTONE				60/0"	4	0	@ 12.0 ft: grinding. 16:30, 27 Sep. 94: auger boring terminated @ 12.0 ft.
		Total Depth: 12.0 ft.			15				
					20				
					25				
					30				
					35				

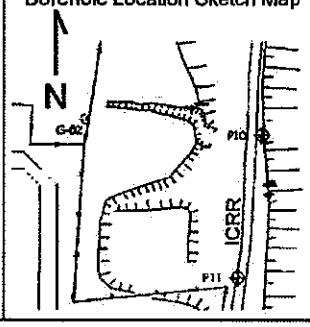
GeoSyntec Consultants

BORING LOG

Identification: P-10 **Page** 1 **of** 1
Site: Carus Chemical Company, La Salle, Illinois **Project No.:** FE 2167-1

Status: Boring Hole **Drilled:** 28 September 1994
Tools & Method: 4.25 in. I.D. H.S. Auger w/SPT, automatic hammer **Bit Diameter:** 8 in.
Total Depth: 12.0 ft. **Ground Elevation:** 527.76 **Surveyor:** Chamlin & Associates, Inc.
Drilling Company: Layne Northwest. **Rig:** Mobil B-57
Supervisor: J. Raymer **Reviewer:** **Driller:** Mark Backhaus.

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std. Pen. Blows	Run	Test Rec.	Drilling Log
527.8		***MODERN DEPOSITS*** (ICRR GRADE): GRAVELLY SANDY CLAY (topsoil), dark yellowish brown to dusky brown; some organic matter, some very fine gravel, dry, loose, poorly sorted, poorly graded (SP).							14:30, 28 Sep. 94: boring begun.
525.3	2.5	GRANULAR FILL, grayish brown; GRAVELLY SILTY SAND, mixture of quartz sand and silt, gravel of coal, cinders, slag, limestone; dry, loose, well graded SAND (SW).				3 7 8 7	1		@ 2.0 ft: clayey fill in plastic state. @ 4.0 to 6.0 ft: granular fill dry.
521.3	6.5	***PENNSYLVANIAN SYSTEM***: RED SHALE, dark grayish red; very stiff, partially weathered; remolded to FAT CLAY (CH); trace of green shale; red shale becomes more calcareous with depth.			5	9 12 30	2		
520.3	7.5	LIMESTONE **Total Depth: 7.5 ft.**			10 15 20 25 30 35				14:40, 28 Sep. 94: auger boring terminated @ 6.0 ft; split spoon sample taken to 7.5 ft; boring hole dry; boring hole abandoned and plugged with bentonite chips.

GeoSyntec Consultants

BORING LOG

Identification: P-11 **Page** 1 **of** 1

Site: Carus Chemical Company, La Salle, Illinois **Project No.:** FE 2167-1

Status: Boring Hole **Drilled:** 28 September 1994

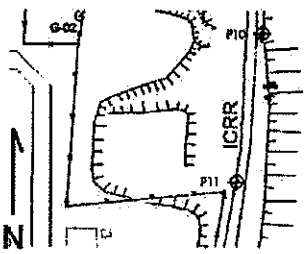
Tools & Method: 4.25 in. I.D. H.S. Auger w/SPT, automatic hammer **Bit Diameter:** 8 in.

Total Depth: 13.0 ft. **Ground Elevation:** 525.85 **Surveyor:** Chamlin & Associates, Inc.

Drilling Company: Layne Northwest. **Rig:** Mobil B-57

Supervisor: J. Raymer **Reviewer:** **Driller:** Mark Backhaus.

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std. Blows	Pen. Run	Test Rec.	Drilling Log
525.8		***MODERN DEPOSITS*** (ICRR GRADE): GRANULAR FILL, grayish brown; GRAVELLY SILTY SAND, poorly sorted, with some organic matter (*topsoil*), mixture of quartz sand and silt, gravel of Pleistocene material, coal, cinders, slag, and glassy pieces (SP).				5 14 25 29	1	2.0'	10:30, 28 Sep. 94: boring begun; ground moist. @ 4.0 ft: little water above land surface.
520.8	5.0	***PENNSYLVANIAN SYSTEM:*** SHALEY LIMESTONE, light grayish green to very light gray; mudstone to grainstone (fusulinid grainstone); top is shaley, more calcareous with depth.			5	50/4"	2	0.4'	@ 5.0 ft: very hard, grinding. @ 7.0 ft: thin bed easier but still grinding. @ 8.0 ft: less grinding, then hard.
512.8		**Total Depth: 13.0 ft.**			10 15 20 25 30 35				11:45, 28 Sep. 94: auger boring terminated @ 13.0 ft;boring hole dry; boring hole abandoned and plugged with bentonite chips.

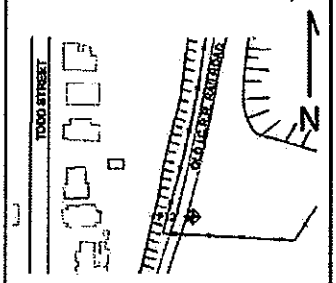
GeoSyntec Consultants

BORING LOG

Identification: P-12 **Page** 1 **of** 1
Site: Carus Chemical Company, La Salle, Illinois **Project No.:** FE 2167-1

Status: Boring Hole **Drilled:** 28 September 1994
Tools & Method: 4.25 in. I.D. H.S. Auger w/SPT, automatic hammer **Bit Diameter:** 8 in.
Total Depth: 5.0 ft. **Ground Elevation:** 523.67 **Surveyor:** Chamlin & Associates, Inc.
Drilling Company: Layne Northwest. **Rig:** CME 850
Supervisor: T. Pelte **Reviewer:** **Driller:** Mark Backhaus.

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std.Pen. Blows	Run	Test Rec.	Drilling Log
523.7		***MODERN DEPOSITS*** (ICRR GRADE): GRAVELLY SANDY SILT (*topsoil*), dark gray; some organic matter, dry, loose, with roots; silt is black fill material, trace of clay (ML).				3 7 8 7	1	1.4'	15:00, 5 Oct. 94: boring begun, ground dry.
519.4	4.3	***PENNSYLVANIAN SYSTEM***: WEATHERED SHALE, medium gray with stains of moderate reddish brown; firm, remolded to FAT CLAY, high toughness, high plasticity, medium dry strength (CH); very coarse gravel in sample resulting of breaking of a greenish gray SHALEY LIMESTONE.			5	5 9 >36	2	1.0'	@ 4.0 to 6.0 ft: black silty fill dry. @ 5.0 ft: split spoon refusal; auger refusal.
518.7	5.0	LIMESTONE **Total Depth: 5.0 ft.**			10 15 20 25 30 35				15:20, 5 Oct. 94: auger boring terminated @ 5.0 ft; boring hole dry boring hole abandoned and plugged with bentonite chips.

GeoSyntec Consultants

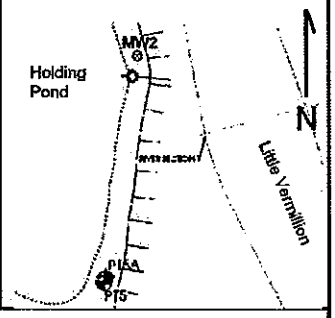
BORING LOG

Identification: P-15 **Page** 1 **of** 2

Site: Carus Chemical Company, La Salle, Illinois **Project No.:** FE 2167-1

Status: Ground-Water Monitoring Well **Drilled:** 28 September 1994
Tools & Method: 4.25 in. I.D. H.S. Auger w/SPT, automatic hammer **Bit Diameter:** 8 in.
Total Depth: 45.0 ft. **Ground Elevation:** 489.23 **Surveyor:** Chamlin & Associates, Inc.
Drilling Company: Layne Northwest. **Rig:** CME 850
Supervisor: T. Pelte **Reviewer:** **Driller:** Vince Meindel

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std. Blows	Pen. Run	Test Rec.	Drilling Log
489.2		***MODERN DEPOSITS*** : GRAVELLY CLAY, dark olive gray; some rounded siliceous fine gravel with organic matter (roots), in dry state; remolded to clay, firm, low toughness, medium plasticity (CL).							14:20, 28 Sep. 94: boring begun, ground dry. @ 0 to 3.0 ft: easy driling; steady easy drilling to 40.0 ft.
485.2	4.0	SLAG, dark reddish brown to dark gray; silty sandy gravel with medium to very coarse sand and very fine to coarse gravel; trace of organic matter (roots) to 25.0 ft; poorly sorted, loose, angular (GM).			5	2 5 6 9	1	1.8'	
						6 14 13 14	2	1.8'	
					10				
						6 24 29 19	3	1.0'	@ 13.0 ft: slag moist.
					15				
						10 7 10 9	4	0.8'	
					20				
		@ 23.0 ft: silty gravel, light brownish red; wet, loose, very fine silt and fine to medium gravel (GM).				6 7 7 6	5	1.0'	@ 23.0 ft: water in the sample, saturated soil.
					25				
461.2	28.0	SILT, grayish black; sandy silt with organic matter (strong smell), loose to weakly indurated, in plastic state, very soft; remolded in a silt with low plasticity and low toughness (MH); likely to be natural sediment of pond or swamp with steady water.				0 4 3 0	6	1.8'	@ 28.0 ft: very soft spooning and drilling.
458.2	31.0	***PENNSYLVANIAN SYSTEM:*** WEATHERED GREEN SHALE, greenish gray with reddish brown stains; dry, stiff, trace of organic matter (roots), remolded to CLAY, medium toughness, low dry strength (CH).			30				
							7		Sample #7 is a shelby tube sample for geotechnical analysis.
					35				
						4 8 14 22	8	2.0'	

Identification: P-15 Site: Carus Chemical Company, Phase II Proj. No.: FE 2167-1 Page 2 of 2

Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale	Std. Blows	Pen. Run	Test Rec.	Drilling Log
446.2	43.0	UNWEATHERED GREEN SHALE, grayish green with some greyish red stains; hard, dry; remolded to a high plasticity CLAY with medium toughness and high dry strength (CL).			45	10 24 >52	9	1.5'	@ 43.0 ft: steady and slow drilling.
444.2		**Total Depth: 45.0 ft.**							16:30, 28 Sep. 94: auger boring terminated @ 43.0 ft; split spoon sample to 45.0 ft.
					50				
					55				
					60				
					65				
					70				
					75				
					80				
					85				

GEOSYNTEC CONSULTANTS

BORING LOG

Identification: P-15A **Page** 1 **of** 1

Site: Carus Chemical Company, La Salle, Illinois **Project No.:** FE 2167-1

Status: Ground-Water Monitoring Well **Drilled:** 29 September 1994

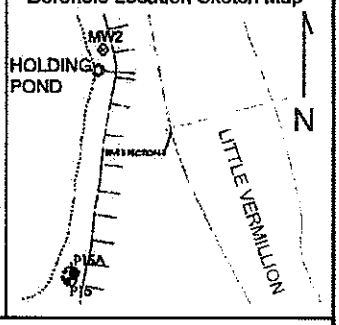
Tools & Method: 4.25 in. I.D. H.S. Auger w/SPT, automatic hammer **Bit Diameter:** 8 in.

Total Depth: 25.0 ft. **Ground Elevation:** 489.22 **Surveyor:** Chamlin & Associates, Inc.

Drilling Company: Layne Northwest. **Rig:** CME 850

Supervisor: T. Pelte **Reviewer:** **Driller:** Vince Meindel

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std. Pen. Blows	Run	Test Rec.	Drilling Log
489.22		(See Boring No. P-15 for lithologic description.)			5, 10, 15, 20, 25, 30, 35	1		0.5'	10:00, 29 Sep. 94: boring begun, ground moist. (Location is 5.0 ft north of P15.)
464.2		**Total Depth: 25.0 ft.**							11:00, 29 Sep. 94: boring terminated @ 25.0 ft.

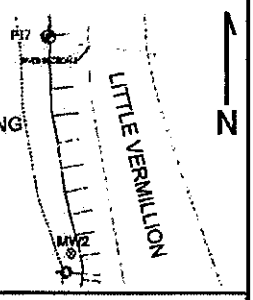
GeoSyntec Consultants

BORING LOG

Identification: P-17 **Page** 1 **of** 2
Site: Carus Chemical Company, La Salle, Illinois **Project No.:** FE 2167-1

Status: Ground-Water Monitoring Well **Drilled:** 29 September 1994
Tools & Method: 4.25 in. I.D. H.S. Auger w/SPT, automatic hammer **Bit Diameter:** 8 in.
Total Depth: 55.0 ft. **Ground Elevation:** 487.71 **Surveyor:** Chamlin & Associates, Inc.
Drilling Company: Layne Northwest. **Rig:** CME 850
Supervisor: T. Pelte **Reviewer:** **Driller:** Vince Meindel

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std. Pen. Blows	Run	Test Rec.	Drilling Log
487.7		***MODERN DEPOSITS:*** GRAVELLY CLAY, olive gray with reddish brown silty coating and reddish brown medium to coarse gravel (slag and bricks); some organic matter (roots), in dry state; remolded to clay, firm, low toughness, medium plasticity (CL).							14:15, 29 Sep. 94: boring begun, ground dry.
485.2	2.5	SLAG, dark reddish brown to dark gray; silty sandy gravel with medium to very coarse sand and very fine to coarse gravel; trace of organic matter (roots) to 25.0 ft; poorly sorted, loose, angular (SP to GP).			5				@ 3.0 to 32.0 ft: frequent breaking of bricks and boulders during drilling; slow drilling.
						12 11 10 11	1	1.5'	
					10				@ 11.0 ft: entire bricks coming out of the boring hole.
					15	15 20 58 >39	2	1.4'	
					20				
					25				
						10 42 50 29	3	1.8'	
					30				
455.7	32.0	ALLUVIUM, dark gray; coarse gravel (limestone and slag) with some coarse sand and trace of clay, poorly sorted , poorly graded, loose (GP).							@ 32.0 ft: breaking sounds.
							4		@ 33.0 ft: slough in the auger, no right count; water in the sample, saturated slag.
		Approximately, between @ 32.0 ft and @ 38.0 ft, running sand, dark gray; medium to coarse sand, very loose, well sorted, trace of clay, wet (SP); main component of the slough.			35				
							5		@ 38.0 ft: slough in the auger, no right count.

Identification: P-17 **Site:** Carus Chemical Company, Phase II **Proj. No.:** FE 2167-1 **Page** 2 of 2

Elev. (feet)	Top (feet)	Lithology Log	Std. Blows	Pen. Run	Test Rec.	Drilling Log
447.7	40.0	ALLUVIUM, dark yellowish brown; gravelly medium sand with trace of clay to clayey sandy gravel (from top to basis), limestone and trace of coal as fine to very coarse gravel, loose to weakly indurated (where clay present), poorly sorted and poorly graded (SP to GC).	21 12 16 18	6	1.8'	@ 40.0 ft: slough in the auger, blow count may be wrong.
						@ 42.0 ft: cleaning slough with water injection, center plug: no result.
			28 26 20 14	7	1.8'	17:15, 29 Sep. 94: boring suspended @ 42.0 ft.
			11 20 22 22	8	1.5'	8:30, 30 Sep. 94: boring resumed; pulling out of augers and changing of head basket (broken in slag).
			9 >30	9	0.2'	@ 47.0 ft: split spooning refusal and hard drilling.
						@ 48.0 ft: slough in auger; washing and spooning to remove running sand from auger; drilling resumed with injected water.
			6 11 21 13	10	1.5'	
436.7	51.0	***HOLOCENE***: ALLUVIUM, dark yellowish brown; gravelly clay; in plastic state, with medium plasticity (CL); contains well-rounded limestone coarse gravel.	7 7 71 35	11	1.4'	@ 49.0 ft: spooning with an initial slough thickness of 1.0 ft. @ 52.0 ft: smoother drilling.
434.7	53.0	***PENNSYLVANIAN SYSTEM***: WEATHERED GREEN SHALE, moderate olive brown with reddish brown stains; stiff, dry; remolded in a medium-plasticity clay with medium toughness and high dry strength (CL).	7 9 43 >40	12	1.8'	
432.7		**Total Depth: 55.0 ft.**				11:10, 30 Sep. 94: auger boring terminated @ 53.0 ft; split spoon sample taken to 55.0 ft.

Graphic Log / Well / Depth Scale: 45, 50, 55, 60, 65, 70, 75, 80, 85

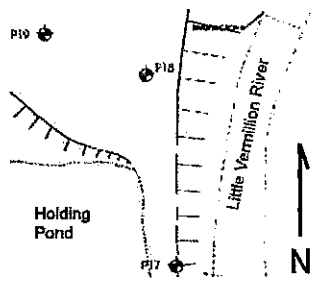
GeoSyntec Consultants

BORING LOG

Identification: P-18 **Page** 1 **of** 2
Site: Carus Chemical Company, La Salle, Illinois **Project No.:** FE 2167-1

Status: Ground-Water Monitoring Well **Drilled:** 27 September 1994
Tools & Method: 4.25 in. I.D. H.S. Auger w/SPT, automatic hammer **Bit Diameter:** 8 in.
Total Depth: 62.0 ft. **Ground Elevation:** 505.85 **Surveyor:** Chamlin & Associates, Inc.
Drilling Company: Layne Northwest. **Rig:** CME 850
Supervisor: T. Pelte **Reviewer:** **Driller:** Vince Meindel

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std.Pen. Blows	Run	Test Rec.	Drilling Log
505.8		***MODERN DEPOSITS***: SLAG, dark reddish brown to grayish blue very dusky red, and dusky brown; coarse sand to boulders (@ 32.0 ft), well sorted to poorly sorted, poorly graded (SP to GP) dry to 35.0 ft.							15:40, 27 Sep. 94: boring begun, ground dry.
						7 3 5 5	1	2.0'	
					5				@ 5.0 to 55.0 ft: breaking of boulders during drilling.
					10				
						8 33 13 24	2	1.2'	
					15				
					20				
						0 2 5 22	3	0.4'	@ 23.0 ft: cavity.
					25				
					30				
						>62	4	0.2'	@ 32.0 to 35.0 ft: very hard drilling, close to auger refusal; 3.0-ft thick boulder.
		@ 35.0 ft: some silt to abundant silt, increasing content with depth; water observed on rod @ 35.0 ft; slag dry in sample to @ 48.0 ft.			35				@ 35.0 ft: easier drilling.
						11 11 10 9	5	1.0'	@ 38.0 ft: moist sample.

Identification: P-18 Site: Carus Chemical Company, Phase II Proj. No.: FE 2167-1 Page 2 of 2

Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale	Std. Pen. Blows	Run	Test Rec.	Drilling Log
					45				
						31 40 25 25	6	1.0'	@ 48.0 ft: liquid water in sample.
					50				
	53.0	ALLUVIUM, dark gray; very fine sand (silicous) with medium gravel (slag, bricks,limestone, vitrified slag), trace of clay, poorly sorted, loose, poorly graded (SC).				41 42 22 22	7	1.5'	@ 53.0 ft: water on top of sample.
					55				
	58.0	ALLUVIUM, dark yellowish brown; gravelly clayey sand with some silt, poorly sorted and poorly graded; abundant very coarse limestone gravel, sand ranging from very fine to very coarse, loose to weakly indurated (SC).					8	1.4'	@ 58.0 ft: slough into the auger: no count.
					60	40 35 30 50	9	1.8'	@ 60.0 ft: slough into the auger: count may be wrong.
	62.0	LIMESTONE: possible ALLUVIUM boulder.				>100	10	0.4'	@ 62.0 ft: spoon and auger refusals in limestone.
		Total Depth: 62.0 ft.			65				10:00, 28 Sep. 94: auger boring terminated @ 62.0 ft.
					70				
					75				
					80				
					85				

GEOSYNTEC CONSULTANTS

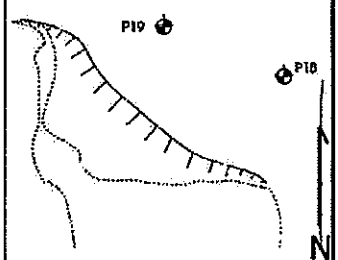
BORING LOG

Identification: P-19 **Page** 1 **of** 2

Site: Carus Chemical Company, La Salle, Illinois **Project No.:** FE 2167-1

Status: Ground-Water Monitoring Well **Drilled:** 29 September 1994
Tools & Method: 4.25 in. I.D. H.S. Auger w/SPT, automatic hammer **Bit Diameter:** 8 in.
Total Depth: 61.0 ft. **Ground Elevation:** 511.90 **Surveyor:** Chamlin & Associates, Inc.
Drilling Company: Layne Northwest. **Rig:** Mobil B-57
Supervisor: J. Raymer **Reviewer:** **Driller:** Mark Backhaus

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std. Pen. Blows	Run	Test Rec.	Drilling Log
511.9		***MODERN DEPOSITS***: CLAYEY SILT (topsoil), dark yellowish brown; contains some oganic matter (CL).							14:15, 29 Sep. 94: boring begun, ground dry; easy drilling.
		SLAG, grayish red, dark reddish brown, blackish red, dark yellowish orange; gravel to sand sized; vesicular texture; vesicles collapse under stress of drilling and sampling.			5				Note: top of borehole enlarged to 18 in. by end of drilling. Only two shovelfull of cuttings recovered.
					10	6 8 10 9	1	2.0'	
					15				@ 18.0 ft: harder drilling.
									@ 19.0 ft: easier drilling.
		@ 20.0 ft: slag is very dusky reddish purple, dark reddish brown, and dark yellowish orange.			20	9 13 13 15	2	2.0'	@ 21.0 ft: slag dry.
		@ 22.0 ft: medium bed of SILT, moderate yellowish brown.				12 15 16 12	3		@ 22.0 ft: silt in dry state; sample #2 for chemical analysis.
		@ 23.0 to 24.0 ft: brick.			25				
					30				@ 30.0 ft: grinding, slow drilling.
		@ 31.5 ft: becoming slag silt, bright reddish orange.							@ 31.5 ft: faster and smoother drilling
					35	22 21 17 11	5		

Identification: P-19 **Site:** Carus Chemical Company, Phase II **Proj. No.:** FE 2167-1 **Page** 2 **of** 2

Elev. (feet)	Top (feet)	Lithology Log	Std. Blows	Pen. Run	Test Rec.	Drilling Log
		@ 41.0 ft: medium bed of clay, grayish ggreen, soft; @ 41.5 ft: slag becoming black.	15 14 16 11	5	1.5'	@ 40.0 ft: soil sample for metal analysis; @ 41.0 ft: water in slag; clay layer in plastic state..
			7 30 24 13	6		@ 45.0 ft: harder drilling.
		@ 50.0 ft: brown brick in end of spoon.	25 34 55	7	0.5'	@ 52.0 ft: steady drilling..
			60/4"	8	0.2'	@ 55.0 ft: cobble stuck in end of auger, not noticed yet.
454.4	57.5	***PENNSYLVANIAN SYSTEM***: RED CLAY (possible residual soil), moderate reddish brown; contains pieces of red shale and weathered pebbles of limestone.				@ 57.5 ft: slow, smooth drilling. @ 58.5 ft: little easier, very smooth.
449.1		**Total Depth: 61.0 ft.**	NR	9	1.0'	Sample #9 blow counts not valid due to cobble stuck in auger; raised augers to knock out cobble then collected sample.
						15:00, 29 Sep. 94: auger boring terminated @ 60.0 ft; split spoon sample taken to 61.0 ft.

Graphic Log / Well / Depth Scale: 45, 50, 55, 60, 65, 70, 75, 80, 85

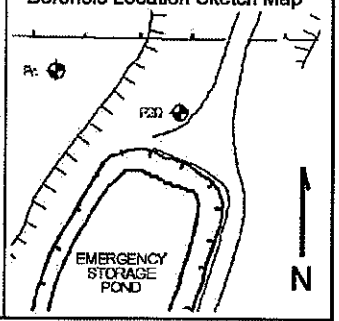
GeoSyntec Consultants

BORING LOG

Identification: P-20 **Page** 1 **of** 1
Site: Carus Chemical Company, La Salle, Illinois **Project No.:** FE 2167-1

Status: Ground-Water Monitoring Well **Drilled:** 29 September 1994
Tools & Method: 4.25 in. I.D. H.S. Auger w/SPT, automatic hammer **Bit Diameter:** 8 in.
Total Depth: 21.5 ft. **Ground Elevation:** 543.19 **Surveyor:** Chamlin & Associates, Inc.
Drilling Company: Layne Northwest. **Rig:** Mobil B-57
Supervisor: J. Raymer **Reviewer:** **Driller:** Mark Backhaus.

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std. Pen. Blows	Run	Test Rec.	Drilling Log
543.2		***MODERN DEPOSITS*** (Fill around emergency pond): REWORKED TILL and SHALE; clayey gravelly sandy silt some cobbles.				13 9 8 9	1	1.5'	7:30, 29 Sep. 94: boring begun, ground moist
		@ 6.0 to 8.0 ft: some cobbles.			5				
533.2	10.0	GRANULAR FILL (Illinois Central Rail Road grade), black; medium sand with some rounded gravel, some cinders, some coal; loose (SP).			10	6 9 22 18	2	1.5'	@ 11.0 ft: fill dry.
		@ 14.0 to 16.0 ft: possible slag and sinter.			15	6 9 11 11	3	1.5'	@ 15.0 ft: some wet zones in fill material.
		@ 18.5 ft: medium bed of gravel.							
524.7	18.5	***PENNSYLVANIAN SYSTEM***: RED WEATHERED SHALE, moderate reddish brown; with some green lenses; stiff; remolded to FAT CLAY, high toughness, high plasticity (CH).			20	4 4 6 8	4	2.0'	@ 19.5 ft: shale dry.
521.7	21.5	LIMESTONE.							@ 21.5 ft: very hard drilling, grinding.
		Total Depth: 21.5 ft.			25				8:30, 29 Sep. 94: auger boring terminated @ 21.5 ft.
					30				
					35				

GEOSYNTEC CONSULTANTS

BORING LOG

Identification: P-21 **Page** 1 **of** 2

Site: Carus Chemical Company, La Salle, Illinois **Project No.:** FE 2167-1

Status: Boring Hole **Drilled:** 30 September 1994

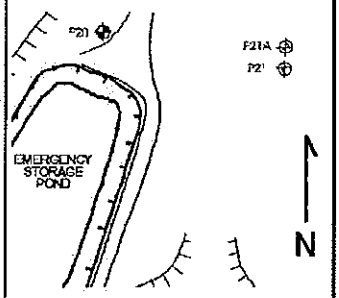
Tools & Method: 4.25 in. I.D. H.S. Auger w/SPT, automatic hammer **Bit Diameter:** 8 in.

Total Depth: 77.0 ft. **Ground Elevation:** 543.7 **Surveyor:** Chamlin & Associates, Inc.

Drilling Company: Layne Northwest. **Rig:** CME 850

Supervisor: T. Pelte **Reviewer:** **Driller:** Vince Meindel

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std.Pen. Blows	Run	Test Rec.	Drilling Log
543.7		***MODERN DEPOSITS*** : SANDY CLAYEY SILT (topsoil), moderate yellowih brown (SM).							10:45, 30 Sep. 94: boring begun, ground dry.
541.7	2.0	SLAG, dark reddish brown, moderate red, blackish red, very dusky purple; highly vesicular, moderately brittle; collapses considerably under stress of drilling and sampling; cuttings commonly medium to coarse pebble size; sample commonly sand size.			5 10 15 20 25 30 35	13 50/4"	1	0.8'	Soil sample for metal analysis.

Identification: P-21 **Site:** Carus Chemical Company, Phase II **Proj. No.:** FE 2167-1 **Page** 2 of 2

Elev. (feet)	Top (feet)	Lithology Log	Drilling Log
			19 17 10 — 2 — 1.5' — @ 41.0 ft: soil sample for metal analysis.
			20 18 9 14 — 3 — 1.0' — @ 60.0 ft: slag dry; soil sample for metal analysis. Note: slag collapses during sampling: vesicles collapse.
			@ 67.0 to 68.0 ft: noisy drilling through slag.
			@ 70.0 ft: borehole dry.
460.7	73.0	***PENNSYLVANIAN SYSTEM***: RED CLAY (possible paleosol or Holocene residual soil), moderate reddish brown; non fissile; contains very coarse sand to fine gravel of weathered limestone and red shale; very stiff; remolded to FAT CLAY, high toughness, high plasticity (CH).	@ 73.0 ft: slower and smoother drilling.
			28 29 41 32 — 4
456.7		**Total Depth: 77.0 ft.**	13.50, 29 Sep. 94: auger boring terminated @ 75.0 ft; borehole dry; split spoon sample to 77.0 ft; pulled augers to 72.0 ft. 14:30, 29 Sep. 94: checked for water; borehole dry; borehole abandoned and plugged with bentonite chips.

Graphic Log | Well | Depth Scale (45, 50, 55, 60, 65, 70, 75, 80, 85) | Std. Pen. Blows | Run | Test Rec.

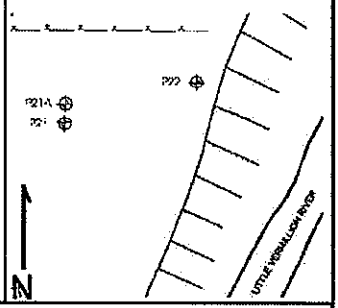
GeoSyntec Consultants

BORING LOG

Identification: P-22 **Page** 1 **of** 3
Site: Carus Chemical Company, La Salle, Illinois **Project No.:** FE 2167-1

Status: Boring Hole **Drilled:** 4 October 1994
Tools & Method: 4.25 in. I.D. H.S. Auger w/SPT, automatic hammer **Bit Diameter:** 8 in.
Total Depth: 121.0 ft. **Ground Elevation:** 552.28 **Surveyor:** Chamlin & Associates, Inc.
Drilling Company: Layne Northwest. **Rig:** CME 850
Supervisor: T. Pelte. **Reviewer:** J. Raymer. **Driller:** Vince Meindel.

Borehole Location Sketch Map



Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale (feet)	Std.Pen. Blows	Std.Pen. Run	Test Rec.	Drilling Log
552.3		***MODERN DEPOSITS*** : SLAG, dusky red to blackish red with abundant grayish yellow crushed bricks; gravelly sand (boulders and cobbles are present but not observed), dry to @ 90.0 ft, with trace of silt, fine sand to coarse gravel, poorly graded (SP to GP).			5				15:30, 4 Oct. 94: boring begun; ground dry. @ 0 to 5.0 ft: easy drilling.
					10				@ 6.0 to 7.0: crushing sounds, hard drilling.
					15				@ 14.0 ft: crushing sounds; inclination of auger toward north; correction of inclination.
					20	14 7 4 7	1	1.0'	@ 19.0 ft: broken basket teeth in sample.
					25				
					30				
					35	15 12	2	1.4"	@ 35.0 to 36.0 ft: very hard drilling.

Identification: P-22 Site: Carus Chemical Company, Phase II Proj. No.: FE 2167-1 Page 2 of 3

Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale	Std. Blows	Pen. Run	Test Rec.	Drilling Log
					45	40 23			@41.0 ft: Soil sample for metals analysis.
					50				
					55				
					60	53 34 39 23	3	1.0'	@ 61.0 ft: drop of the spoon (hole).
					65				@ 65.0 to 80.0 ft: easier drilling, steady.
					70				
					75				
					80	41 57 43 42	4	1.8'	17:15, 4 Oct. 94: boring suspended @ 79.0 ft. 7:10, 5 Oct. 94: boring resumed.
					85				@ 85.0 ft: dry hole.
						44 21	5	1.2'	@ 90.0 ft: lower blow count; water in the sample.

Identification: P-22 **Site:** Carus Chemical Company, Phase II **Proj. No.:** FE 2167-1 **Page** 3 of 3

Elev. (feet)	Top (feet)	Lithology Log	Graphic Log	Well	Depth Scale	Std. Blows	Pen. Run	Test Rec.	Drilling Log
					95	17 15			
						18 16 12 13	6	1.6'	@ 98.0 ft: crushing sounds.
					100	16 23 14 15	7	1.2'	
450.3	112.0	ALLUVIUM, olive gray; CLAYEY GRAVELLY with some sand and some silt; gravel are sub-angular to angular; limestone, quartz, and coal, poorly sorted and poorly graded, weakly indurated, wet; the fine material is firm (GC); some beds show a increased clay content (GRAVELLY CLAY)							@ 102.0 to 103.5 ft: slow and hard drilling (no crushing).
					105	101 70 39 41	8	2.0'	@ 106.0 ft: Soil sample for metal analysis.
		@ 109.0 to 110.0 ft: fine to medium sand, brownish gray, well sorted, poorly graded, wet, trace of clay (SP).			110	17 39 47 39	9	1.0'	
438.3	114.0	***HOLOCENE***: ALLUVIUM, olive gray; CLAYEY GRAVEL with some sand and some silt; gravel are well rounded to angular; limestone, quartz, poorly sorted and poorly graded, weakly indurated, wet; the fine material is firm (GC).			115	104 78/4"	10	0.8'	@ 114.0 ft: spooning refusal; 1 ft of slough. @ 116.0 ft: very hard drilling.
432.8	119.5	***PENNSYLVANIAN SYSTEM***: WEATHERED RED SHALE (residual soil), moderate reddish brown; non fissile; contains very coarse sand to fine gravel of weathered limestone and red shale; very stiff; remolded to FAT CLAY, high toughness, high plasticity (CH).			120	17 40 26 31	11	1.2'	@ 121.0 ft: spoon was sticked in the ground. 10:00, 5 Oct. 94: auger boring terminated @ 119.0 ft; split spoon sample taken to 121.0 ft.
431.3		**Total Depth: 121.0 ft.**			125				Well construction was began; very difficult auger pulling; unscrewing of auger to allow pulling out induced unscrewing of well; well lost. Taking into account location and boring data, boring hole was abandoned and plugged with bentonite chips.
					130				
					135				

GEOSYNTEC CONSULTANTS
Atlanta, Ga • Boca Raton, Fla • Brussels, Belgium
Columbia, Md • Huntington Beach, Cal • Walnut Grove, Cal

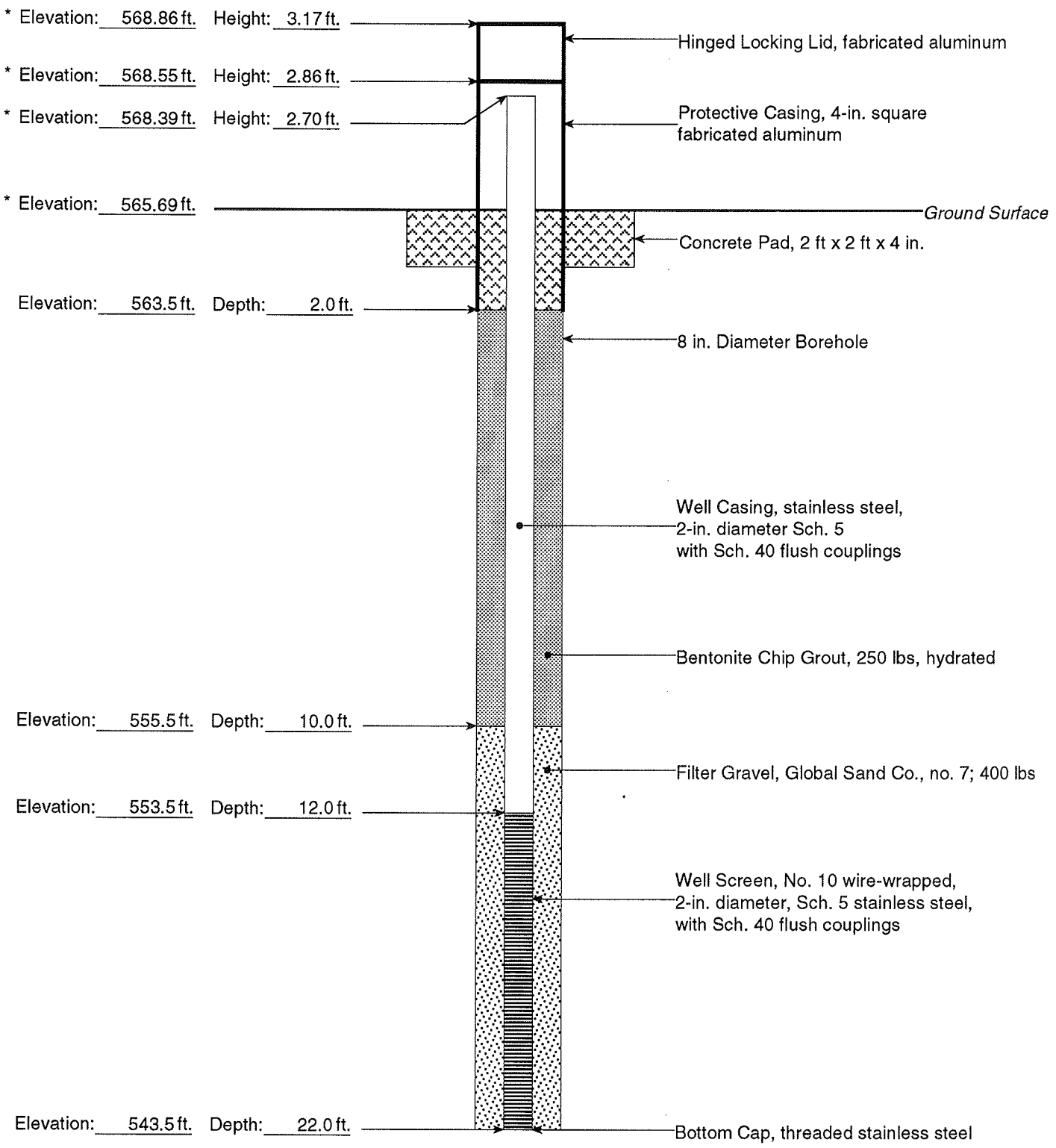
Well Construction Schematic Diagram

Identification: G-02 **Type:** Ground-Water Monitoring Well

Site: Carus Chemcial Company, LaSalle, Illinois **Project No.:** FE2147-1 **Date Completed:** 10 Nov 93

Drilling Co.: Layne Northwestern **Driller:** Mark Backhaus **Supervisor:** Brian Tindell

Development Method: Manual Bail & Surge **Reviewer:** J. Raymer



Notes: (1) * indicates vertically surveyed elevation; (2) drawing has no scale; (3) depths and heights are relative to ground surface

GEOSYNTEC CONSULTANTS
Atlanta, Ga • Boca Raton, Fla • Brussels, Belgium
Columbia, Md • Huntington Beach, Cal • Walnut Grove, Cal

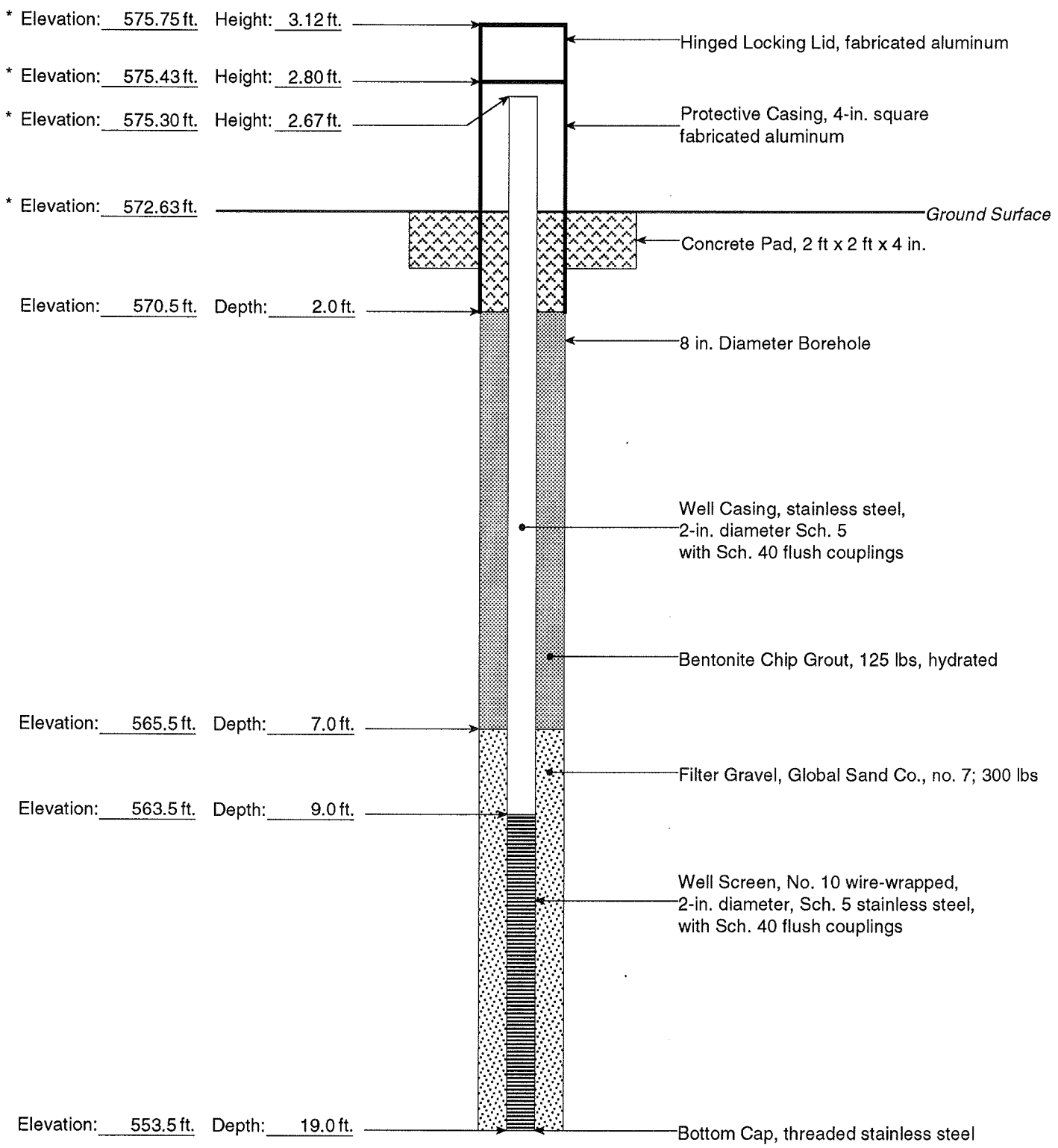
Well Construction Schematic Diagram

Identification: G-04 **Type:** Ground-Water Monitoring Well

Site: Carus Chemcial Company, LaSalle, Illinois **Project No.:** FE2147-1 **Date Completed:** 10 Nov 93

Drilling Co.: Layne Northwestern **Driller:** Mark Backhaus **Supervisor:** J. Raymer

Development Method: Manual Bail & Surge **Reviewer:** Nandra Weeks



Notes: (1) * indicates vertically surveyed elevation; (2) drawing has no scale; (3) depths and heights are relative to ground surface

GeoSyntec Consultants
Atlanta, Ga • Boca Raton, Fla • Brussels, Belgium
Columbia, Md • Huntington Beach, Cal • Walnut Grove, Cal

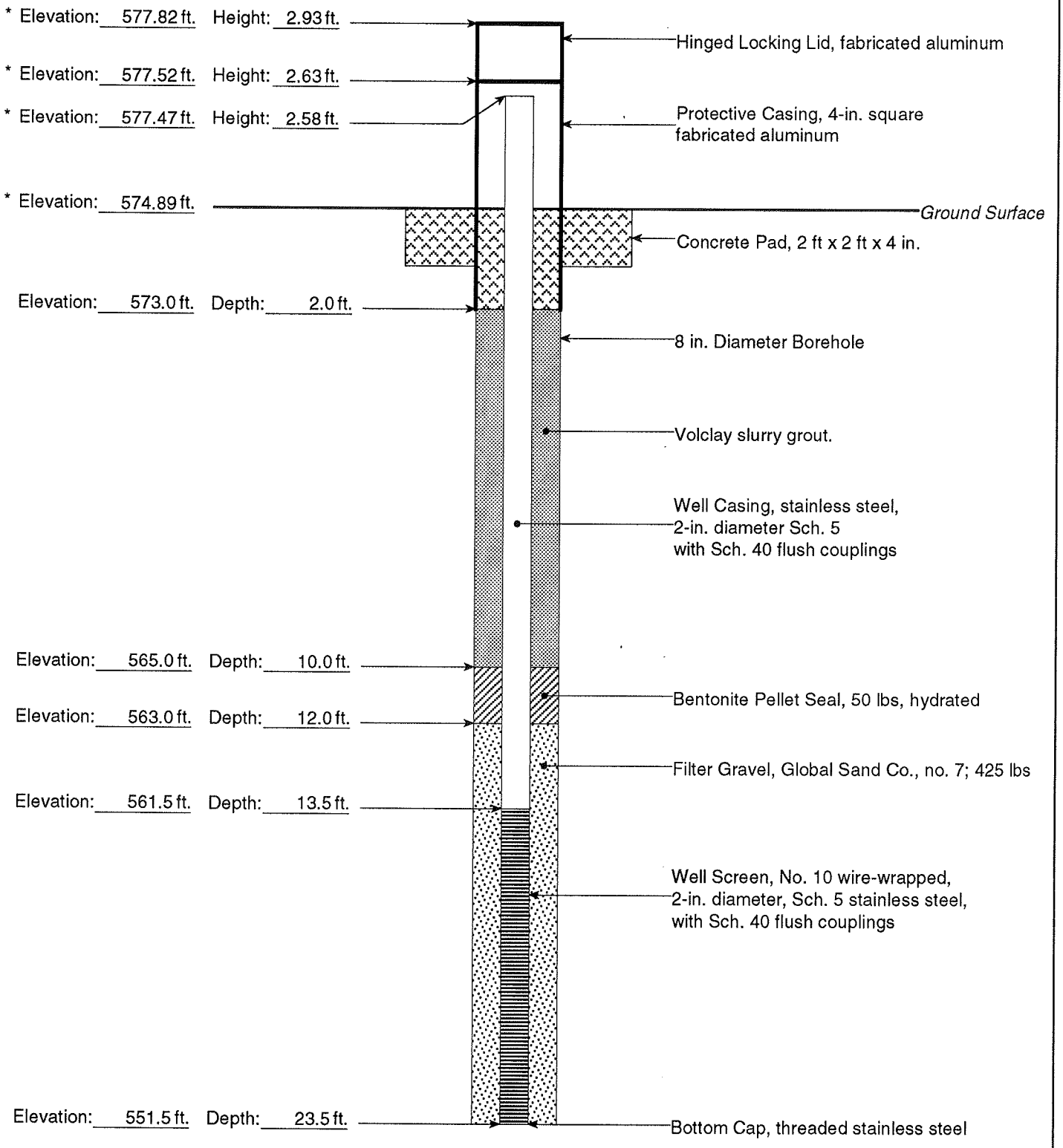
Well Construction Schematic Diagram

Identification: G-05 **Type:** Ground-Water Monitoring Well

Site: Carus Chemcial Company, LaSalle, Illinois **Project No.:** FE2147-1 **Date Completed:** 10 Nov 93

Drilling Co.: Layne Northwestern **Driller:** Mark Backhaus **Supervisor:** Nandra Weeks

Development Method: Manual Bail & Surge **Reviewer:** J. Raymer

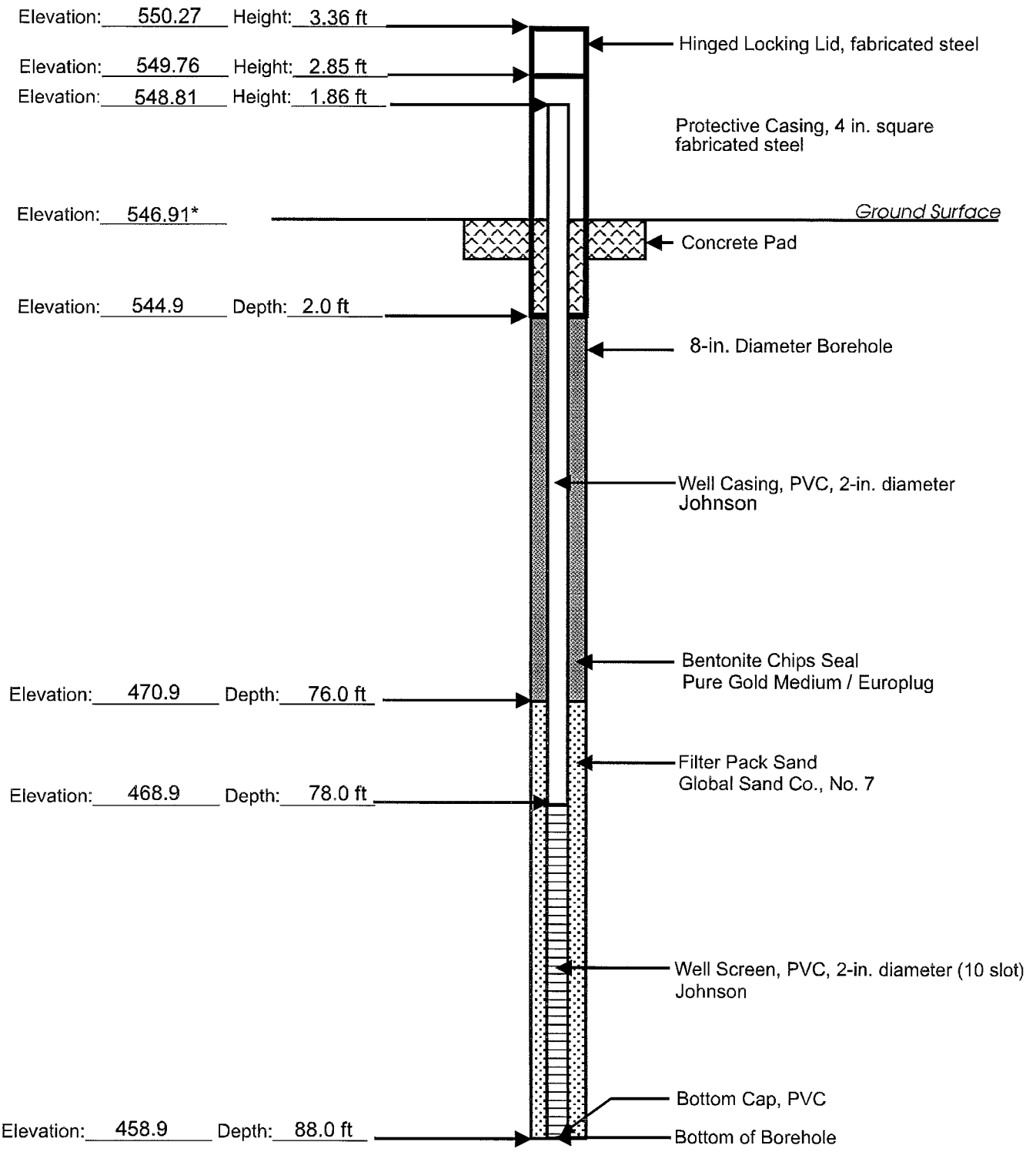


Notes: (1) * indicates vertically surveyed elevation; (2) drawing has no scale; (3) depths and heights are relative to ground surface

GeoSyntec Consultants

WELL CONSTRUCTION SCHEMATIC DIAGRAM

Identification: P-1 **Type:** Ground-Water Piezometer
Site: Carus Chemical Company, Phase II **Project No.:** FE 2167 **Date completed:** 3 Oct 94
Drilling Company: Layne Northwest **Driller:** Vince Meindel **Supervisor:** Thierry Pelte
Development Method: Grundfos pumping and surging **Reviewer:**

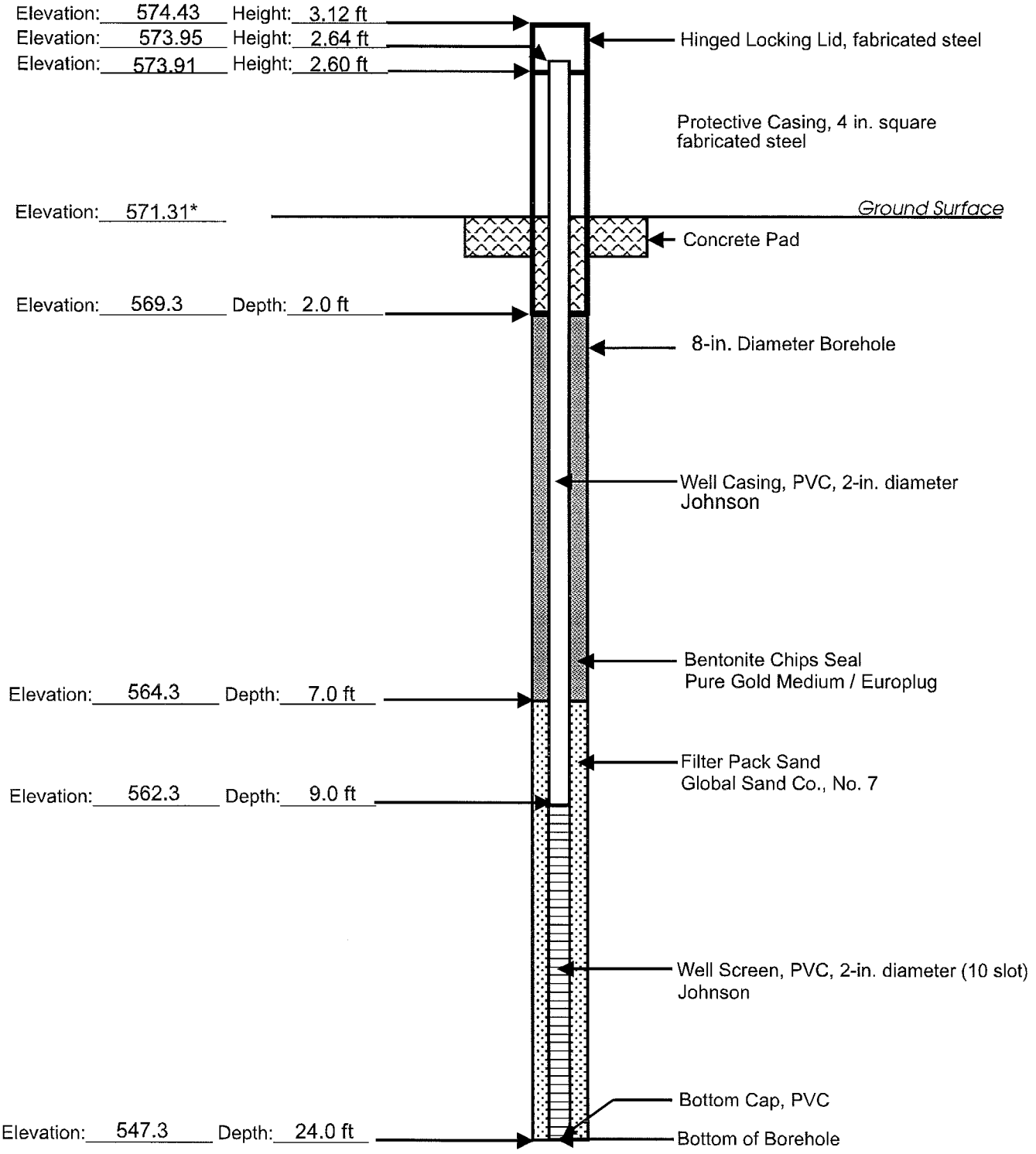


Notes: (1) *indicates vertically surveyed elevation; (2) drawing has no scale; (3) depths and heights are relatives to ground surface

GeoSyntec Consultants

WELL CONSTRUCTION SCHEMATIC DIAGRAM

Identification: P-6 **Type:** Ground-Water Piezometer
Site: Carus Chemical Company, Phase II **Project No.:** FE 2167 **Date completed:** 11 Oct 94
Drilling Company: Layne Northwest **Driller:** Vince Meindel **Supervisor:** Thierry Pelte
Development Method: Bailing and surging **Reviewer:**

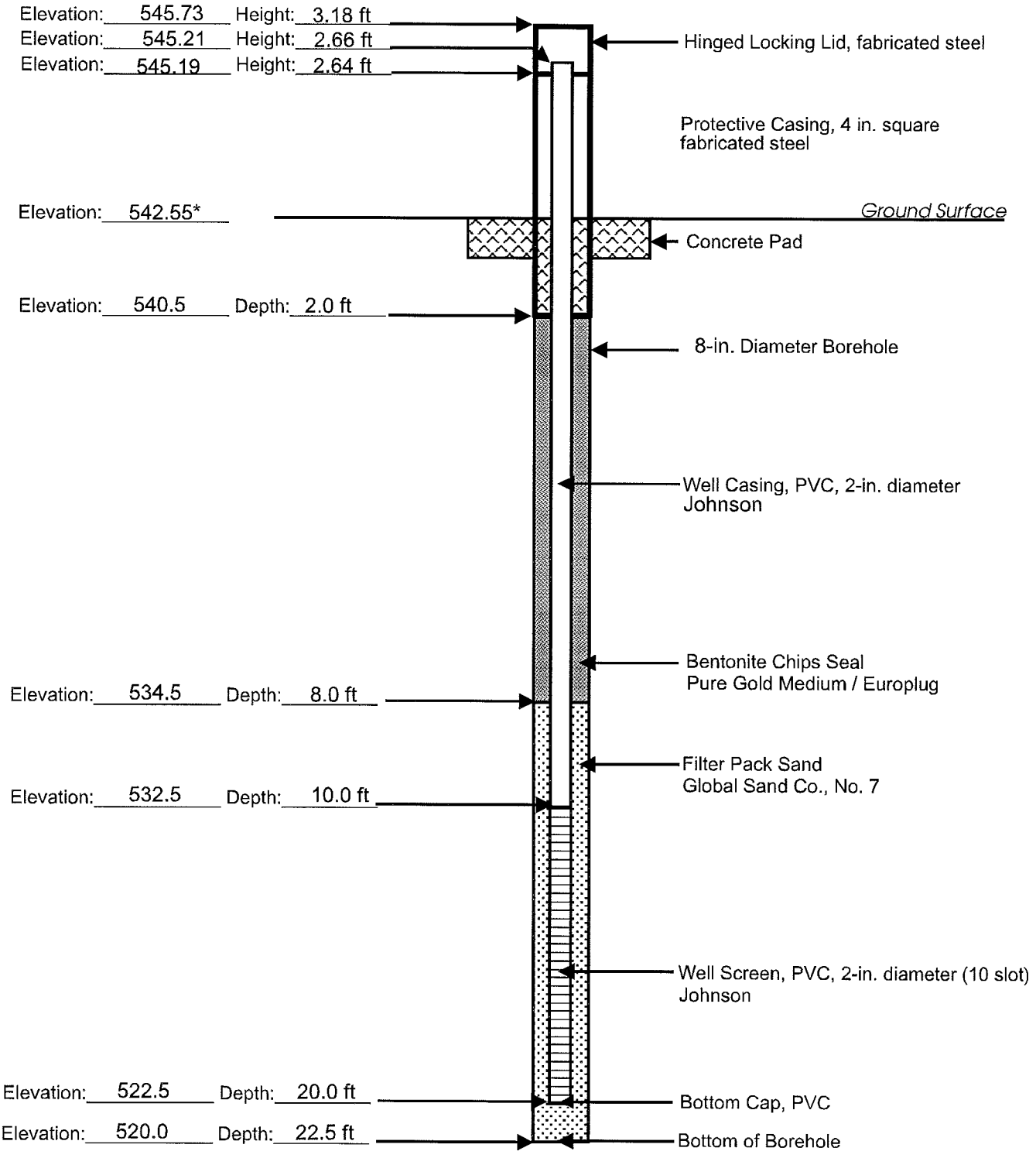


Notes: (1) *indicates vertically surveyed elevation; (2) drawing has no scale; (3) depths and heights are relatives to ground surface

GeoSyntec Consultants

WELL CONSTRUCTION SCHEMATIC DIAGRAM

Identification: P-7 **Type:** Ground-Water Piezometer
Site: Carus Chemical Company, Phase II **Project No.:** FE 2167 **Date completed:** 28 Sep 94
Drilling Company: Layne Northwest **Driller:** Mark Backhaus **Supervisor:** Jack Raymer
Development Method: Bailing and surging **Reviewer:**

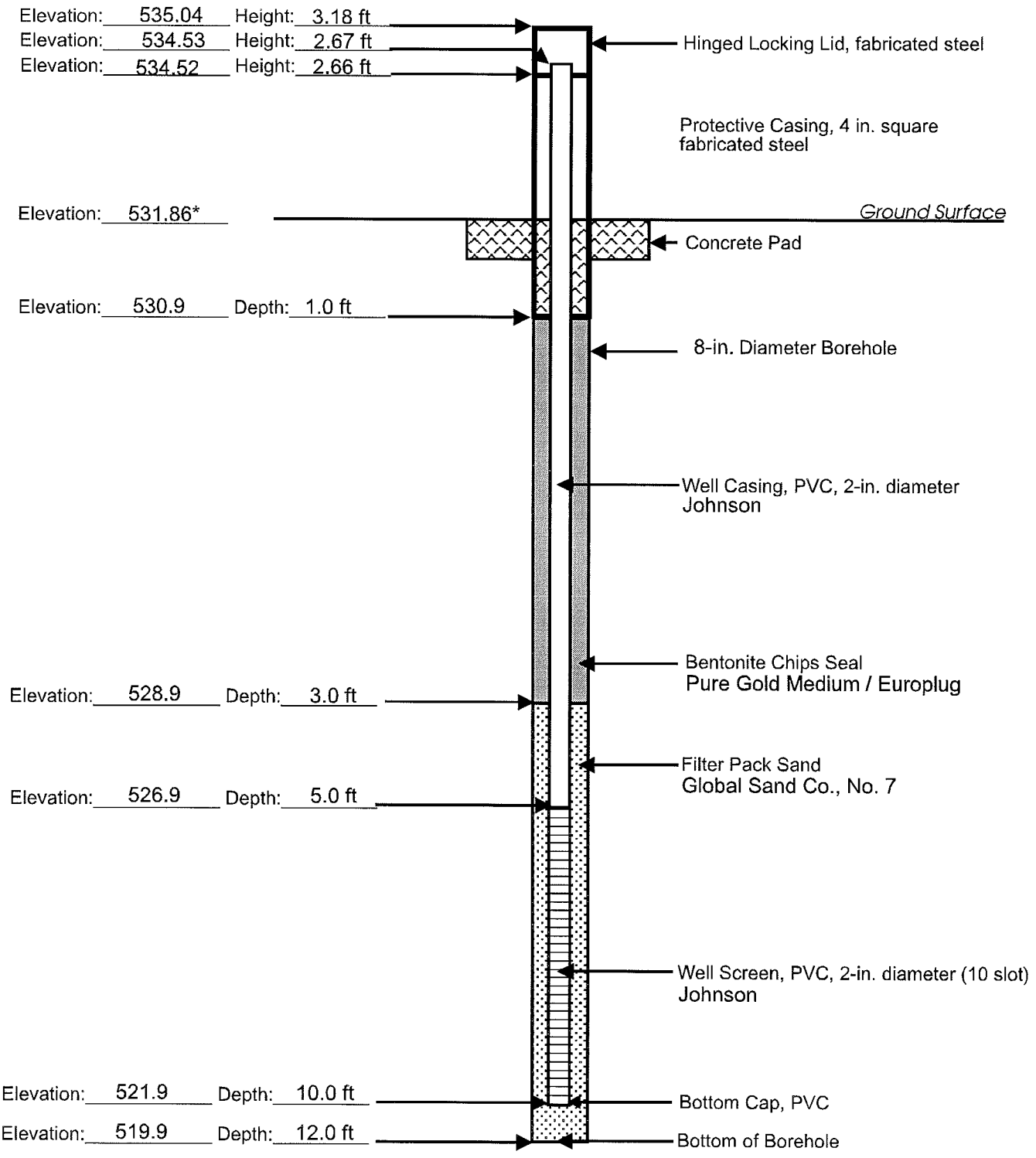


Notes: (1) *indicates vertically surveyed elevation; (2) drawing has no scale; (3) depths and heights are relatives to ground surface

GeoSyntec Consultants

WELL CONSTRUCTION SCHEMATIC DIAGRAM

Identification: P-9 **Type:** Ground-Water Monitoring Well
Site: Carus Chemical Company, Phase II **Project No.:** FE 2167 **Date completed:** 27 Sep 94
Drilling Company: Layne Northwest **Driller:** Mark Backhaus **Supervisor:** Jack Raymer
Development Method: Bailing and surging **Reviewer:**

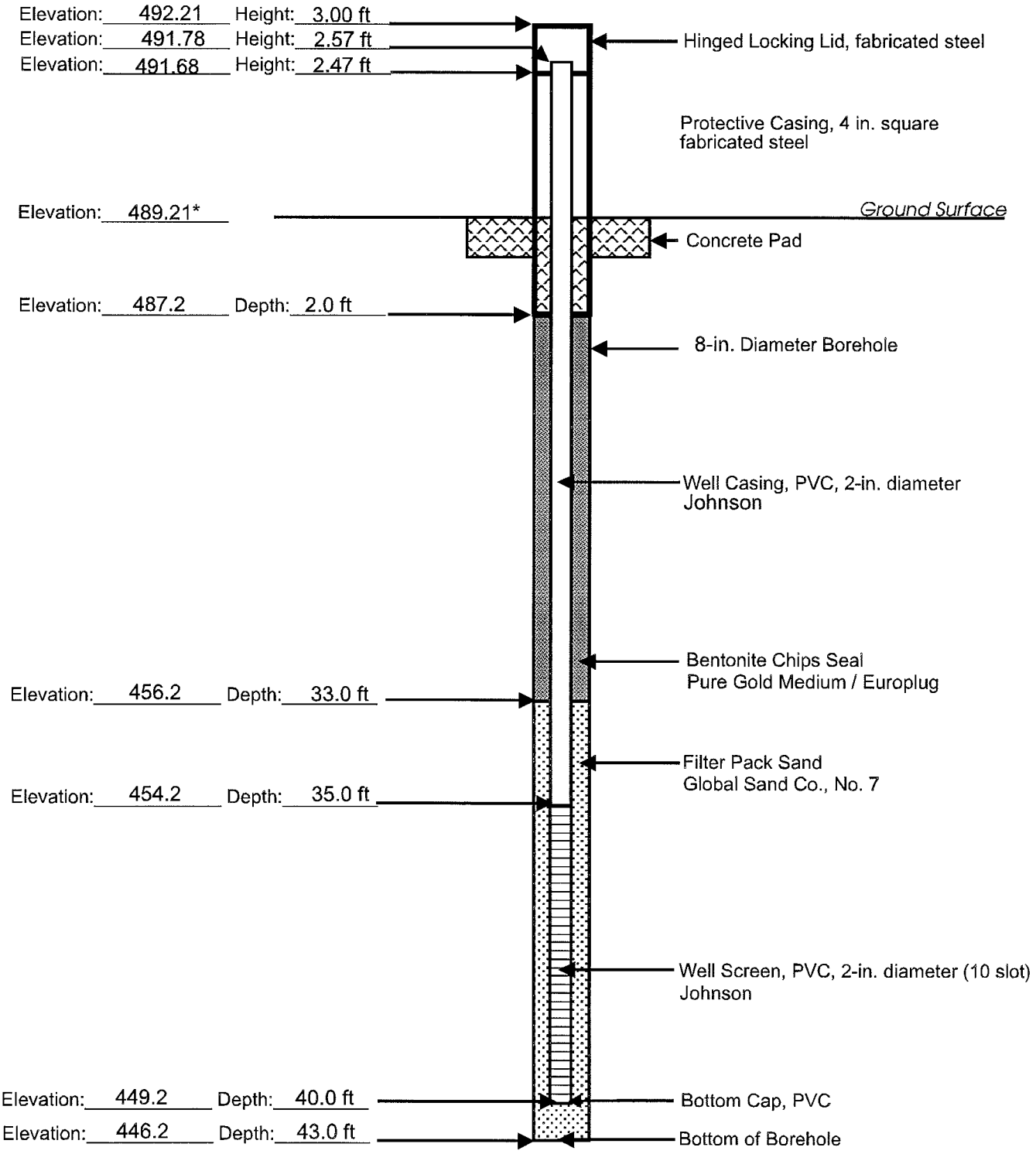


Notes: (1) *indicates vertically surveyed elevation; (2) drawing has no scale; (3) depths and heights are relatives to ground surface

GeoSyntec Consultants

WELL CONSTRUCTION SCHEMATIC DIAGRAM

Identification: P-15 **Type:** Ground-Water Piezometer
Site: Carus Chemical Company, Phase II **Project No.:** FE 2167 **Date completed:** 28 Sep 94
Drilling Company: Layne Northwest **Driller:** Vince Meindel **Supervisor:** Thierry Pelte
Development Method: Bailing and surging **Reviewer:**

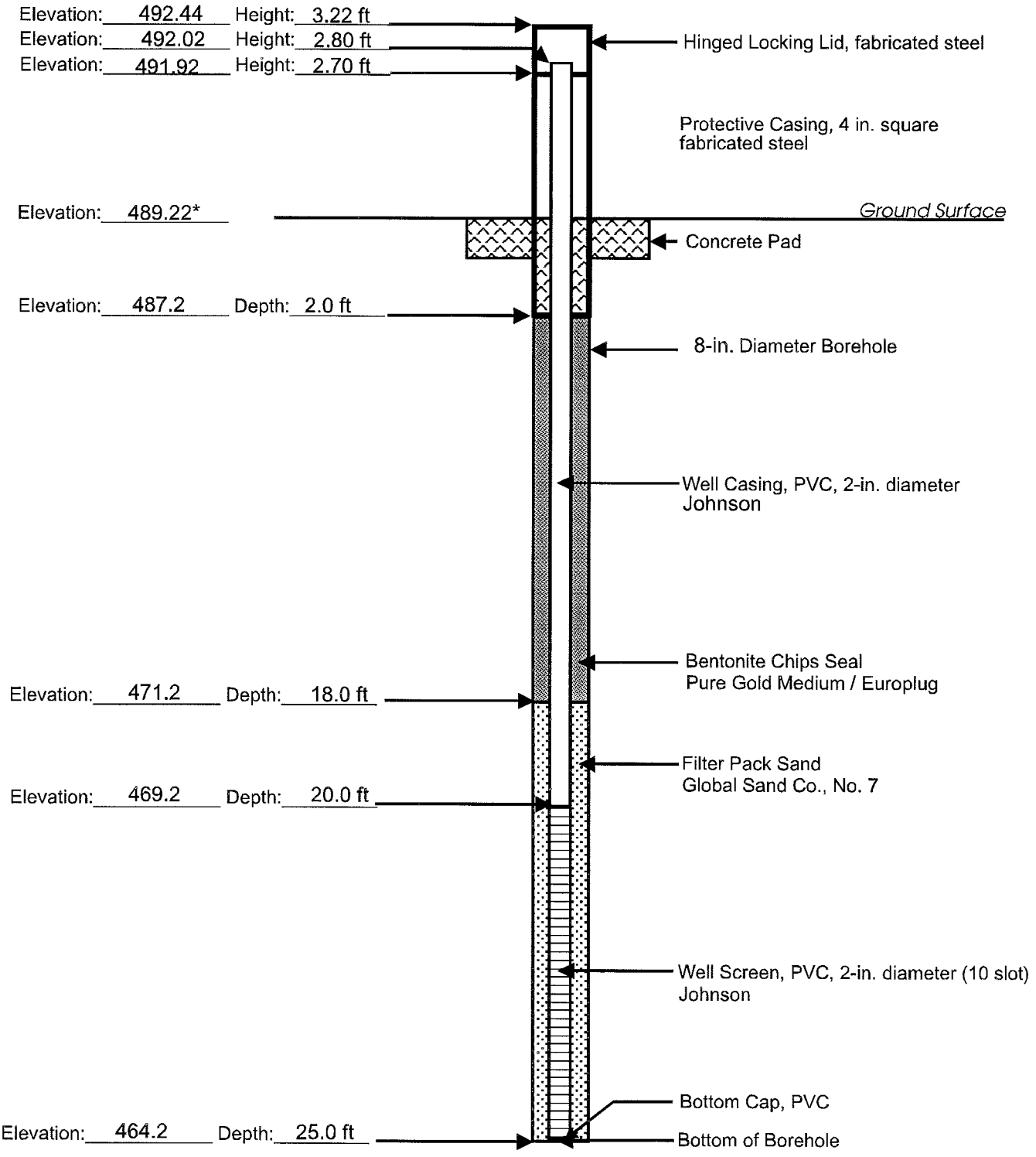


Notes: (1) *indicates vertically surveyed elevation; (2) drawing has no scale; (3) depths and heights are relatives to ground surface

GEOSYNTEC CONSULTANTS

WELL CONSTRUCTION SCHEMATIC DIAGRAM

Identification: P-15A **Type:** Ground-Water Piezometer
Site: Carus Chemical Company, Phase II **Project No.:** FE 2167 **Date completed:** 29 Sep 94
Drilling Company: Layne Northwest **Driller:** Vince Meindel **Supervisor:** Thierry Pelte
Development Method: Bailing and surging **Reviewer:**

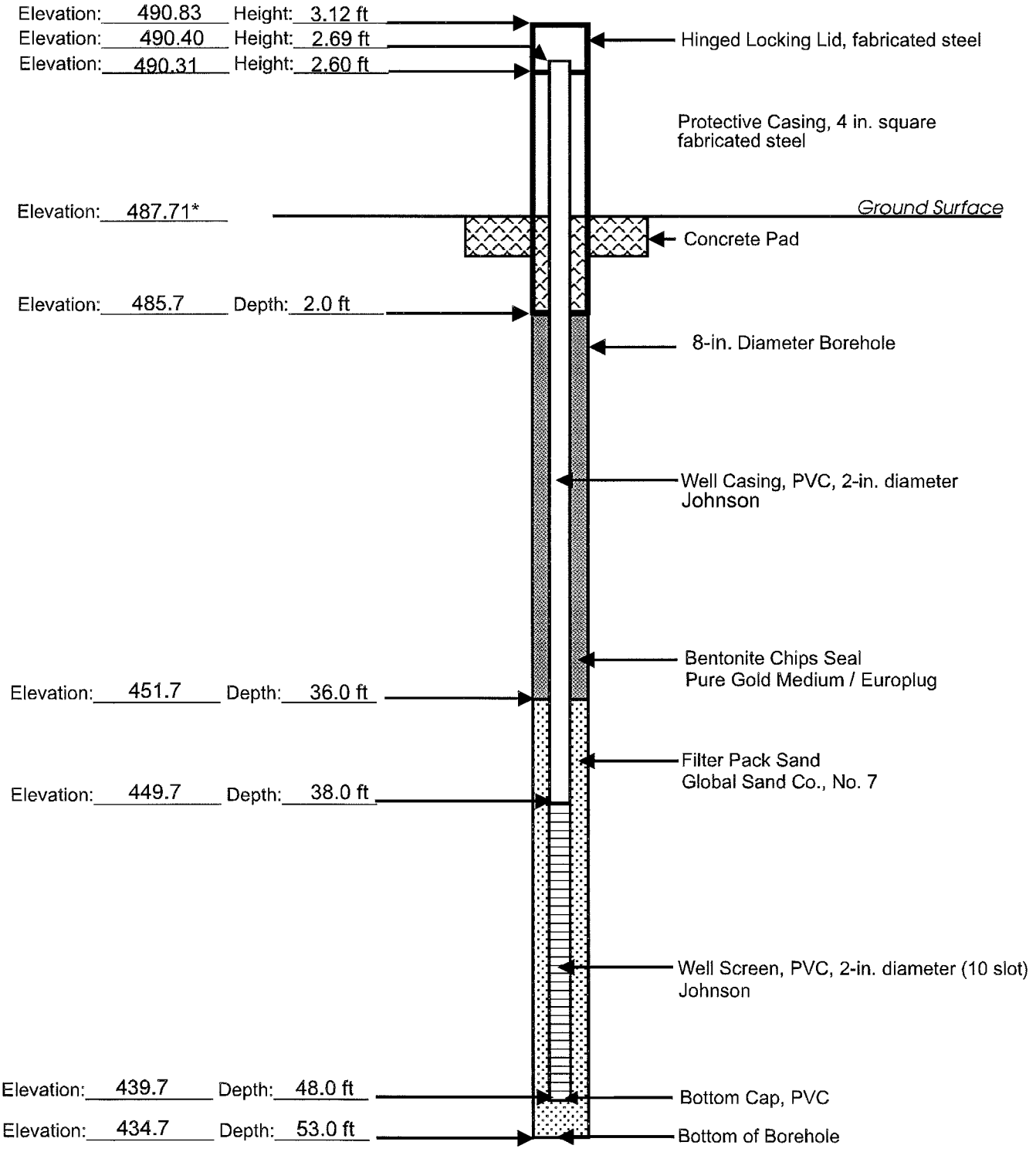


Notes: (1) *indicates vertically surveyed elevation; (2) drawing has no scale; (3) depths and heights are relatives to ground surface

GeoSyntec Consultants

WELL CONSTRUCTION SCHEMATIC DIAGRAM

Identification: P-17 **Type:** Ground-Water Piezometer
Site: Carus Chemical Company, Phase II **Project No.:** FE 2167 **Date completed:** 30 Sep 94
Drilling Company: Layne Northwest **Driller:** Vince Meindel **Supervisor:** Thierry Pelte
Development Method: Grundfos pumping and surging **Reviewer:**

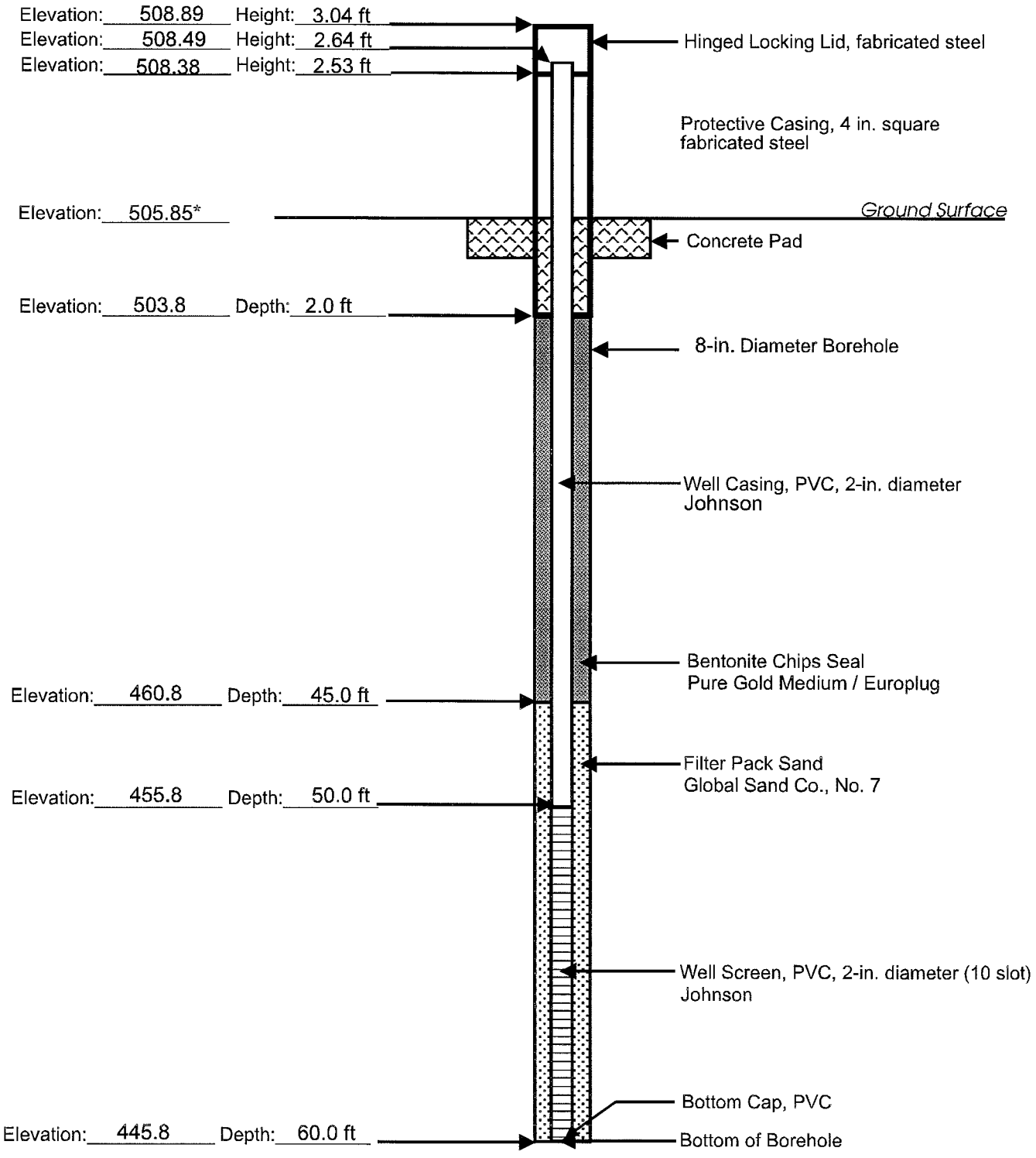


Notes: (1) *indicates vertically surveyed elevation; (2) drawing has no scale; (3) depths and heights are relatives to ground surface

GeoSyntec Consultants

WELL CONSTRUCTION SCHEMATIC DIAGRAM

Identification: P-18 **Type:** Ground-Water Piezometer
Site: Carus Chemical Company, Phase II **Project No.:** FE 2167 **Date completed:** 28 Sep 94
Drilling Company: Layne Northwest **Driller:** Vince Meindel **Supervisor:** Thierry Pelte
Development Method: Grundfos pumping and surging **Reviewer:**

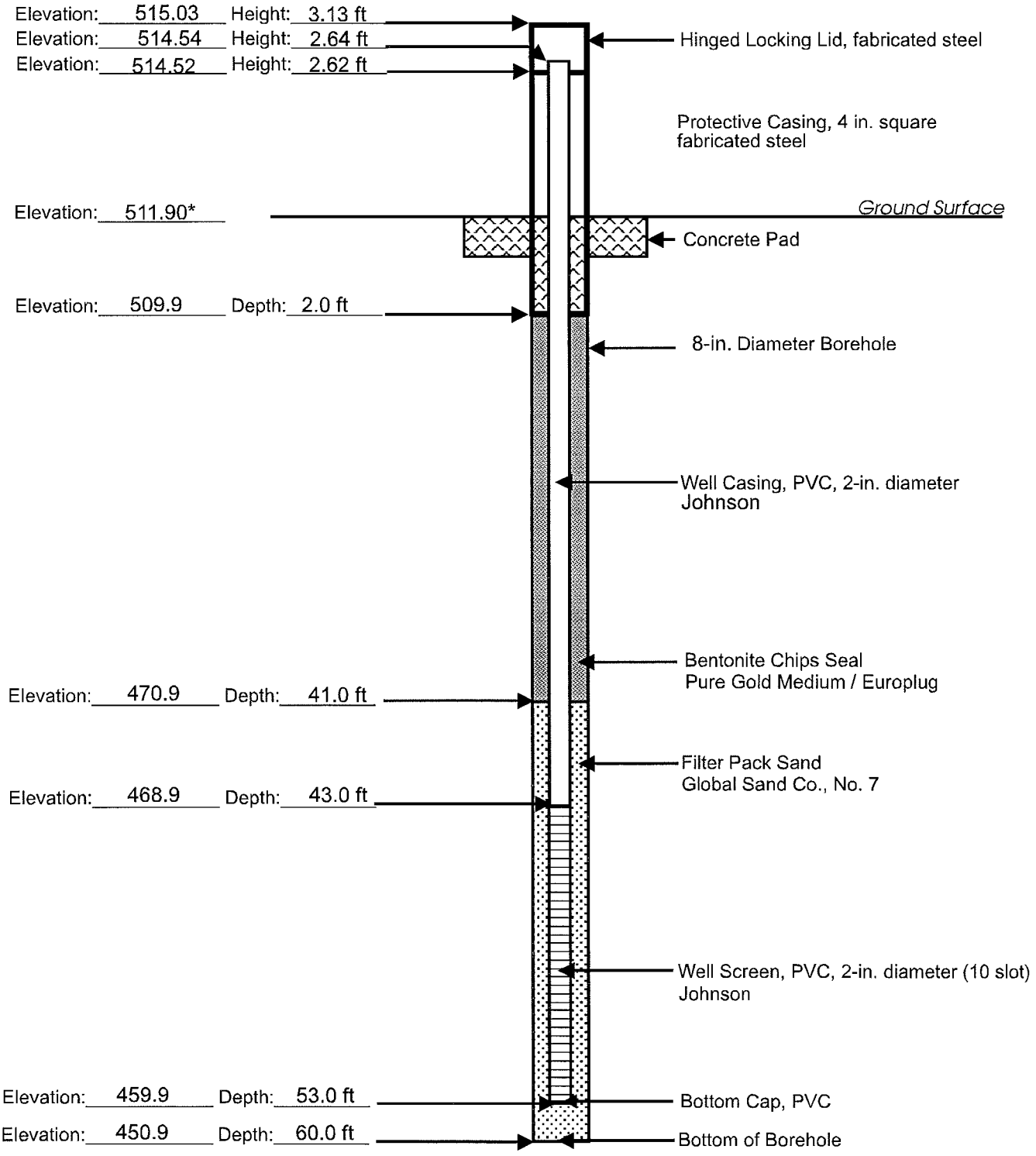


Notes: (1) *indicates vertically surveyed elevation; (2) drawing has no scale; (3) depths and heights are relatives to ground surface

GeoSyntec Consultants

WELL CONSTRUCTION SCHEMATIC DIAGRAM

Identification: P-19 **Type:** Ground-Water Piezometer
Site: Carus Chemical Company, Phase II **Project No.:** FE 2167 **Date completed:** 29 Sep 94
Drilling Company: Layne Northwest **Driller:** Mark Backhaus **Supervisor:** Jack Raymer
Development Method: Grundfos pump and surging **Reviewer:**

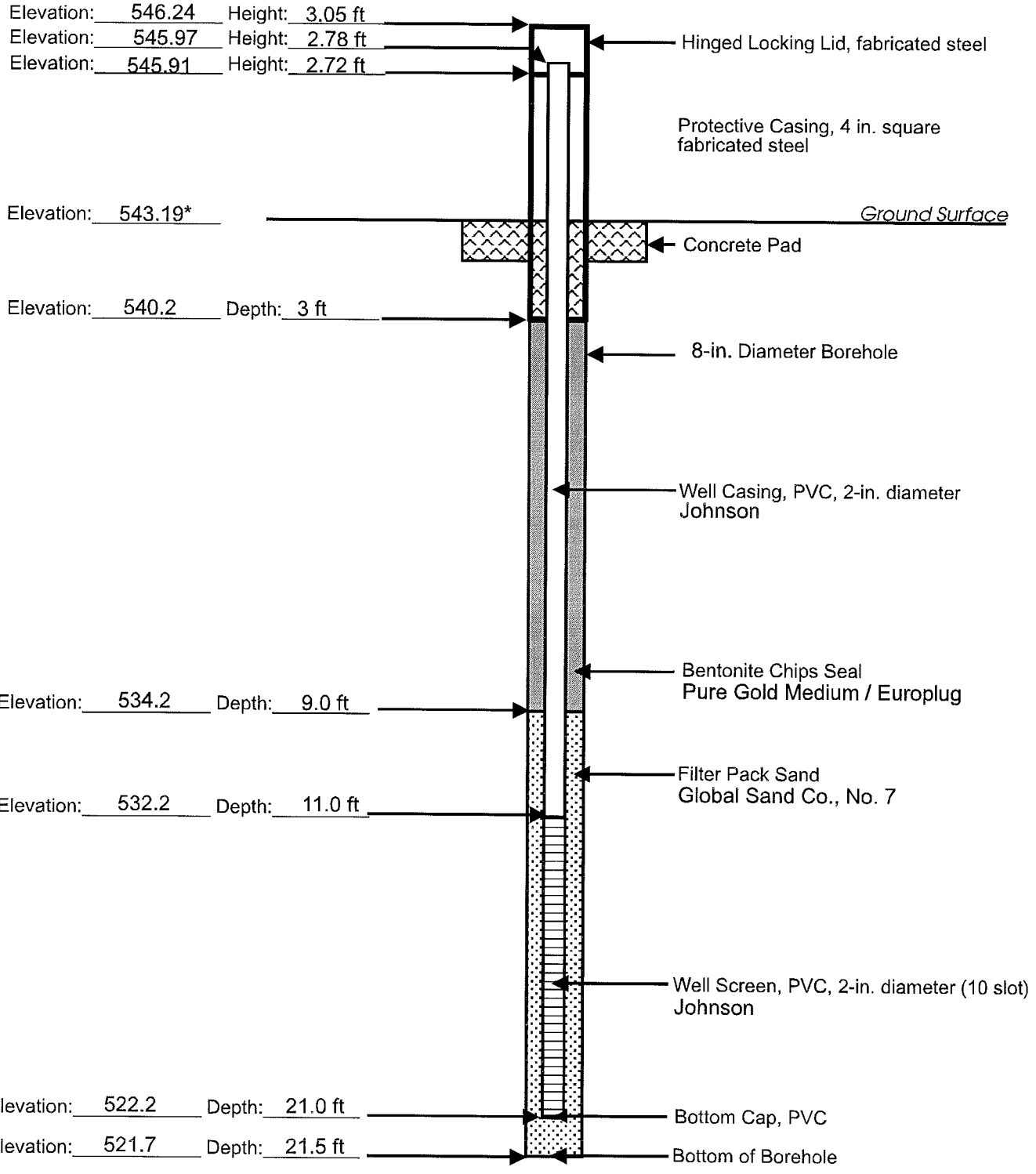


Notes: (1) *indicates vertically surveyed elevation; (2) drawing has no scale; (3) depths and heights are relatives to ground surface

GeoSyntec Consultants

WELL CONSTRUCTION SCHEMATIC DIAGRAM

Identification: P-20 **Type:** Ground-Water Monitoring Well
Site: Carus Chemical Company, Phase II **Project No.:** FE 2167 **Date completed:** 29 Sep 94
Drilling Company: Layne Northwest **Driller:** Mark Backhaus **Supervisor:** Jack Raymer
Development Method: Well dry **Reviewer:**



Notes: (1) *indicates vertically surveyed elevation; (2) drawing has no scale; (3) depths and heights are relatives to ground surface

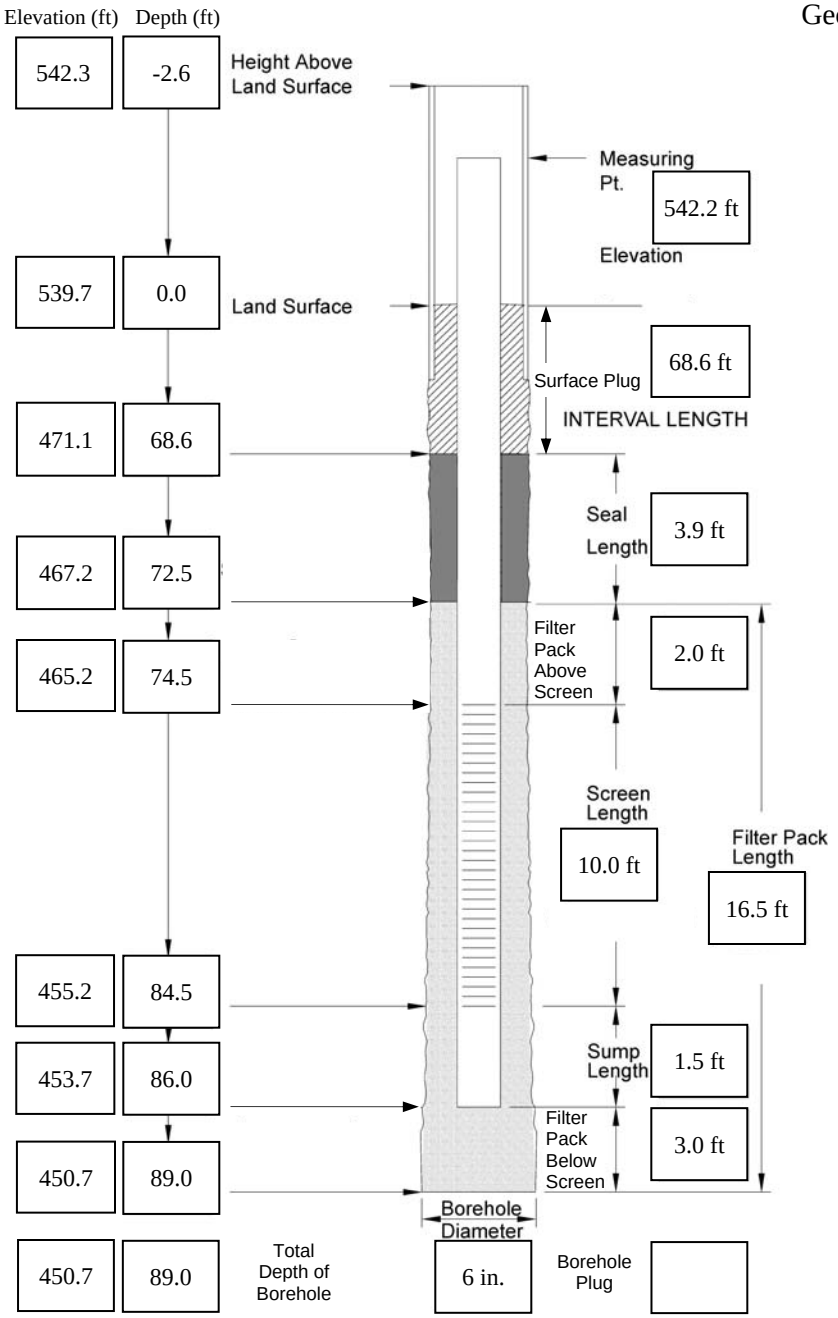
Geosyntec consultants
engineers | scientists | innovators

WELL CONSTRUCTION LOG

PROJECT NAME Carus Chemical Corporation
PROJECT # CWR1710 **WELL ID:** MW-301H

Drilling Company: Stearns Drilling
Drillers: Denny; Ron; Rich
Geologist/Engineer: J. McKinnon
Signature: _____

Site: Carus Chemical Corporation
Drilling Method: Sonic
Start/Completion Date: 10 October 2007
Well Type: Stick-up
Geologic Completion Zone: Holocene



Well Completion
Guard Posts (Y / **N**) Date: _____
Surface Pad Size: 2 ft x 2 ft
Protective Casing or Cover
Diameter/Type: 6"/Steel Locking (Y / **N**)
Depth BGS: - Weep Hole (Y / **N**)
Grout
Composition/Proportions: Bentonite slurry/Bentonite chips (~50 lbs.)
Placement Method: Direct pour/tag

Seal
Type: Bentonite chips (~50 lbs.)
Set-up/Hydration Time: _____
Placement Method: Direct pour/tag
Vol. Fluid Added: _____
Filter Pack
Type: Silica sand
Source: _____
Amount Used: Approx. 50 lbs.
Placement Method: Direct pour/tag
Well Riser Pipe
Casing Material: Schedule 40 PVC
Casing Inside Diameter: 2 in.
Screen
Material: Schedule 40 PVC
Inside Diameter: 2 in.
Screen Slot Size: 0.01 in.
Sump or Bottom Cap (**Y** / N)
Type/Length: _____
Backfill Plug (**Y** / N)
Material: Betonite Chips
Placement Method: Direct pour/tag
Set-up/Hydration Time: _____

Comments
_____
_____
_____

Reviewed
By: J. McKinnon Date: 1/26/10

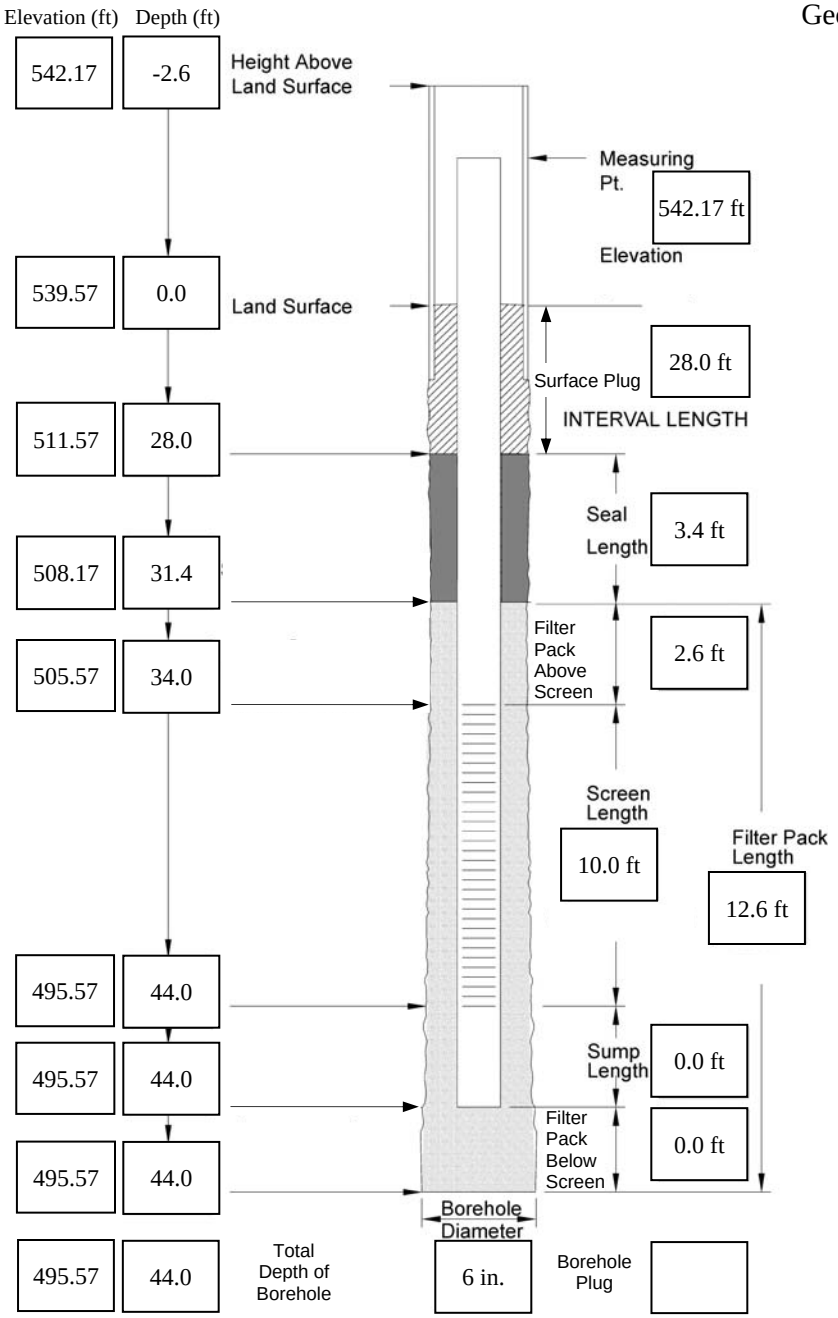
Geosyntec consultants
engineers | scientists | innovators

WELL CONSTRUCTION LOG

PROJECT NAME Carus Chemical Corporation
PROJECT # CWR1710 **WELL ID:** MW-301S

Drilling Company: Stearns Drilling
Drillers: Denny; Ron; Rich
Geologist/Engineer: J. McKinnon
Signature: _____

Site: Carus Chemical Corporation
Drilling Method: Sonic
Start/Completion Date: 10 October 2007
Well Type: Stick-up
Geologic Completion Zone: Slag



Well Completion
Guard Posts (Y / **N**) Date: _____
Surface Pad Size: 2 ft x 2 ft
Protective Casing or Cover
Diameter/Type: 6"/Steel Locking (Y / **N**)
Depth BGS: - Weep Hole (Y / **N**)
Grout
Composition/Proportions: Bentonite slurry/Bentonite Chips (~50 lbs.)
Placement Method: Direct pour/tag

Seal
Type: Bentonite chips (~50 lbs.)
Set-up/Hydration Time: _____
Placement Method: Direct pour/tag
Vol. Fluid Added: _____
Filter Pack
Type: Silica sand
Source: _____
Amount Used: Approx. 50 lbs.
Placement Method: Direct pour/tag
Well Riser Pipe
Casing Material: Schedule 40 PVC
Casing Inside Diameter: 2 in.
Screen
Material: Schedule 40 PVC
Inside Diameter: 2 in.
Screen Slot Size: 0.01 in.
Sump or Bottom Cap (**Y** / N)
Type/Length: _____
Backfill Plug (Y / **N**)
Material: _____
Placement Method: _____
Set-up/Hydration Time: _____

Comments
_____
_____
_____

Reviewed
By: J. McKinnon Date: 1/26/10

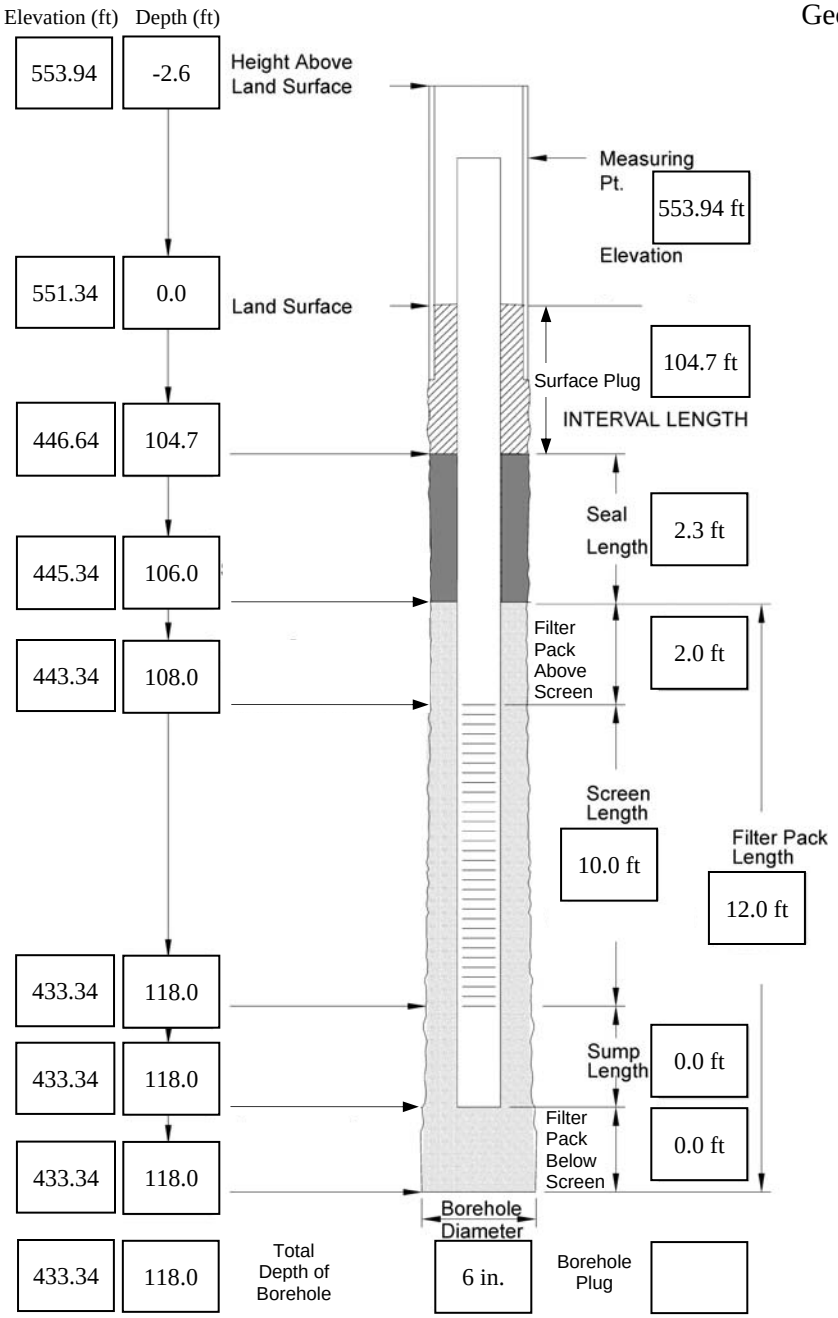
Geosyntec consultants
engineers | scientists | innovators

WELL CONSTRUCTION LOG

PROJECT NAME Carus Chemical Corporation
PROJECT # CWR1710 **WELL ID:** MW-303H

Drilling Company: Stearns Drilling
Drillers: Denny; Ron; Rich
Geologist/Engineer: J. McKinnon
Signature: _____

Site: Carus Chemical Corporation
Drilling Method: Sonic
Start/Completion Date: 15 October 2007
Well Type: Stick-up
Geologic Completion Zone: Holocene



Comments

_____
_____
_____

Well Completion
Guard Posts (Y / **N**) Date: _____
Surface Pad Size: 2 ft x 2 ft
Protective Casing or Cover
Diameter/Type: 6"/Steel Locking (Y / **N**)
Depth BGS: _____ Weep Hole (Y / **N**)
Grout
Composition/Proportions: Bentonite slurry/Bentonite chips (~50 lbs.)
Placement Method: Direct pour/tag
Seal
Type: Bentonite chips (50 lbs.)
Set-up/Hydration Time: _____
Placement Method: Direct pour/tag
Vol. Fluid Added: _____
Filter Pack
Type: Silica sand
Source: _____
Amount Used: 300 lbs. (6 bags)
Placement Method: Direct pour/tag
Well Riser Pipe
Casing Material: Schedule 40 PVC
Casing Inside Diameter: 2 in.
Screen
Material: Schedule 40 PVC
Inside Diameter: 2 in.
Screen Slot Size: 0.01 in.
Sump or Bottom Cap (**Y** / N)
Type/Length: _____
Backfill Plug (**Y** / N)
Material: _____
Placement Method: _____
Set-up/Hydration Time: _____

Reviewed
By: J. McKinnon Date: 1/25/10

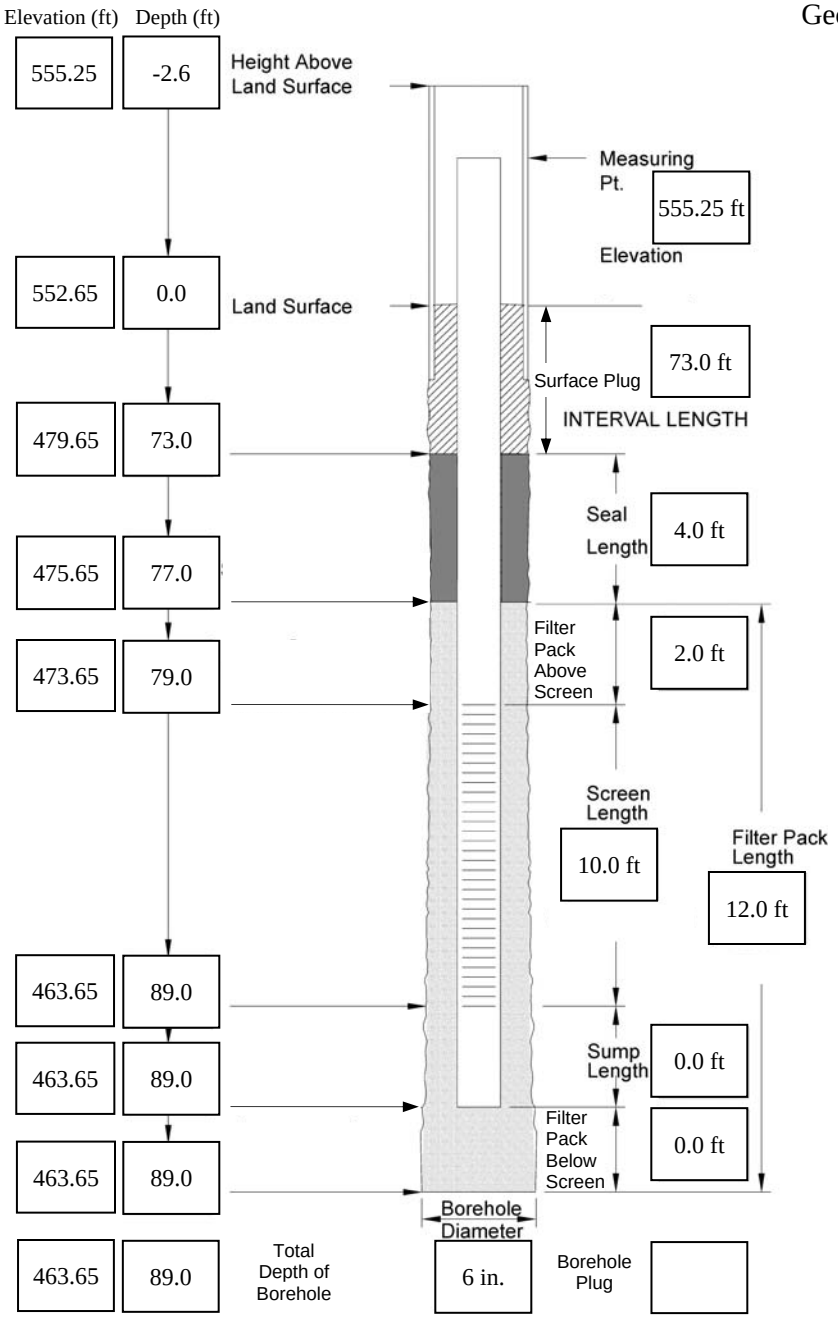
Geosyntec consultants
engineers | scientists | innovators

WELL CONSTRUCTION LOG

PROJECT NAME Carus Chemical Corporation
PROJECT # CWR1710 **WELL ID:** MW-303S

Drilling Company: Stearns Drilling
Drillers: Denny; Ron; Rich
Geologist/Engineer: J. McKinnon
Signature: _____

Site: Carus Chemical Corporation
Drilling Method: Sonic
Start/Completion Date: 15 October 2007
Well Type: Stick-up
Geologic Completion Zone: Slag



Well Completion
Guard Posts (Y / **N**) Date: _____
Surface Pad Size: 2 ft x 2 ft
Protective Casing or Cover
Diameter/Type: 6"/Steel Locking (Y / **N**)
Depth BGS: _____ Weep Hole (Y / **N**)
Grout
Composition/Proportions: Bentonite slurry/Bentonite chips (~50 lbs.)
Placement Method: Direct pour/tag

Seal
Type: Bentonite chips (approx. 50 lbs.)
Set-up/Hydration Time: _____
Placement Method: Direct pour/tag
Vol. Fluid Added: _____
Filter Pack
Type: Silica sand
Source: _____
Amount Used: Approx. 300 lbs.
Placement Method: Direct pour/tag
Well Riser Pipe
Casing Material: Schedule 40 PVC
Casing Inside Diameter: 2 in.
Screen
Material: Schedule 40 PVC
Inside Diameter: 2 in.
Screen Slot Size: 0.01 in.
Sump or Bottom Cap (**Y** / N)
Type/Length: _____
Backfill Plug (Y / **N**)
Material: _____
Placement Method: _____
Set-up/Hydration Time: _____

Comments
_____
_____
_____

Reviewed
By: J. McKinnon Date: 1/26/10

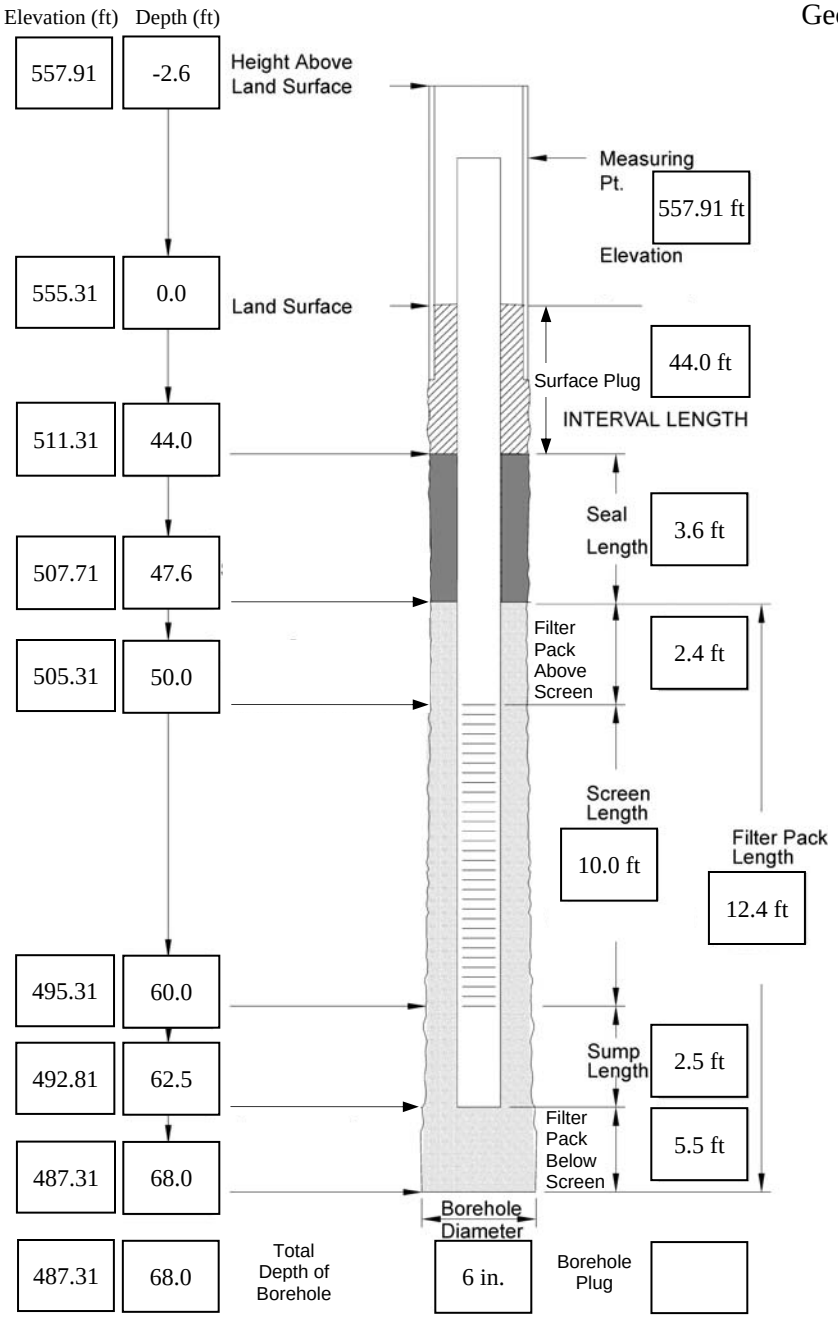
Geosyntec consultants
engineers | scientists | innovators

WELL CONSTRUCTION LOG

PROJECT NAME Carus Chemical Corporation
PROJECT # CWR1710 **WELL ID:** MW-304S

Drilling Company: Stearns Drilling
Drillers: Denny; Ron; Rich
Geologist/Engineer: J. McKinnon
Signature: _____

Site: Carus Chemical Corporation
Drilling Method: Sonic
Start/Completion Date: 11 October 2007
Well Type: Stick-up
Geologic Completion Zone: Slag



Well Completion
Guard Posts (Y / **N**) Date: _____
Surface Pad Size: 2 ft x 2 ft
Protective Casing or Cover
Diameter/Type: 6"/Steel Locking (Y / **N**)
Depth BGS: _____ Weep Hole (Y / **N**)
Grout
Composition/Proportions: Bentonite slurry/Bentonite chips (~50 lbs.)
Placement Method: Direct pour/tag
Seal
Type: Bentonite chips (50 lbs.)
Set-up/Hydration Time: _____
Placement Method: Direct pour/tag
Vol. Fluid Added: _____
Filter Pack
Type: Silica sand
Source: _____
Amount Used: 50 lbs.
Placement Method: Direct pour/tag
Well Riser Pipe
Casing Material: Schedule 40 PVC
Casing Inside Diameter: 2 in.
Screen
Material: Schedule 40 PVC
Inside Diameter: 2 in.
Screen Slot Size: 0.01 in.
Sump or Bottom Cap (**Y** / N)
Type/Length: _____
Backfill Plug (**Y** / N)
Material: Bentonite chips
Placement Method: Direct pour/tag
Set-up/Hydration Time: _____

Comments

Reviewed
By: J. McKinnon Date: 1/26/10

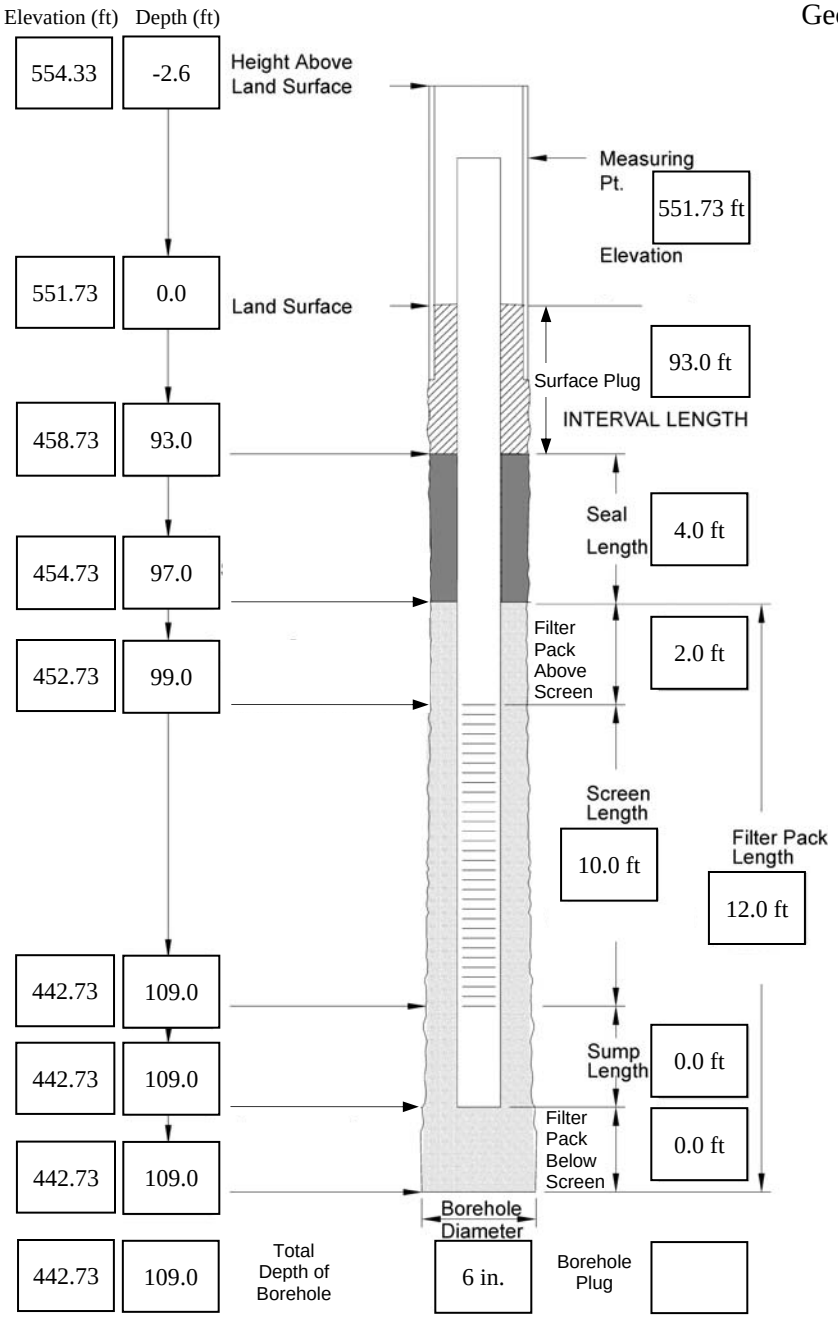
Geosyntec consultants
engineers | scientists | innovators

WELL CONSTRUCTION LOG

PROJECT NAME Carus Chemical Corporation
PROJECT # CWR1710 **WELL ID:** MW-305H

Drilling Company: Stearns Drilling
Drillers: Denny; Ron; Rich
Geologist/Engineer: J. McKinnon
Signature: _____

Site: Carus Chemical Corporation
Drilling Method: Sonic
Start/Completion Date: 23 October 2007
Well Type: Stick-up
Geologic Completion Zone: Holocene



Well Completion
Guard Posts (Y / **N**) Date: _____
Surface Pad Size: 2 ft x 2 ft
Protective Casing or Cover
Diameter/Type: 6"/Steel Locking (Y / **N**)
Depth BGS: _____ Weep Hole (Y / **N**)
Grout
Composition/Proportions: Bentonite slurry
Placement Method: Direct pour/tag
Seal
Type: Bentonite chips
Set-up/Hydration Time: _____
Placement Method: Direct pour/tag
Vol. Fluid Added: _____
Filter Pack
Type: Silica sand
Source: _____
Amount Used: _____
Placement Method: Direct pour/tag
Well Riser Pipe
Casing Material: Schedule 40 PVC
Casing Inside Diameter: 2 in.
Screen
Material: Schedule 40 PVC
Inside Diameter: 2 in.
Screen Slot Size: 0.01 in.
Sump or Bottom Cap (**Y** / N)
Type/Length: _____
Backfill Plug (Y / **N**)
Material: _____
Placement Method: _____
Set-up/Hydration Time: _____

Comments
_____
_____
_____

Reviewed
By: J. McKinnon Date: 1/26/10

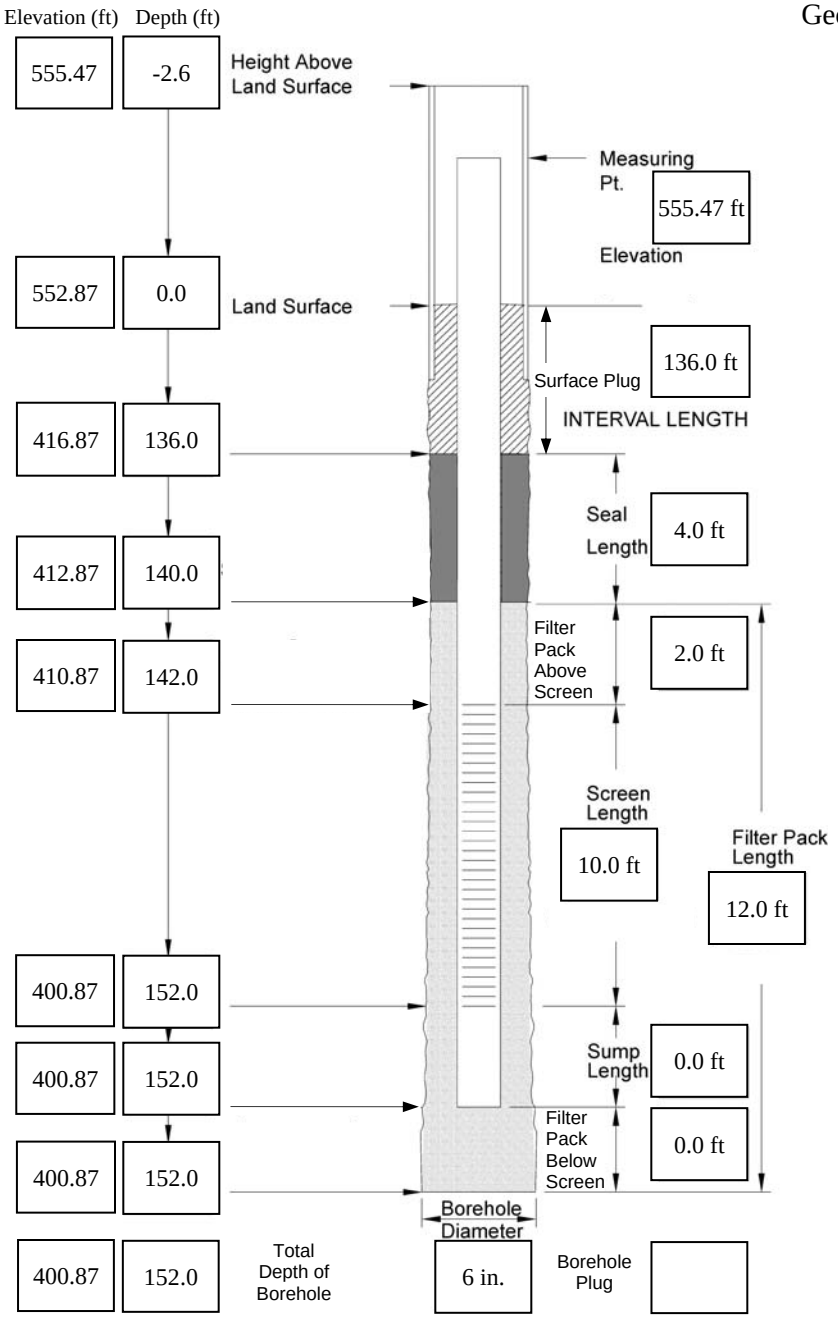
Geosyntec consultants
engineers | scientists | innovators

WELL CONSTRUCTION LOG

PROJECT NAME Carus Chemical Corporation
PROJECT # CWR1710 **WELL ID:** MW-305R

Drilling Company: Stearns Drilling
Drillers: Denny; Ron; Rich
Geologist/Engineer: J. McKinnon
Signature: _____

Site: Carus Chemical Corporation
Drilling Method: Sonic
Start/Completion Date: 23 October 2007
Well Type: Stick-up
Geologic Completion Zone: Limestone



Well Completion
Guard Posts (Y / **N**) Date: _____
Surface Pad Size: 2 ft x 2 ft
Protective Casing or Cover
Diameter/Type: 6"/Steel Locking (Y / **N**)
Depth BGS: _____ Weep Hole (Y / **N**)
Grout
Composition/Proportions: Bentonite slurry (400 gal.)
Placement Method: Direct pour/tag
Seal
Type: Bentonite chips (75 lbs.)
Set-up/Hydration Time: _____
Placement Method: Direct pour/tag
Vol. Fluid Added: _____
Filter Pack
Type: Silica sand
Source: _____
Amount Used: 150 lbs.
Placement Method: Direct pour/tag
Well Riser Pipe
Casing Material: Schedule 40 PVC
Casing Inside Diameter: 2 in.
Screen
Material: Schedule 40 PVC
Inside Diameter: 2 in.
Screen Slot Size: 0.01 in.
Sump or Bottom Cap (**Y** / N)
Type/Length: _____
Backfill Plug (Y / **N**)
Material: _____
Placement Method: _____
Set-up/Hydration Time: _____

Comments
_____
_____
_____

Reviewed
By: J. McKinnon Date: 1/26/10

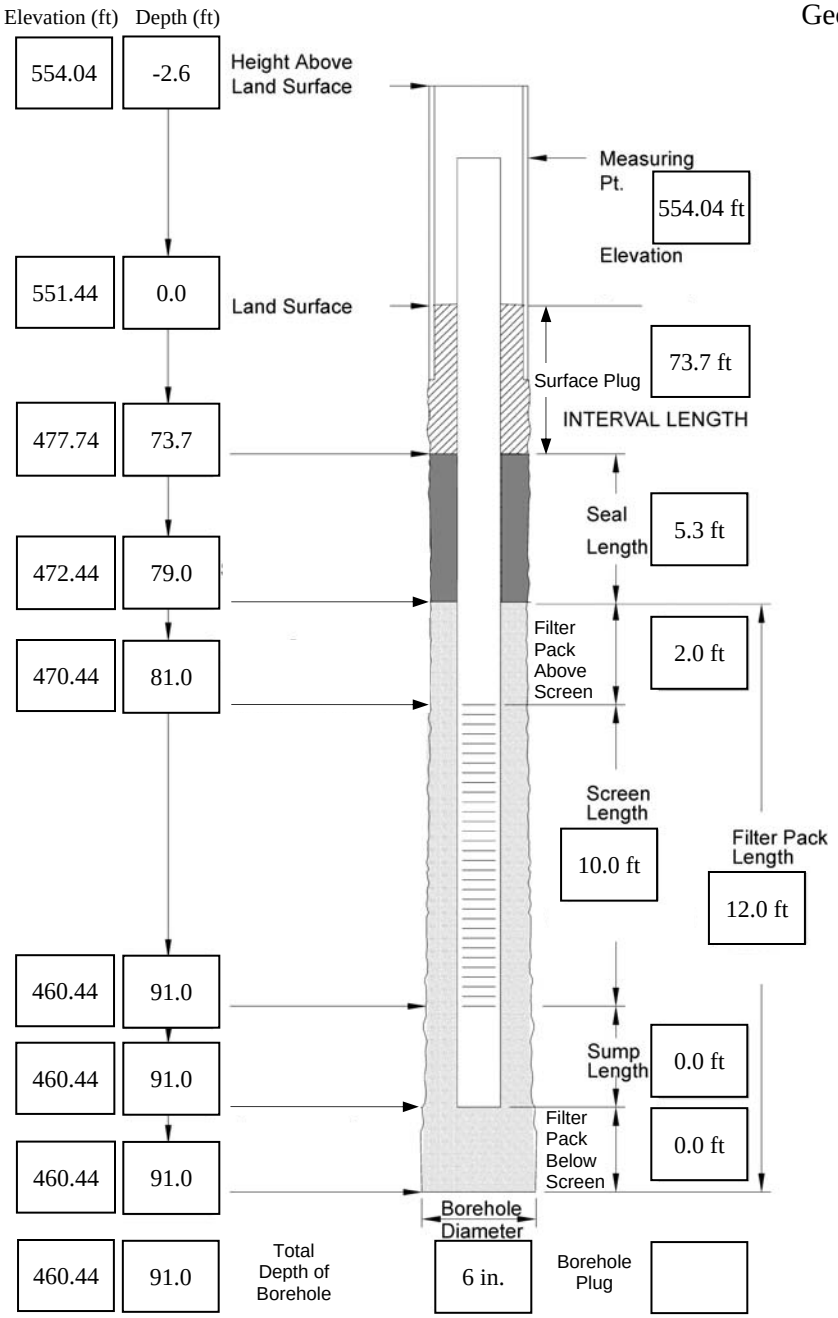
Geosyntec consultants
engineers | scientists | innovators

WELL CONSTRUCTION LOG

PROJECT NAME Carus Chemical Corporation
PROJECT # CWR1710 **WELL ID:** MW-305S

Drilling Company: Stearns Drilling
Drillers: Denny; Ron; Rich
Geologist/Engineer: J. McKinnon
Signature: _____

Site: Carus Chemical Corporation
Drilling Method: Sonic
Start/Completion Date: 24 October 2007
Well Type: Stick-up
Geologic Completion Zone: Slag



Well Completion
Guard Posts (Y / **N**) Date: _____
Surface Pad Size: 2 ft x 2 ft
Protective Casing or Cover
Diameter/Type: 6"/Steel Locking (Y / **N**)
Depth BGS: _____ Weep Hole (Y / **N**)
Grout
Composition/Proportions: Bentonite slurry (500 gal.)
Placement Method: Direct pour/tag
Seal
Type: Bentonite chips (50 lbs.)
Set-up/Hydration Time: _____
Placement Method: Direct pour/tag
Vol. Fluid Added: _____
Filter Pack
Type: Silica sand
Source: _____
Amount Used: 300 lbs.
Placement Method: Direct pour/tag
Well Riser Pipe
Casing Material: Schedule 40 PVC
Casing Inside Diameter: 2 in.
Screen
Material: Schedule 40 PVC
Inside Diameter: 2 in.
Screen Slot Size: 0.01 in.
Sump or Bottom Cap (Y / **N**)
Type/Length: _____
Backfill Plug (Y / **N**)
Material: _____
Placement Method: _____
Set-up/Hydration Time: _____

Comments
_____
_____
_____

Reviewed
By: J. McKinnon Date: 1/26/10

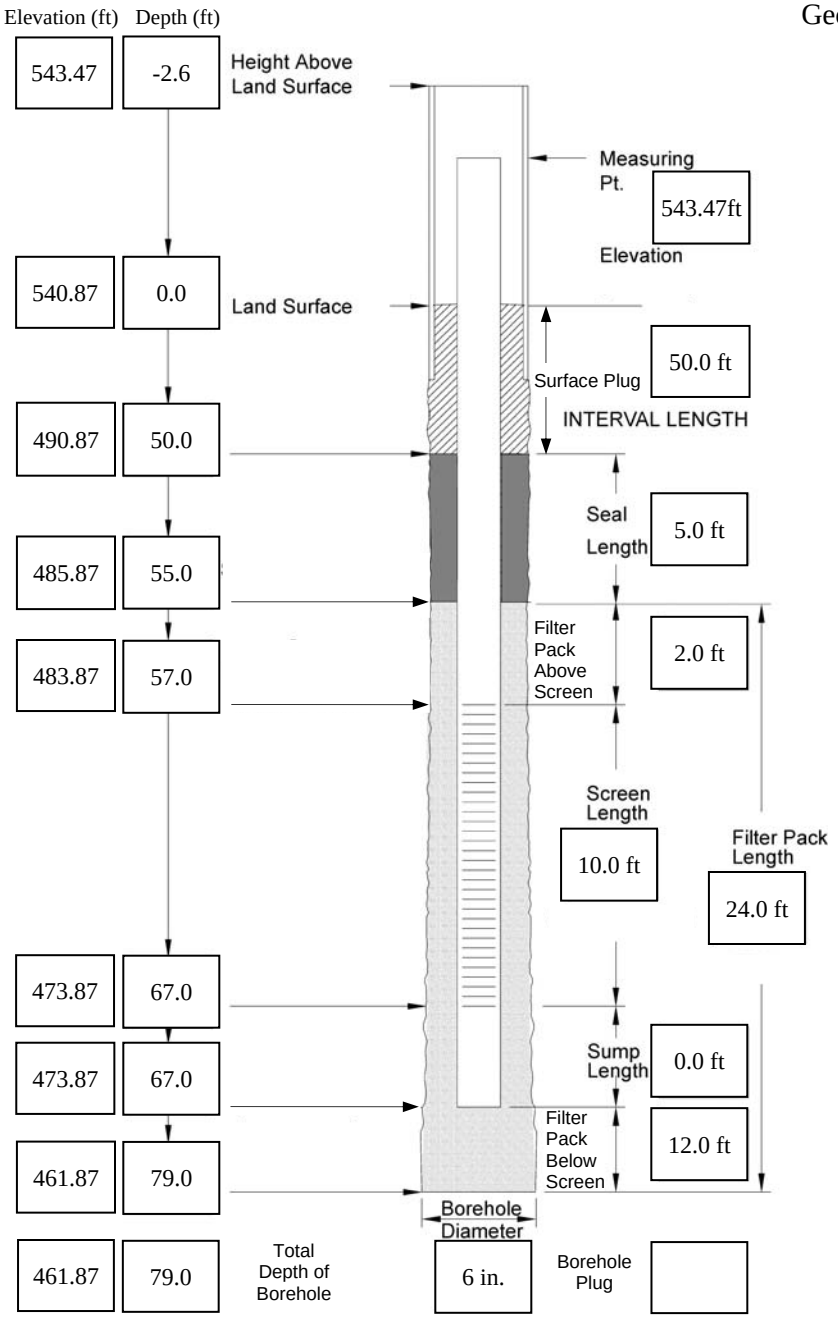
Geosyntec consultants
engineers | scientists | innovators

WELL CONSTRUCTION LOG

PROJECT NAME Carus Chemical Corporation
PROJECT # CWR1710 **WELL ID:** MW-306S

Drilling Company: Stearns Drilling
Drillers: Denny; Ron; Rich
Geologist/Engineer: J. McKinnon
Signature: _____

Site: Carus Chemical Corporation
Drilling Method: Sonic
Start/Completion Date: 16 October 2007
Well Type: Stick-up
Geologic Completion Zone: Slag



Well Completion
Guard Posts (Y / **N**) Date: _____
Surface Pad Size: 2 ft x 2 ft
Protective Casing or Cover
Diameter/Type: 6"/Steel Locking (Y / **N**)
Depth BGS: _____ Weep Hole (Y / **N**)
Grout
Composition/Proportions: Bentonite slurry (200 gal.)
Placement Method: Direct pour/tag
Seal
Type: Bentonite chips (50 lbs.)
Set-up/Hydration Time: _____
Placement Method: Direct pour/tag
Vol. Fluid Added: _____
Filter Pack
Type: Silica sand (#7)
Source: _____
Amount Used: 300 lbs.
Placement Method: Direct pour/tag
Well Riser Pipe
Casing Material: Schedule 40 PVC
Casing Inside Diameter: 2 in.
Screen
Material: Schedule 40 PVC
Inside Diameter: 2 in.
Screen Slot Size: 0.01 in.
Sump or Bottom Cap (Y / **N**)
Type/Length: _____
Backfill Plug (**Y** / N)
Material: Bentonite chips
Placement Method: Direct pour/tag
Set-up/Hydration Time: _____

Comments

Reviewed
By: J. McKinnon Date: 1/26/10

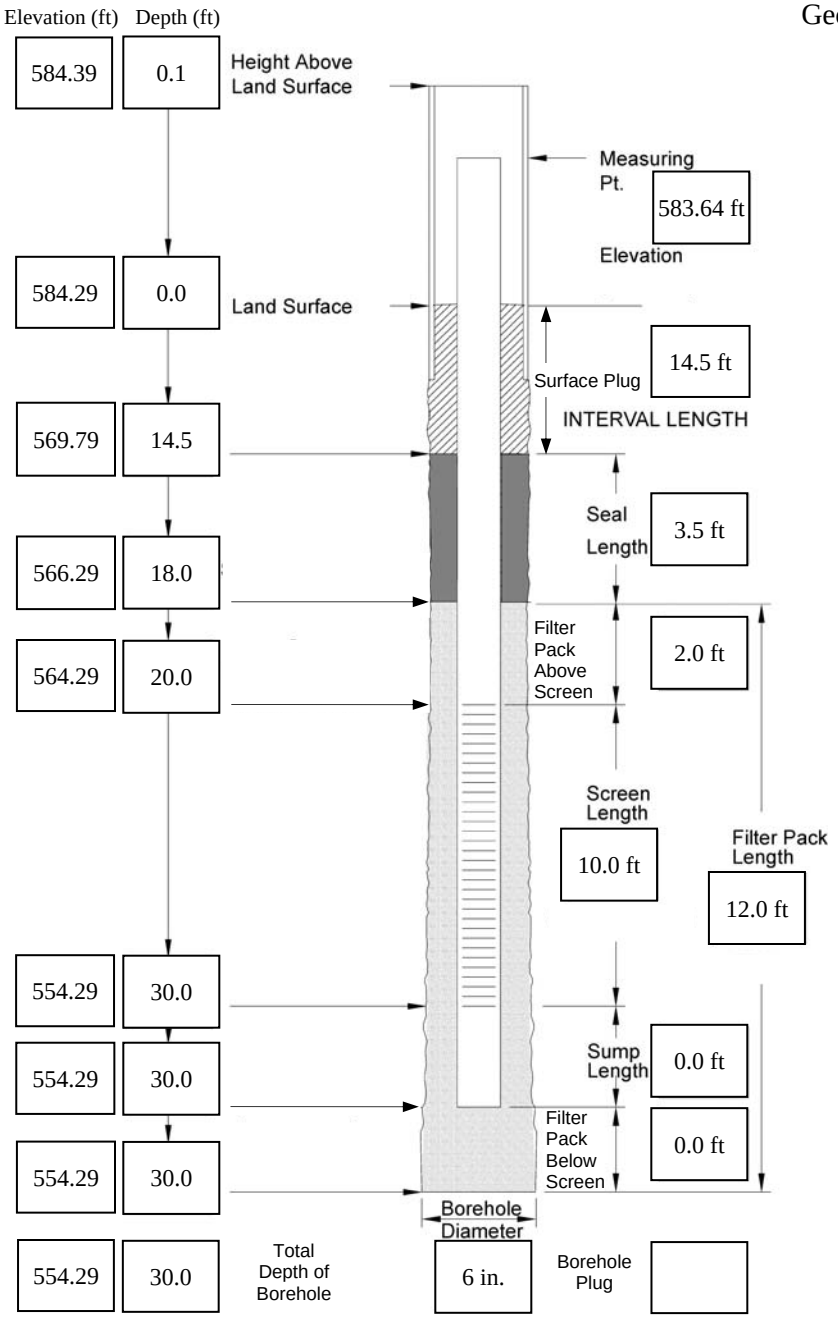
Geosyntec consultants
engineers | scientists | innovators

WELL CONSTRUCTION LOG

PROJECT NAME Carus Chemical Corporation
PROJECT # CWR1710 **WELL ID:** MW-311R

Drilling Company: Stearns Drilling
Drillers: Denny; Ron; Rich
Geologist/Engineer: J. McKinnon
Signature: _____

Site: Carus Chemical Corporation
Drilling Method: Sonic
Start/Completion Date: 26 October 2007
Well Type: Flush-mount
Geologic Completion Zone: Limestone



Well Completion
Guard Posts (Y / **N**) Date: _____
Surface Pad Size: 2 ft x 2 ft
Protective Casing or Cover
Diameter/Type: 6"/Steel Locking (Y / **N**)
Depth BGS: _____ Weep Hole (Y / **N**)
Grout
Composition/Proportions: Bentonite slurry (30 gal.)
Placement Method: Direct pour/tag
Seal
Type: Bentonite chips (75 lbs.)
Set-up/Hydration Time: _____
Placement Method: Direct pour/tag
Vol. Fluid Added: _____
Filter Pack
Type: Silica sand
Source: _____
Amount Used: 150 lbs.
Placement Method: _____
Well Riser Pipe
Casing Material: Schedule 40 PVC
Casing Inside Diameter: 2 in.
Screen
Material: Schedule 40 PVC
Inside Diameter: 2 in.
Screen Slot Size: 0.01 in.
Sump or Bottom Cap (Y / **N**)
Type/Length: _____
Backfill Plug (Y / **N**)
Material: _____
Placement Method: _____
Set-up/Hydration Time: _____

Comments
_____
_____
_____

Reviewed
By: J. McKinnon Date: 1/26/10

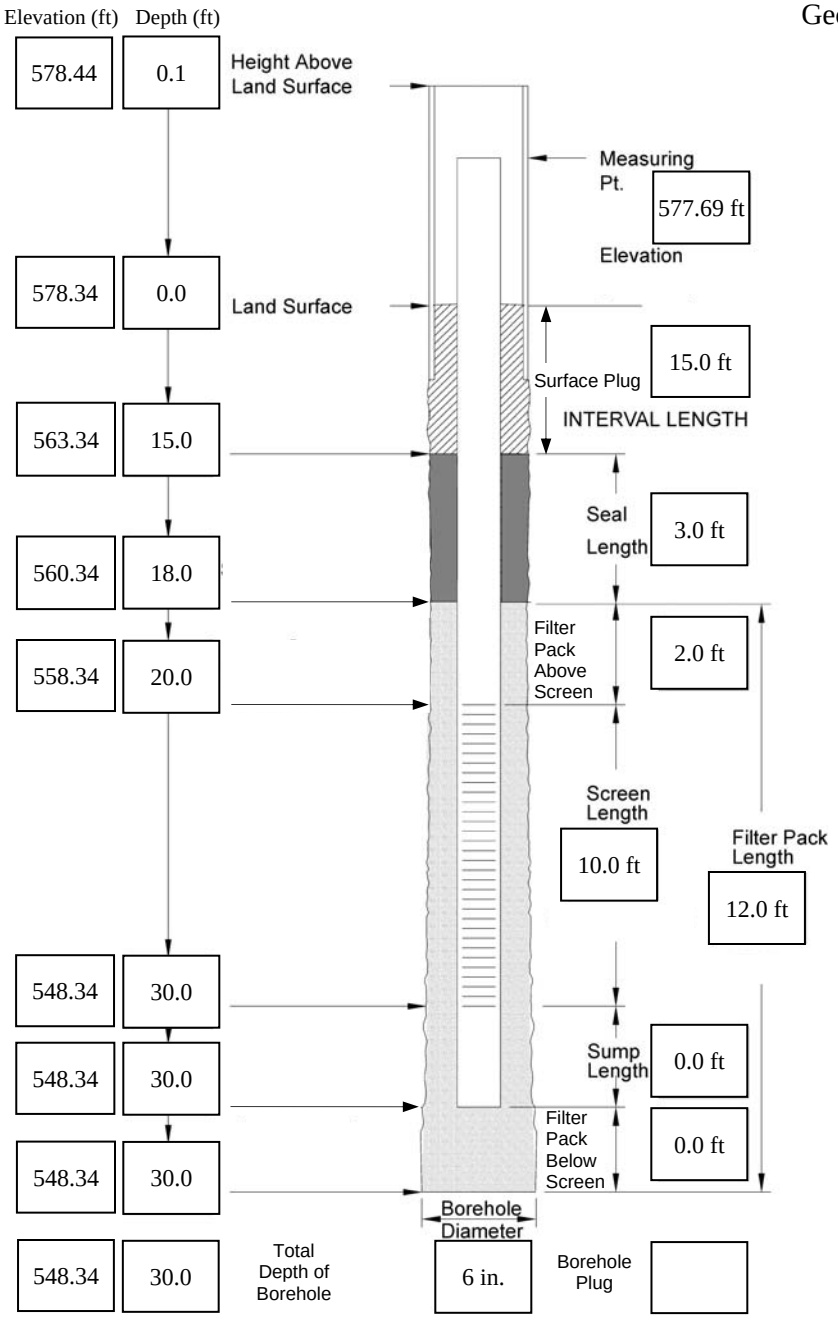
Geosyntec consultants
engineers | scientists | innovators

WELL CONSTRUCTION LOG

PROJECT NAME Carus Chemical Corporation
PROJECT # CWR1710 **WELL ID:** MW-317R

Drilling Company: Stearns Drilling
Drillers: Denny; Ron; Rich
Geologist/Engineer: J. McKinnon
Signature: _____

Site: Carus Chemical Corporation
Drilling Method: Sonic
Start/Completion Date: 25 October 2007
Well Type: Flush-mount
Geologic Completion Zone: Limestone



Well Completion
Guard Posts (Y / **N**) Date: _____
Surface Pad Size: 2 ft x 2 ft
Protective Casing or Cover
Diameter/Type: 6"/Steel Locking (Y / **N**)
Depth BGS: _____ Weep Hole (Y / **N**)
Grout
Composition/Proportions: Bentonite slurry (33 gal.)
Placement Method: Direct pour/tag
Seal
Type: Bentonite chips (50 lbs.)
Set-up/Hydration Time: _____
Placement Method: Direct pour/tag
Vol. Fluid Added: _____
Filter Pack
Type: Silica sand
Source: _____
Amount Used: 150 lbs.
Placement Method: Direct pour/tag
Well Riser Pipe
Casing Material: Schedule 40 PVC
Casing Inside Diameter: 2 in.
Screen
Material: Schedule 40 PVC
Inside Diameter: 2 in.
Screen Slot Size: 0.01 in.
Sump or Bottom Cap (**Y** / N)
Type/Length: _____
Backfill Plug (Y / **N**)
Material: _____
Placement Method: _____
Set-up/Hydration Time: _____

Comments
_____
_____
_____

Reviewed
By: J. McKinnon Date: 1/26/10

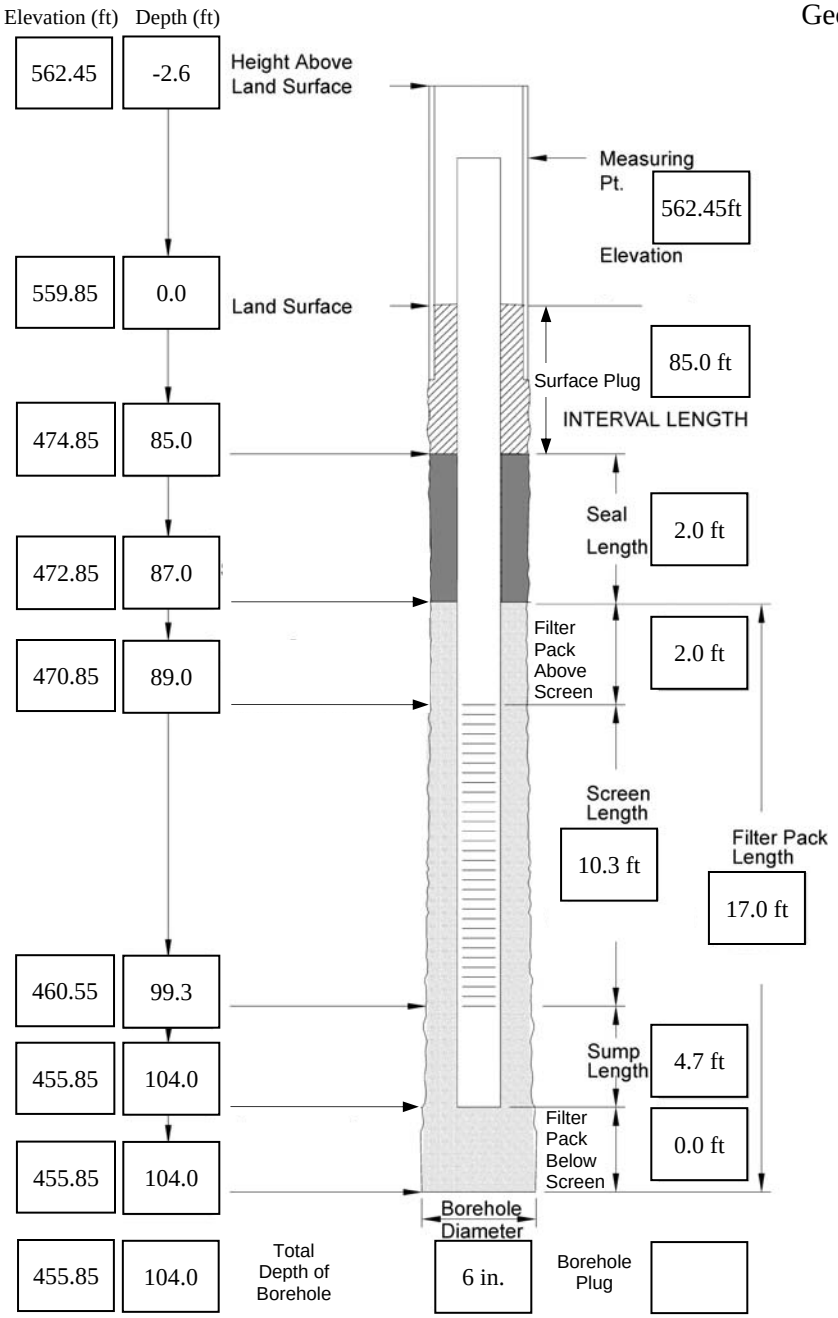
Geosyntec consultants
engineers | scientists | innovators

WELL CONSTRUCTION LOG

PROJECT NAME Carus Chemical Corporation
PROJECT # CWR1710 **WELL ID:** MW-320H

Drilling Company: Stearns Drilling
Drillers: Jerry
Geologist/Engineer: E. Evans
Signature: _____

Site: Carus Chemical Corporation
Drilling Method: Sonic
Start/Completion Date: 18 December 2007
Well Type: Stick-up
Geologic Completion Zone: Holocene sediment



Well Completion
Guard Posts (Y / **N**) Date: _____
Surface Pad Size: 2 ft x 2 ft
Protective Casing or Cover
Diameter/Type: 6"/Steel Locking (Y / **N**)
Depth BGS: _____ Weep Hole (Y / **N**)
Grout
Composition/Proportions: Bentonite slurry
Placement Method: Direct pour/tag
Seal
Type: Bentonite chips
Set-up/Hydration Time: _____
Placement Method: Direct pour/tag
Vol. Fluid Added: _____
Filter Pack
Type: Silica sand
Source: _____
Amount Used: _____
Placement Method: Direct pour/tag
Well Riser Pipe
Casing Material: Schedule 40 PVC
Casing Inside Diameter: 2 in.
Screen
Material: Schedule 40 PVC
Inside Diameter: 2 in.
Screen Slot Size: 0.01 in.
Sump or Bottom Cap (**Y** / N)
Type/Length: _____
Backfill Plug (**Y** / N)
Material: Bentonite chips
Placement Method: Direct pour/tag
Set-up/Hydration Time: _____

Comments
_____
_____
_____

Reviewed
By: J. McKinnon Date: 1/26/10

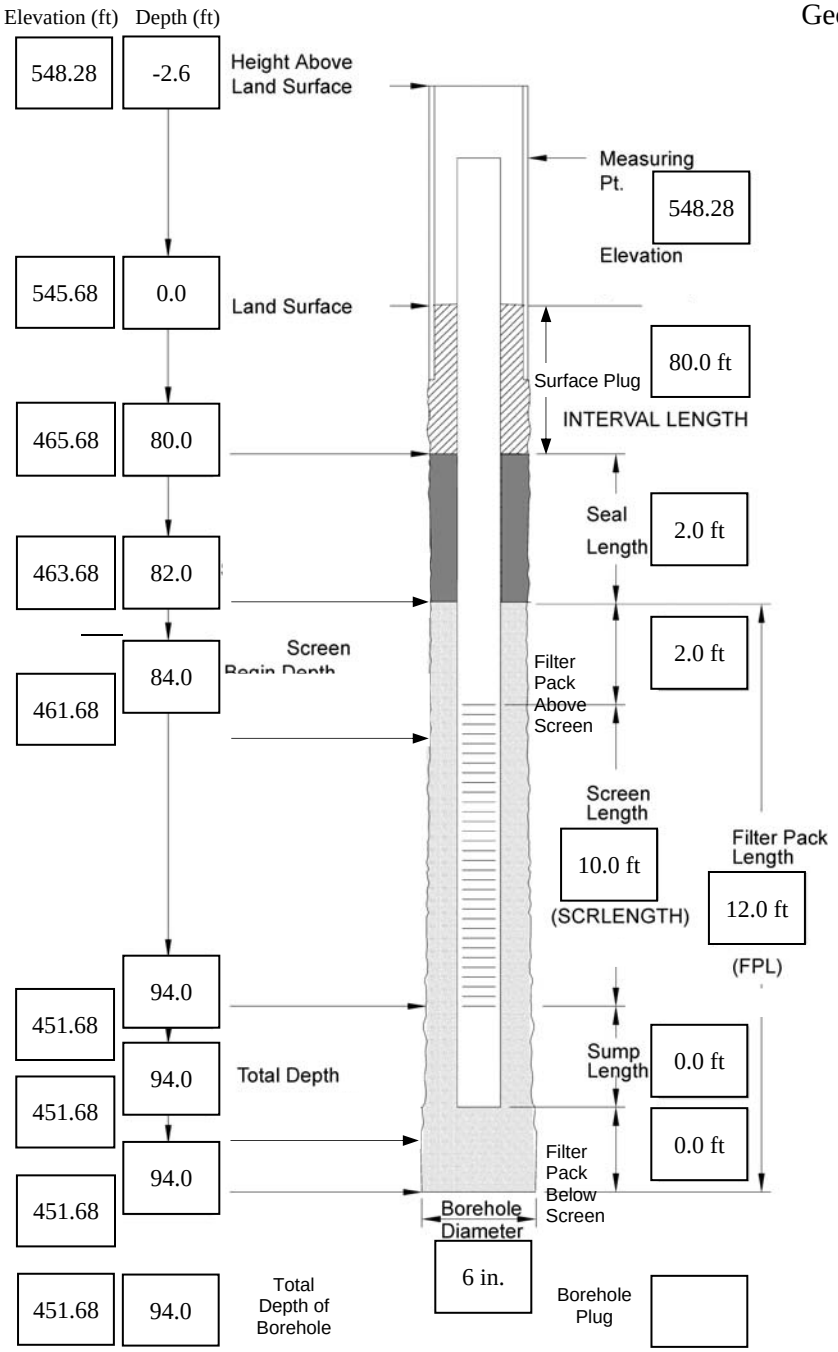
Geosyntec consultants
engineers | scientists | innovators

WELL CONSTRUCTION LOG

PROJECT NAME Carus Chemical Corporation
PROJECT # CWR1710 **WELL ID:** MW-321H

Drilling Company: Stearns Drilling
Drillers: Jerry
Geologist/Engineer: E. Evans
Signature: _____

Site: Carus Chemical Corporation
Drilling Method: Sonic
Start/Completion Date: 19 December 2007
Well Type: Stick-up
Geologic Completion Zone: Holocene sediment



Well Completion
Guard Posts (Y / **N**) Date: _____
Surface Pad Size: 2 ft x 2 ft
Protective Casing or Cover
Diameter/Type: 6"/Steel Locking (Y / **N**)
Depth BGS: _____ Weep Hole (Y / **N**)
Grout
Composition/Proportions: Bentonite slurry (10 gal.)
Placement Method: Direct pour/tag
Seal
Type: Bentonite chips (50 lbs)
Set-up/Hydration Time: _____
Placement Method: Direct pour/tag
Vol. Fluid Added: _____
Filter Pack
Type: Silica sand
Source: _____
Amount Used: 50 lbs.
Placement Method: Direct pour/tag
Well Riser Pipe
Casing Material: Schedule 40 PVC
Casing Inside Diameter: 2 in.
Screen
Material: Schedule 40 PVC
Inside Diameter: 2 in.
Screen Slot Size: 0.01 in.
Sump or Bottom Cap (**Y** / N)
Type/Length: _____
Backfill Plug (Y / **N**)
Material: _____
Placement Method: _____
Set-up/Hydration Time: _____

Comments
_____
_____

Reviewed
By: J. McKinnon Date: 1/26/10

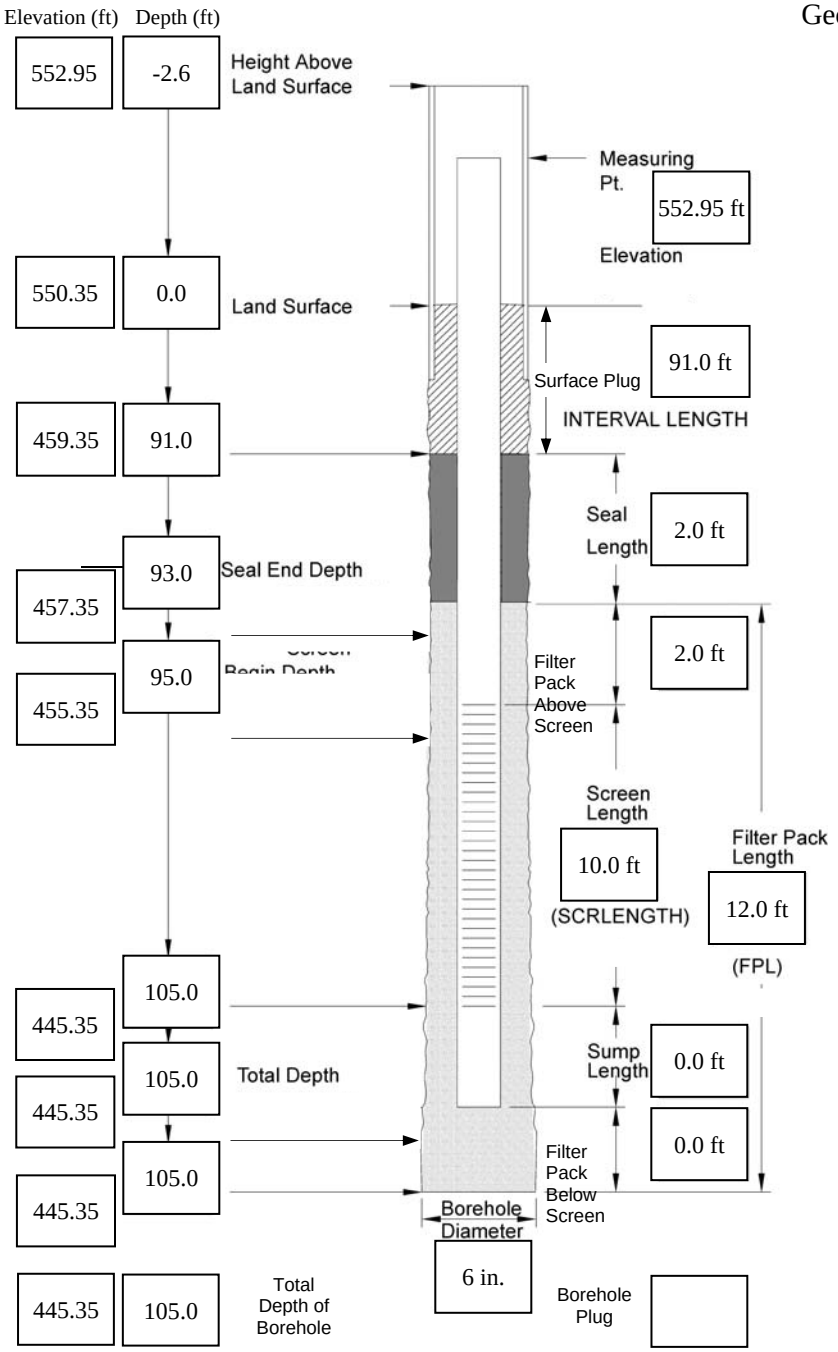
Geosyntec consultants
engineers | scientists | innovators

WELL CONSTRUCTION LOG

PROJECT NAME Carus Chemical Corporation
PROJECT # CWR1710 **WELL ID:** MW-322H

Drilling Company: Stearns Drilling
Drillers: Jerry
Geologist/Engineer: E. Evans
Signature: _____

Site: Carus Chemical Corporation
Drilling Method: Sonic
Start/Completion Date: 19 December 2007
Well Type: Stick-up
Geologic Completion Zone: Holocene sediments



Well Completion
Guard Posts (Y / **N**) Date: _____
Surface Pad Size: 2 ft x 2 ft
Protective Casing or Cover
Diameter/Type: 6"/Steel Locking (Y / **N**)
Depth BGS: _____ Weep Hole (Y / **N**)
Grout
Composition/Proportions: Bentonite Slurry (400 gal.)
Placement Method: Direct pour/tag
Seal
Type: Bentonite chips (50 lbs.)
Set-up/Hydration Time: _____
Placement Method: Direct pour/tag
Vol. Fluid Added: _____
Filter Pack
Type: Silica sand
Source: _____
Amount Used: 450 lbs. (9 bags)
Placement Method: Direct pour/tag
Well Riser Pipe
Casing Material: Schedule 40 PVC
Casing Inside Diameter: 2 in.
Screen
Material: Schedule 40 PVC
Inside Diameter: 2 in.
Screen Slot Size: 0.01 in.
Sump or Bottom Cap (**Y** / N)
Type/Length: _____
Backfill Plug (Y / **N**)
Material: _____
Placement Method: _____
Set-up/Hydration Time: _____

Comments
_____
_____

Reviewed
By: J. McKinnon Date: 1/26/10

Appendix G-2-3
OU1 Historical Groundwater Level Data
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Location	Geology	WBZ	Sampling Date														
			11/20/1991	10/3/1993	10/10/1994	11/4/1994	11/12/1994	7/10/2007	7/19/2007	9/12/2007	9/13/2007	9/14/2007	9/17/2007	9/18/2007	11/2/2007	11/5/2007	11/6/2007
G-02	Bedrock	2	--	557.72	557.62	558.26	558.81	557.47	--	--	557.43	--	--	--	--	--	--
G-04	Till	1	--	559.12	559.27	559.58	560.17	560.19	--	560.59	--	--	--	--	--	--	--
G-05	Fill	1	--	562.30	562.15	562.08	562.41	--	--	--	--	--	--	--	--	--	--
G-101	Bedrock	2	551.45	562.00	561.92	561.93	562.75	562.88	--	--	--	--	--	--	--	--	--
G-103	Till	1	551.07	559.16	559.53	559.37	559.98	560.06	--	--	--	--	--	--	--	--	--
G-106	Slag	1	541.23	548.05	548.11	548.23	548.48	547.68	--	--	--	--	--	--	--	--	--
ISW-001		1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ISW-001-River	River		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ISW-002		1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
ISW-002-River	River		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-1	Slag	1	--	555.94	555.87	555.78	556.03	--	DRY < 547.58	--	--	--	--	--	--	--	--
MW-2	Alluvium	1	--	455.92	456.13	456.67	457.63	--	--	--	--	--	--	--	--	--	--
MW-301H	Alluvium	1	--	--	--	--	--	--	--	--	--	--	--	--	454.60	--	--
MW-301S	Slag	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-303H	Alluvium	1	--	--	--	--	--	--	--	--	--	--	--	--	--	464.47	--
MW-303S	Slag	1	--	--	--	--	--	--	--	--	--	--	--	--	--	465.36	--
MW-304S	Slag	1	--	--	--	--	--	--	--	--	--	--	--	--	--	495.30	--
MW-305H	Alluvium	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	461.43
MW-305R	Bedrock	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	466.73
MW-305S	Slag	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	465.09
MW-306S	Slag	1	--	--	--	--	--	--	--	--	--	--	--	--	--	474.70	--
MW-311R	Bedrock	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-317R	Bedrock	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-320H	Alluvium	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-321H	Alluvium	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-322H	Alluvium	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-A	Unknown	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
P-1	Slag	1	--	--	464.02	464.13	464.89	--	--	--	--	--	--	--	--	--	--
P-15	Bedrock	2	--	466.90	455.35	466.07	467.04	--	466.07	--	--	--	--	465.60	--	--	--
P-15A	Slag	1	--	468.37	468.32	467.99	468.14	--	468.43	--	--	--	--	467.76	--	--	--
P-17	Alluvium	1	--	458.09	469.22	458.47	459.34	--	459.67	--	--	--	458.20	--	--	--	--
P-18	Alluvium	1	--	460.54	465.50	460.91	461.81	461.24	--	--	--	461.67	--	--	--	--	--
P-19	Slag	1	--	461.83	461.76	462.09	463.12	--	463.15	--	--	--	--	--	--	--	--
P-20	Fill	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
P-6	Till	1	--	--	--	553.51	553.62	--	560.52	--	--	554.63	--	--	--	--	--
P-7	Bedrock	2	--	528.34	529.31	529.74	529.92	--	534.10	--	--	533.80	--	--	--	--	--
P-9	Bedrock	2	--	525.62	525.64	525.69	525.72	--	525.13	--	--	525.36	--	--	--	--	--
RL-1	River		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RL-2	River		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RL-3	River		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Appendix G-2-3
OU1 Historical Groundwater Level Data
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Location	Geology	WBZ	11/7/2007	11/12/2007	1/7/2008	1/8/2008	1/9/2008	1/10/2008	1/14/2008	1/15/2008	1/16/2008	3/11/2008	6/16/2008	9/8/2008	9/22/2008
G-02	Bedrock	2	--	556.82	--	--	--	--	--	--	--	557.55	558.34	--	557.97
G-04	Till	1	--	559.39	--	--	--	--	--	--	--	561.08	561.40	--	561.61
G-05	Fill	1	--	--	--	--	--	--	--	--	--	--	--	--	--
G-101	Bedrock	2	--	562.70	--	--	--	--	--	--	--	563.12	563.85	--	564.21
G-103	Till	1	--	559.49	--	--	--	--	--	--	--	560.83	561.09	--	561.45
G-106	Slag	1	--	547.01	--	--	--	--	--	--	--	547.78	548.68	--	547.33
ISW-001		1	--	--	--	--	--	--	--	--	--	--	--	--	--
ISW-001-River	River		--	--	--	--	--	--	--	--	--	--	--	--	--
ISW-002		1	--	--	--	--	--	--	--	--	--	--	--	--	--
ISW-002-River	River		--	--	--	--	--	--	--	--	--	--	--	--	--
MW-1	Slag	1	--	DRY < 547.58	DRY < 547.58	--	--	--	--	--	--	DRY < 547.58	DRY < 547.58	--	DRY < 547.58
MW-2	Alluvium	1	--	456.41	457.94	--	--	--	457.88	--	--	457.29	457.03	--	458.24
MW-301H	Alluvium	1	--	454.74	455.37	--	455.40	--	--	--	--	456.05	457.11	--	458.10
MW-301S	Slag	1	--	DRY < 498.59	495.69	--	--	--	--	--	--	495.94	496.07	--	496.17
MW-303H	Alluvium	1	--	463.77	460.58	--	--	--	--	--	--	465.11	465.05	--	465.80
MW-303S	Slag	1	--	464.99	464.35	--	464.20	--	--	--	--	466.01	465.66	--	466.93
MW-304S	Slag	1	--	DRY < 497.95	495.31	--	--	--	--	--	--	495.35	495.35	--	--
MW-305H	Alluvium	1	--	463.31	462.93	--	--	--	--	--	--	464.67	464.81	--	465.31
MW-305R	Bedrock	2	--	461.82	464.32	--	--	--	--	--	463.56	465.23	465.52	--	465.63
MW-305S	Slag	1	--	464.59	464.16	463.54	--	--	--	--	--	465.97	466.70	--	466.45
MW-306S	Slag	1	--	DRY < 476.53	473.83	--	--	--	--	--	--	447.01	474.11	--	474.13
MW-311R	Bedrock	2	563.97	561.48	569.08	568.68	--	--	--	--	--	566.18	565.11	--	566.77
MW-317R	Bedrock	2	568.54	569.86	570.51	--	570.36	--	--	--	--	571.75	571.83	--	572.68
MW-320H	Alluvium	1	--	--	--	--	467.07	--	--	--	--	467.71	466.97	--	469.23
MW-321H	Alluvium	1	--	--	--	--	--	467.91	--	466.23	--	466.95	466.50	--	467.28
MW-322H	Alluvium	1	--	--	--	--	--	--	461.48	461.62	--	462.69	462.59	--	463.18
MW-A	Unknown	1	--	554.40	--	--	--	--	--	--	--	554.50	555.50	--	555.90
P-1	Slag	1	--	--	--	--	--	--	--	--	--	--	--	--	--
P-15	Bedrock	2	--	469.71	468.28	--	468.28	--	--	--	--	468.24	467.73	--	467.66
P-15A	Slag	1	--	470.64	470.32	470.32	--	--	--	--	--	471.00	469.97	--	469.90
P-17	Alluvium	1	--	458.00	459.55	--	--	--	--	458.96	--	459.06	458.74	--	459.51
P-18	Alluvium	1	--	462.23	462.54	--	--	--	462.41	--	--	463.41	463.40	--	463.91
P-19	Slag	1	--	464.28	463.12	--	--	--	--	--	--	465.89	467.00	--	466.26
P-20	Fill	1	--	--	--	--	--	--	--	--	--	--	525.15	--	525.13
P-6	Till	1	--	DRY < 549.95	--	--	--	--	--	--	--	555.07	554.62	--	555.08
P-7	Bedrock	2	--	533.45	--	--	--	--	--	--	--	533.89	534.44	--	534.12
P-9	Bedrock	2	--	525.27	--	--	--	--	--	--	--	525.40	525.45	--	525.49
RL-1	River		--	--	--	--	--	--	--	--	--	--	--	477.42	467.42
RL-2	River		--	--	--	--	--	--	--	--	--	--	--	475.28	465.20
RL-3	River		--	--	--	--	--	--	--	--	--	--	--	463.34	456.34

Appendix G-2-3
OU1 Historical Groundwater Level Data
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Location	Geology	WBZ	9/30/2008	10/2/2008	3/17/2009	6/8/2009	6/19/2009	8/17/2009	8/19/2009	8/20/2009	10/5/2009
G-02	Bedrock	2	--	--	557.84	557.38	--	--	--	--	557.99
G-04	Till	1	--	--	562.35	560.76	--	--	--	--	559.75
G-05	Fill	1	--	--	--	--	--	--	--	--	--
G-101	Bedrock	2	--	--	563.83	563.52	--	--	--	--	562.61
G-103	Till	1	--	--	562.16	560.84	--	--	--	--	559.77
G-106	Slag	1	--	--	547.00	547.97	--	--	--	--	546.19
ISW-001		1	--	--	--	--	466.50	466.68	466.41	466.15	466.14
ISW-001-River	River		--	--	--	--	466.57	466.88	466.39	466.25	466.25
ISW-002		1	--	--	--	--	464.80	464.79	465.38	464.10	464.09
ISW-002-River	River		--	--	--	--	464.45	464.93	464.21	463.80	463.80
MW-1	Slag	1	--	--	DRY < 547.58	DRY < 547.58	--	--	--	--	DRY < 547.58
MW-2	Alluvium	1	--	--	458.75	457.38	--	--	--	--	456.73
MW-301H	Alluvium	1	--	--	460.02	460.66	--	--	--	--	461.25
MW-301S	Slag	1	--	--	496.22	496.14	--	--	--	--	495.79
MW-303H	Alluvium	1	--	--	465.72	465.52	--	--	--	--	463.93
MW-303S	Slag	1	--	--	466.73	466.60	--	--	--	--	465.20
MW-304S	Slag	1	--	--	495.99	495.63	--	--	--	--	495.31
MW-305H	Alluvium	1	--	--	465.20	463.94	--	--	--	--	463.37
MW-305R	Bedrock	2	--	--	465.92	465.72	--	--	--	--	464.67
MW-305S	Slag	1	--	--	466.28	464.74	--	--	--	--	464.58
MW-306S	Slag	1	--	--	474.19	474.24	--	--	--	--	474.40
MW-311R	Bedrock	2	--	--	565.62	565.12	--	--	--	--	567.00
MW-317R	Bedrock	2	--	--	572.81	572.07	--	--	--	--	571.43
MW-320H	Alluvium	1	--	--	469.34	467.44	--	--	--	--	467.04
MW-321H	Alluvium	1	--	--	467.35	467.18	--	--	--	--	466.71
MW-322H	Alluvium	1	--	--	463.10	461.93	--	--	--	--	461.43
MW-A	Unknown	1	--	--	554.69	555.86	--	--	--	--	554.90
P-1	Slag	1	--	--	--	--	--	--	--	--	--
P-15	Bedrock	2	--	--	468.10	467.64	--	--	--	--	468.72
P-15A	Slag	1	--	--	470.19	470.06	--	--	--	--	471.07
P-17	Alluvium	1	--	--	459.72	458.88	--	--	--	--	458.36
P-18	Alluvium	1	--	--	463.73	462.84	--	--	--	--	462.30
P-19	Slag	1	--	--	466.10	464.58	--	--	--	--	464.18
P-20	Fill	1	--	--	525.28	524.99	--	--	--	--	524.77
P-6	Till	1	--	--	555.31	554.80	--	--	--	--	554.14
P-7	Bedrock	2	--	--	534.11	534.01	--	--	--	--	533.97
P-9	Bedrock	2	--	--	525.53	525.43	--	--	--	--	525.38
RL-1	River		467.92	467.92	--	467.63	--	--	--	--	--
RL-2	River		--	--	465.47	464.62	--	--	--	--	--
RL-3	River		--	458.34	--	455.50	--	--	--	--	--

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: G-02

Date: 9/13/07

Well Condition: NA

PID (ppm): NA

Initial Depth to Water (ft): 10.96

Initial Depth to Bottom (ft): 24.41

Well Diameter (in): 2

Height of Water (ft): 14.45

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 2.35

Final Depth to Water (ft): NA

Final Depth to Bottom (ft): NA

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
16.21 + minute pieces	NA	NA	NA	NA
16.24		3.25	76.4	clear
Mrtg. 16.38		4.00	120.0	"
16.45		5.00	66.6	"
16.46		5.50	15.6	"
16.48		6.50	11.4	"
16.52		7.50	10.2	"
16.54		8.00	9.58	"
start 15.30/15.40	↓	10.00	NA.	NA

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

Water Quality Meter

Meter Number: NA

Calibrated on/by: J.M / 9/13/07

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Setup end of tubing at about 18' bgs.
Pump started & 2 gals were purged before tube was damaged and then patched. Pump on again and turned off after 4 gals removed. (flow cell disassembled and tubing replaced)
pump turned on after lowering tubing to 22' bgs.

* Confirmed with Rich that <10NTU it's acceptable to stop developing well w/o having 3 consecutive readings.

→ Bottom felt hard.

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: G-04
Date: 9/12/07
Well Condition: NA
PID (ppm): NA
Initial Depth to Water (ft): 14.71
Initial Depth to Bottom (ft): 21.49
Well Diameter (in): 2"
Height of Water (ft): 6.78
multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 1.1
Final Depth to Water (ft): NA
Final Depth to Bottom (ft): NA

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
17.41	NA	—	—	Very turbid. (smell of gasoline)
17.45	↓	3.25	114	low turbidity
17.48		5.5	45.5	close to clear
17.49		7.0	40.8	"
17.50		8.0	43.6	"
17.52	↓	9.5	45.6	clear to eye.

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

Screen 9-19'
Water level at 14.71'
set up tubing at about 17' bgs. (Foot valve at bottom of tubing)
Surge water before pumping.
Smell of gasoline when purging.
Stopped and finished developing after having consecutive readings at ~ 40 NTU
and finished bottom was hard when pushing w/ foot valve

Water Quality Meter

Meter Number: NA
Calibrated on/by: J. M. / 9/12/07

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: G-101

Date: 9/14/07

Well Condition: NA

PID (ppm): NA

Initial Depth to Water (ft): 12.58

Initial Depth to Bottom (ft): 25.73 (soft).

Well Diameter (in): 2

Height of Water (ft): 13.15

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 2.14

Final Depth to Water (ft): NA

Final Depth to Bottom (ft): NA

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
Start pump 9:25/9.26	NA	1.0	12.2	Clear
9.28		3.0	9.49	"
9.31 **		7.5	23.0	"
9.33		11.0	18.4	"
9.35		14.0	18.5	"
9.36		15.0	75.1	Gray
9.38 **		18.0	62.3	"
9.39		20.0	180.0	"
9.49/ 9.50		21.0	9.0	clear
9.51		22.5	9.49	"
9.52		23.0	9.96	"

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

* ~~[illegible]~~ Tubing lowered to ≈ 18.5' (screen from 13-23')
* No surging at the start of well
** Rate was slightly lowered and turbidity readings went up. ** Rate was increased again.
* pump stopped at 9.40 (all buckets are full).
* pump on at 9.49 am
* WELL COMPLETED DEVELOPMENT at stable turbidity < 10 NTU.
* Bottom looked hard, no sediments

Water Quality Meter

Meter Number: NA

Calibrated on/by: JM / 9/14/07

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Part (1)

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093 12 (MH)

Monitoring Well: G-103

Date: 09/12/07

Well Condition: NA

PID (ppm): NA

Initial Depth to Water (ft): 13.76

Initial Depth to Bottom (ft): 22.90

Well Diameter (in): 2"

Height of Water (ft): 9.14

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 1.48

Final Depth to Water (ft): NA

Final Depth to Bottom (ft): NA

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
12:36	NA	(MH)	NA	NA
12:39		(MH) 1.5	NA	
12:41		(MH) 3.75		
(MH) 12:44				
12:46		4.5	571	turbid.
12:48		6.0	415	"
12:50		8.0	362	"
12:52		9.5	309	"
12:55		11.5	216	"
13:00		16.5	258	low turbid
15:00		18.5	109.5	"
15:02		21.5	121	"
15:04		23.5	123	close to clear
15:07		26.5	121	close to clear (light)

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

T = 14.69

Conductivity = 3278 µS/cm

DO = ~~NA~~ 4.78 mg/L

pH = 6.98

ORP = -14.2

Stopped at 13:00 because all buckets were filled and needed drum on site. Drums were brought to well location and buckets were emptied.

Resumed at 2:57 pm, pumped again water into buckets and tested turbidity

15:10 Surge water down the well using tubing.

Resumed at 2:57 pm

Water Quality Meter

Meter Number: NA

Calibrated on/by: J.M 9/12/07

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Part (2)

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS Project No.: FR1093

Monitoring Well: G-103 Date: 9/12/07
Well Condition: NA PID (ppm): NA
Initial Depth to Water (ft): 13.76 Initial Depth to Bottom (ft): 22.90
Well Diameter (in): 2 4 Height of Water (ft): ~~9.14~~ 9.14
multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): ~~1.48~~ 1.48
Final Depth to Water (ft): NA. Final Depth to Bottom (ft): NA.

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
15.16 *	NA	29.5	> limit	very turbid.
15.21		34.5	595	turbid
15.24		37.5	224	turbid.
15.26		39.5	141	lish turpid
15.28		41.5	86.2	almost clear (slightly turbid)
15.30		42.5	63.1	"
15.32		44.5	39.9	"
15.33		46.0	93.5	"
15.35		47.5	65.5	"
15.36		49.5	64.6	almost clear
15.38	↓	50.5	59.4	" "

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

* After surging.
* well was completed after turbidity stabilized at about 48 NTU.
Bottom of well (sediments) was checked by placing water meter down well, no sediments were caught on sensor.

Water Quality Meter
Meter Number: NA
Calibrated on/by: J.M. / 9/12/07

Stabilization Parameters
turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: G-106

Date: 9/13/07

Well Condition: NA

PID (ppm): NA

Initial Depth to Water (ft): 25.17

Initial Depth to Bottom (ft): 31.83

Well Diameter (in): 2"

Height of Water (ft): 6.66

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 1.08

Final Depth to Water (ft): NA

Final Depth to Bottom (ft): NA

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
~~10.45~~ 12.44 (HH)	NA	~~NA~~ (HH)	NA	NA
12.46	↓	2.0	257	Gray, turbid
12.50		4.5	73.5	slight to low turpid
12.53		5.5	31.0	clear
12.55		6.5	39.5	clear
12.56		7.5	40.5	clear
12.58 (HH)		8.5	23.5	clear
13.00		9.0	19.8	"
13.01		9.5	19.3	"
13.02	↓	10.0	18.5	"

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

Top of screen 15' | water depth at 25.17
Bottom screen 30' |

Tubing was inserted at 28' rather than 22.5' (above water level).
SURGED well prior to pump.
10.45 no water come out, entered water meter, water at 25.25'
dropped the tubing one foot and 10.55 pump again, no water, tubing was pulled, foot valve was lost.
Smaller size tubing (1/2" ID) arrived to site w/ 1/2" foot valve. Tefelon tape will be used on to better grip ~~the foot~~ the foot valve to tubing.
12.57 lower Flow rate was observed. Completed well development w/ stable readings NTU

Water Quality Meter

Meter Number: NA

Calibrated on/by: JM / 9/13/07

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: MW-1/G102

Date: 9/13/07

Well Condition: NA

PID (ppm): NA.

Initial Depth to Water (ft): 15.5

Initial Depth to Bottom (ft): 15.7

Well Diameter (in): 2

Height of Water (ft): 0

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 0

Final Depth to Water (ft): NA

Final Depth to Bottom (ft): NA

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
NA	NA	NA	NA	NA

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

10.26
Bottom of well was felt at 15.5 ft bgs. MH
MH
WELL IS DRY. NO DEVELOPMENT.

Water Quality Meter

Meter Number: NA

Calibrated on/by: J.M. / 9/13/07

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: MW-2
Date: 9/14/07
Well Condition: NA
PID (ppm): NA
Initial Depth to Water (ft): 32.41
Initial Depth to Bottom (ft): 58.2
Well Diameter (in): 2"
Height of Water (ft): 25.8
multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 4.2
Final Depth to Water (ft): NA
Final Depth to Bottom (ft): NA

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
start pump 13.43 - 13.52	NA	10 gals	663	turpid brown -
13.55		13.0	513	" "
13.57		15.0	403	" "
14.01		20.0	369	" "
14.06		25.0	364	" "
14.11		30.0	325	" "
14.17		35.0	344	" "
14.22		40.0	270	light Brown, turp.'d
14.26		43.0	227	Cloudy, light Brown
14.29		46.0	216	light Brown, turp.'d
14.30		48.0	230	turp.'d.

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

No record for screen length.
Assume 10' screen length, place tubing 5' above bottom (58.2') at 53'.
well was surged prior to pumping. At start, water looks very muddy.
water muddy for first 5 gals, turp'd next 5 gals.
Stop pumping at 14.30 after having 3 consecutive readings of ~200 NTU
Bottom felt hard.

Water Quality Meter

Meter Number: NA
Calibrated on/by: 9/14/07 JM

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: MW-301 H

Date: ~~11.05.07~~ 11.02.07

Well Condition: Completed

PID (ppm): N/A

Initial Depth to Water (ft): 87.6

Initial Depth to Bottom (ft): 88.2

Well Diameter (in): 2

Height of Water (ft): 0.6

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 0.097

Final Depth to Water (ft): N/A

Final Depth to Bottom (ft): N/A

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
1600	87.6	0	N/A	N/A

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

Handar attempted pumping, but no water was available. ~~Cannot be developed~~ (SM) Could not develop.

Water Quality Meter

Meter Number: LaMotte 2020

Calibrated on/by: 11.02.07/ SM

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: MW-301H

Date: 1.09.08

Well Condition: Completed

PID (ppm): N/A

Initial Depth to Water (ft): 86.8

Initial Depth to Bottom (ft): 88.2

Well Diameter (in): 2

Height of Water (ft): 1.4

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 0.23

Final Depth to Water (ft): -

Final Depth to Bottom (ft): -

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
1018	-	-	-	-

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

1018 Pumping begins; tubing set 0.75 ft from well bottom, due to low water level.

1030 No water was received during pumping -- dry. Unable to develop.

Water Quality Meter

Meter Number: La Motte 2020

Calibrated on/by: Pine / [illegible] 1.4.08

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: MW-301 #5

Date: 11.05.07

Well Condition: completed

PID (ppm): N/A

Initial Depth to Water (ft): 46.82

Initial Depth to Bottom (ft): 47.05

Well Diameter (in): 2

Height of Water (ft): 0.23

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 0.037

Final Depth to Water (ft): N/A

Final Depth to Bottom (ft): N/A

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
0900	-	0	-	-

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

Unable to develop due to lack of water needed to pump with a Hydrolift II pump

Water Quality Meter

Meter Number: LaMotte 2020

Calibrated on/by: 11.5.07 / JM

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Pg 1/2

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: MW-303H

Date: 11.05.07

Well Condition: completed

PID (ppm): N/A

Initial Depth to Water (ft): 89.47

Initial Depth to Bottom (ft): ~118

Well Diameter (in): 2

Height of Water (ft): 29.53

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 4.81

Final Depth to Water (ft): ~~NA~~ *

Final Depth to Bottom (ft): ~~NA~~ --

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
1209	89.47	0	—	—
1212	—	1.5	7999	brown
1218	—	5	>999	brown
1230	—	13	7999	brown
1236	—	17	944	brown
1240	—	20	645	brown
1244	—	23	494	light brown
1246	—	25	508	light brown
1251	—	28	527	light brown
1259	—	32	648	light brown
1311	—	37	719	brown
1315	—	40	724	brown
~~1320~~ 1318	—	42	600	light brown
1326	—	48	278	clear - light brown

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

1155 ~~Mark~~ Haught takes water level.
1200 McKinnon surges well with tubing.
1209 Pumping begins
1300 stopped pumping; surged with tubing
1305 began pumping
1346 Pumping ends -- ± 10% NTU Stabilization

* Could not take a total depth reading due to the well being deeper than the measuring tape.

Water Quality Meter

Meter Number: L-Motte 2070

Calibrated on/by: 11.05.07 / JM

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development pg. 2/2

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: MW-303H
Date: 11.05.07
Well Condition: complete
PID (ppm): N/A
Initial Depth to Water (ft): 89.47
Initial Depth to Bottom (ft): ≈ 118
Well Diameter (in): 2
Height of Water (ft): 29.53
multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 4.81
Final Depth to Water (ft): NA
Final Depth to Bottom (ft): NA

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
1332	-	52	178	clear - light brown
1335	-	54	161	clear
1337	-	56	164	clear
1341	-	58	~~145~~ 143	clear
1344	-	60	153	clear
1346	-	62	148	clear

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

*See pg. 1 of form

Water Quality Meter

Meter Number: LaMotte 2020
Calibrated on/by: 11.5.07 / Tm

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: MW-303S

Date: 11, 05, 07

Well Condition: Completed

PID (ppm): N/A

Initial Depth to Water (ft): 89.89

Initial Depth to Bottom (ft): 91.72

Well Diameter (in): 2

Height of Water (ft): ~~89.89~~ 1.83

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 0.3

Final Depth to Water (ft): 89.87

Final Depth to Bottom (ft): 91.72

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
1118	89.89	1.5	226	light brown
1125	–	3	83.7	clear
1127	–	4	100.9	light brown - clear
1129	–	5	149	light brown - clear
1131	–	6	127	light brown
1134	–	8	117	light brown - clear
1136	–	10	111	light brown - clear

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

1110 McKinnon surges with tubing
1100 Haydar takes water level
1118 Pumping begins
1136 Ended development -- ± 10% Stabilization parameter reached.

Water Quality Meter

Meter Number: ~~Solinst~~ LaMotte 2020

Calibrated on/by: JM / 11.05.07

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: MW-3035

Date: 1.9.08

Well Condition: Completed

PID (ppm): N/A

Initial Depth to Water (ft): 91.05

Initial Depth to Bottom (ft): 93.3

Well Diameter (in): 2

Height of Water (ft): 2.25

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 0.37

Final Depth to Water (ft): -

Final Depth to Bottom (ft): -

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
1525	-	-	-	-

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

1525 Pumping begins

~~1535~~ (tw) No water was received during pumping; unable to develop.

1548

Water Quality Meter

Meter Number: LaMoHe 2020

Calibrated on/by: Pine 1.4.08

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: MW-3045

Date: 11.05.07

Well Condition: completed

PID (ppm): N/A

Initial Depth to Water (ft): 62.61 Ft

Initial Depth to Bottom (ft): ~~62.7~~ 62.67

Well Diameter (in): 2

Height of Water (ft): 0.06

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): –

Final Depth to Water (ft): N/A

Final Depth to Bottom (ft): N/A

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
1000	–	–	–	–

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

Unable to develop due to lack of water needed for pumping.

Water Quality Meter

Meter Number: LaMotte 7020

Calibrated on/by: 11.05.07/ SM

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development pg. 1/2

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: MW-305H

Date: 11.06.07

Well Condition: completed

PID (ppm): N/A

Initial Depth to Water (ft): 90.30

Initial Depth to Bottom (ft): 109

Well Diameter (in): 2

Height of Water (ft): 18.7

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 3.04

Final Depth to Water (ft): 90.36

Final Depth to Bottom (ft): 109

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
1130	-	25	>999	brown
1145	-	33	>999	brown
1149	-	35	982	brown
1205	-	45	932	brown
1215	-	52	984	brown
1407	-	78	245	light gray
1411	-	80	194	" "
1415	-	~~84~~ 83	186	light grey
1420	-	88	137	light brown
1423	-	90	158	light brown
1425	-	92	442	brown
1442	-	119	732	brown
1512	-	132	109	clear - light brown
1514	-	135	85.1	clear

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

1042 Hayder takes a water level ~~and DTF~~ reading
1045 McKinnon surges well with tubing.
1048 Pumping begins
1132 McKinnon surges well with tubing.
1133 Pumping begins again
1150 McKinnon surges well with tubing and restarts pumping
1217 McKinnon surges and restarts pumping
1230 Lunch break
~~1310~~ 1400 Hayder surges well with tubing; restarts pumping.
1445 McKinnon surges and restarts pumping
1530 Pumping ends -- approximately ± 10% stabilization reached
1630 Final water level reading taken

Water Quality Meter

Meter Number: LaMotte 2070

Calibrated on/by: 11.06.07 / MH

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development pg. 2/2

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: MW-305H
Date: 11.06.07
Well Condition: Completed
PID (ppm): N/A
Initial Depth to Water (ft): 90.30
Initial Depth to Bottom (ft): 109
Well Diameter (in): 2
Height of Water (ft): 18.7
multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 3.04
Final Depth to Water (ft): 90.360
Final Depth to Bottom (ft): 109

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
1521	-	137	[redacted]	87.3 clear
1523	-	138	81.2	clear
1525	-	139	65.0	clear
1527	-	140	58.5	clear
1529	-	141	53.5	clear

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

* See pg. 1 for notes.

Water Quality Meter

Meter Number: Lamotte 2020

Calibrated on/by: 11.06.07 MH

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: MW-305R

Date: 11/06/07

Well Condition: completed

PID (ppm): NA

Initial Depth to Water (ft): 88.74

Initial Depth to Bottom (ft): 152

Well Diameter (in): 2

Height of Water (ft): 63.26

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): N/A

Final Depth to Water (ft): N/A

Final Depth to Bottom (ft): N/A

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
1535	-	0	-	-
1635	-	15	>999	dark grey

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

1531 Water level reading taken by Hayley
1534 McKinnon surges well with tubing
1535 McKinnon begins pumping
1600 Foot valve lost down well.
1638 Well is pumped dry. ~~Turbid~~ (JM) Could not develop

Water Quality Meter

Meter Number: Lamotte 2020

Calibrated on/by: 11.06.07/ M.H

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: MW-305R

Date: 1.16.08

Well Condition: Completed

PID (ppm): N/A

Initial Depth to Water (ft): 91.91

Initial Depth to Bottom (ft): ≈152

Well Diameter (in): 2

Height of Water (ft):

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g):

Final Depth to Water (ft):

Final Depth to Bottom (ft):

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
1057	91.91	0	-	-
1126	105.75	1	>999	grey
1147	125.45	6	>999	grey
1158	132.40	8.5	>999	grey
1211	134.25	9.5	>999	grey
1220	135.3	10	>999	grey
1230	137.05	12.5	>999	grey
1240	137.50	14	>999	grey
1314	139.10	16	>999	grey
1354	139.70	16.25	>999	grey
1404 (EE)	139.90	17	>999	grey
1414 (EE)	139.90	17.5	>999	grey
1491	135.45	17.75	>999	grey

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

Water Quality Meter

Meter Number: LaMotte 2020

Calibrated on/by: JM / 1.16.08

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

-Tubing set at approx: 147 ft. BTOC

1057 Pumping begins

1102 Foot valve lost; replaced with new one.

1111 Pumping restarts

1415 foot valve lost; replaced w/ th new one

1420 pumping restarts

1500 MW-305R pumps dry -- although the well was not pumped at a fast rate. Also, in approx. 4.5 hours, the turbidity readings were never less than 999 NTU. Therefore, unable to develop.

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: MW-305S

Date: 11.06.07

Well Condition: completed

PID (ppm): N/A

Initial Depth to Water (ft): 88.95

Initial Depth to Bottom (ft): 93.15

Well Diameter (in): 2

Height of Water (ft): 4.20

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 0.69

Final Depth to Water (ft): NA

Final Depth to Bottom (ft): 93.15

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
1027	-	0	-	-
1032	-	1.5	>999	dark brown - grey

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

1000 Hnydar takes water level and total depth.
1007 Hnydar surges well with tubing.
1008 Development pumping begins
1020 No water returned. lost foot valve down well,
1022 Pumping begins again with new foot valve.
1031 1.5 gal received; then no more water is received.
1032 Could not ~~be developed.~~ develop. (SW)

Water Quality Meter

Meter Number: LaMotte 2020

Calibrated on/by: 11.06.07 / MH

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: MW-305S

Date: 1.8.07

Well Condition: Completed

PID (ppm): N/A

Initial Depth to Water (ft): 90.50

Initial Depth to Bottom (ft): 93.1

Well Diameter (in): 2

Height of Water (ft): 2.6

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 0.42

Final Depth to Water (ft): -

Final Depth to Bottom (ft): -

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
1445	-	-	-	-

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

1445 Pumping begins, tubing set @ 92 ft.

1500 No water was received during pumping; unable to develop.

Water Quality Meter

Meter Number: LaMotte 2020

Calibrated on/by: Pine / 1.4.07

Stabilization Parameters

turbidity: ± 10% or ≤ 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: MW-3065
Date: 11.05.07
Well Condition: completed
PID (ppm): N/A
Initial Depth to Water (ft): 68.77
Initial Depth to Bottom (ft): 70.46
Well Diameter (in): 2.00
Height of Water (ft): 1.69
multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 0.28
Final Depth to Water (ft): 69.77
Final Depth to Bottom (ft): 70.46

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
1030	–	–	–	–

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

Attempted pumping, but no water was received -- could not develop

Water Quality Meter

Meter Number: LaMotte 2020
Calibrated on/by: 11.5.07 / SM

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: QU1-GW-MW-311

Date: 1/8/08

Well Condition: completed

PID (ppm): N/R

Initial Depth to Water (ft): 14.98

Initial Depth to Bottom (ft): 29.25

Well Diameter (in): 2

Height of Water (ft): 14.3

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 2.33

Final Depth to Water (ft): -

Final Depth to Bottom (ft): -

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
17.00	14.98	-	7999	dark ~~brown~~ gray
17:05	-	-	7999	dk gray
17:13	-	1 gallon	7999	gray
17:17	-	1.5 gallon	7999	gray

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

1707 - Stopped, lower pump 2.5ft
1709 - Started
1718 - well dry, unable to develop

Water Quality Meter

Meter Number: [illegible] 2020

Calibrated on/by: [illegible] 1.4.08

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: MW-311R

Date: 11.07.07

Well Condition: Completed

PID (ppm): N/A

Initial Depth to Water (ft): 19.67

Initial Depth to Bottom (ft): 29

Well Diameter (in): 2

Height of Water (ft): 9.33

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 1.52

Final Depth to Water (ft): 25.67

Final Depth to Bottom (ft): N/A

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
0805	—	0	—	—
0813	—	1.5	>999	grey

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

0800 Hayley takes water level + total depth sounding.
0803 Hayley surges well with tubing.
0805 Pumping begins -- water pumps out slowly.
0815 Well is pumped dry -- could not develop.

Water Quality Meter

Meter Number: LaMotte 2020

Calibrated on/by: 11.07.07 / MH

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: MW-317R

Date: 11.07.07

Well Condition: Completed

PID (ppm): N/A

Initial Depth to Water (ft): 9.15

Initial Depth to Bottom (ft): 29.5

Well Diameter (in): 2

Height of Water (ft): ~~18.3~~ 20.35

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 3.32

Final Depth to Water (ft): N/A

Final Depth to Bottom (ft): N/A

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
0857	-	-	-	-
0908	-	0	-	-
0914	-	2	>999	grey
0927	-	5	>999	grey

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

0854 Hydrolab takes water level & total depth readings.
0856 McKinney surges well with tubing.
0857 Pumping begins (using plastic PVC foot valve).
0900 No water is received -- foot valve is replaced with stainless steel foot valve.
0908 Pumping is restarted.
0923 Water runs dry -- ~~PVC~~ tubing lowered to 2 ft above ~~borehole~~ well bottom.
0925 Pumping resumes.
0927 Water runs dry; pumping stopped -- could not develop.

Water Quality Meter

Meter Number: L - Multi 2020

Calibrated on/by: 11.07.07 / MF

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: MW-317R

Date: 1.09.08

Well Condition: completed

PID (ppm): N/A

Initial Depth to Water (ft): 7.33

Initial Depth to Bottom (ft): 29.85

Well Diameter (in): 2

Height of Water (ft): 22.52

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 3.67

Final Depth to Water (ft): –

Final Depth to Bottom (ft): –

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
1104	–	–	–	–
1112	–	1.75	>999	grey
1118	20.2	2.5	>999	grey
1128	20.5	3.25	>999	grey
1145	–	5.00	>999	grey

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

1104 Pumping begins; tubing set @ 25 ft
1128 Pumped dry; moved tubing to 28.0 ft
1131 Pumping restarted.
1149 Pumped dry; unable to develop.

Water Quality Meter

Meter Number: La Motte 1020

Calibrated on/by: Pine 11.04.07

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: MW-320 H

Date: 1.09.08

Well Condition: completed

PID (ppm): N/A

Initial Depth to Water (ft): 95.38

Initial Depth to Bottom (ft): 103.10

Well Diameter (in): 2

Height of Water (ft): 7.72

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 1.26

Final Depth to Water (ft): —

Final Depth to Bottom (ft): —

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
1235	-	-	-	-
1247	dry	1	-	-

Describe Development Method (e.g., pumping, surging, instrumentation
total volume removed, rest periods, problems, deviations from plan, etc.)

1235 Pumping begins; tubing set at 98ft.
1247 Well pumped dry; no water level recorded down to 101 ft. Set tubing @ 100ft.
1250 Pumping resumes.
1255 0.1 gal water was produced and then no more water was produced. Pumping ceases; unable to develop

Water Quality Meter

Meter Number: LaMotte 2020

Calibrated on/by: JM / 1.10.08

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS Project No.: FR1093

Monitoring Well: MW-32 H Date: 1.10.08 / 1.11.08
Well Condition: completed PID (ppm): N/A
Initial Depth to Water (ft): 80.37 Initial Depth to Bottom (ft): 96.55
Well Diameter (in): 2 Height of Water (ft): 16.18
multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 2.64
Final Depth to Water (ft): 90.3 Final Depth to Bottom (ft): –

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
1400	–	–	–	–
1408	–	3.5	>999	brown
1416	89.7	5.5	>999	brown
1424	92.3	9	>999	brown
1433	dry (stopped)	10.25	>999	brown
1448	89.4	10.5	>999	brown
1459	90.0	11.5	>999	brown
1510	89.7	13	7999	brown
1545	89.75	16.5	453	light brown/grey
1556	90.6	18.5	285	light brown/grey
1604	91.4	20.0	283	light grey brown
1643	89.7	25	259	light grey brown
1652	93.5	27.5	323	light grey brown
0907	93.62	33.5	45.6	~~light grey~~ clear

Describe Development Method (e.g., pumping, surging, instrumentation
(total volume removed, rest periods, problems, deviations from plan, etc.)

Water Quality Meter
Meter Number: LaMotte 2020
Calibrated on/by: JM / 1.10.07

Stabilization Parameters
turbidity: ± 10% or < 10 NTU

1400 Pumping begins; tubing set at 91.5 ft.
1408 Reduced pumping rate slightly.
1480 Well pumps dry; Geosyntec waits for well to recharge.
1448 Water level recharges to 89.4 ft BTOC; pumping resumes.
1.11.08
1815 Lost foot valve downwell; will continue tomorrow.
0850 Pumping resumes
1030 – Stopped pumping; successfully developed

0938	93.09	39	52.9	clear
0945	92.90	40	42.4	clear
0948	92.70	~~30.5~~ 40.5	~~47.3~~ 30.5	clear
0959	92.2	41.5	26.9	clear
1013	91.35	44	16.1	clear
1022	91.00	45	16.6	clear
1027	90.3	45.5	15.3	clear

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093.14

Monitoring Well: MW-322H

Date: 1.15.08

Well Condition: Completed

PID (ppm): N/A (SM)

Initial Depth to Water (ft): 91.47

Initial Depth to Bottom (ft): ≈106

Well Diameter (in): 2

Height of Water (ft): 14.53

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): ~~9.88~~ 2.37

Final Depth to Water (ft): 90.89

Final Depth to Bottom (ft): -

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
1514	-	30	430	brown
1607	-	50	63.0	clear
1625	-	55	62.0	clear
1645	-	61	58.5	clear

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

1500 Pumping begins. Tubing @ ≈ 101 ft BTOC.

1650 MW-322H Development complete.

Water Quality Meter

Meter Number: LaMotte 2020

Calibrated on/by: JM 1.15.08

Stabilization Parameters

turbidity: (± 10%) or < 10 NTU

Part (1)

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: "A"

Date: 9/13/07

Well Condition: NA

PID (ppm): NA

Initial Depth to Water (ft): 16.95

Initial Depth to Bottom (ft): 27.15

Well Diameter (in): 2

Height of Water (ft): 10.2

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 1.66

Final Depth to Water (ft): NA

Final Depth to Bottom (ft): NA

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
14.38	NA	~~[illegible]~~ MH		Muddy color
14.41		2.5	274	light brown
14.43		3.5 MH	148	light Gray
14.46		6.5	51.3	clear
14.48		8.0	37.1	clear
14.51		9.5	17.8	"
14.55		10.5	11.2	"
14.58		11.5	9.7	"
14.59*		12.5	13.7	"
15.00		14.0	13.4	"
15.02		15.0	10.44	"
15.05		16.0	6.61	"
15.06		16.5	7.60	"
15.08		17.5	6.86	"

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

SURGED WELL, SET Bottom tubing at 22' bgs.

* Pump turned off after (below 10 NTU), but turned on again to make 3 consecutive readings between ± 10%.

Water Quality Meter

Meter Number: NA

Calibrated on/by: J.M / 9/13/07

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Part (2)

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS Project No.: FR1093

Monitoring Well: "A" Date: 9/13/07
Well Condition: NA PID (ppm): NA
Initial Depth to Water (ft): 16.95 Initial Depth to Bottom (ft): 27.15
Well Diameter (in): 2 Height of Water (ft): 10.2
multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 1.66
Final Depth to Water (ft): NA Final Depth to Bottom (ft): NA

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
15.09	NA	18.0	8.52	Clear
15.10		18.5	6.85	"
15.12		~~19.0~~ (4th)	9.2	"
15.13		~~19.25~~ 20.0 (5th)	7.69	"
15.14	↓	20.5	6.11	"

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

Pump turned off at 15.15 after having more than 10 readings below < 10 NTU. 20.5 gals were removed and stored in drum. Bottom didn't have sediment ts

Water Quality Meter

Meter Number: NA
Calibrated on/by: JM / 9/13/07

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: P.6

Date: 9/14/07

Well Condition: NA

PID (ppm): NA

Initial Depth to Water (ft): 19.32

Initial Depth to Bottom (ft): 19.90

Well Diameter (in): 2

Height of Water (ft): 0.6

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 0.1

Final Depth to Water (ft): NA

Final Depth to Bottom (ft): NA

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
NA	NA	NA	NA	NA

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

little depth of water and bottom. Cannot develop. screen length recorded 9-24'. Potential of silt covers at bottom.

Water Quality Meter

Meter Number: NA

Calibrated on/by: JM / 9/14/07

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: P-7

Date: 9/14/07

Well Condition: NA

PID (ppm): NA

Initial Depth to Water (ft): 11.41

Initial Depth to Bottom (ft): 23.03

Well Diameter (in): 2

Height of Water (ft): 11.62

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 1.9

Final Depth to Water (ft): NM

Final Depth to Bottom (ft): NA

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
start 11.10 / 11.13	NA	2.5	30.6	at start looks muddy.
11.14	↓	4.0	9.05	clear.
11.16		(MH) 5.0	6.05	"
11.20		(MH) 6.5	4.08	"
11.22		7.0	NA	"
11.42 - 11.50	√	10.0	NA	"

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

→ tubing set at about 18' (MH) (screen 10'-20')
start pump 11.10.
well was surged prior to pumping.
water purged started muddy. It became clear after 2-3 gals.
Flow Rate became less (low) at 11.15
Development stoped at 11.22 after well was pumped low, dry.
Bottom remained soft when dropping level meter. 3 more gallons were purged. Bottom felt hard.

Water Quality Meter

Meter Number: NA

Calibrated on/by: J.M / 9/14/07

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: P-9

Date: 9/14/07

Well Condition: NA

PID (ppm): NA

Initial Depth to Water (ft): 9.17

Initial Depth to Bottom (ft): 14.20

Well Diameter (in): 2"

Height of Water (ft): 5.03

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 0.82

Final Depth to Water (ft): NA

Final Depth to Bottom (ft): NA

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
start 12.21-12.22	NA	0.5	NA	turbid.
start 12.35-12.38	↓	2.5	189	Brown/turbid.
12.40		3.0	109.6	light brown - turpid
12.41		3.25	76.1	cloudy-gray - turpid
12.43		3.5	86.5	close to clear
12.44		3.75	102.5	cloudy.turpid.
12.45		4.0	103.8	cloudy - turpid
12.47		4.25	94.0	"

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

tubing set at about 11.5' (mid water depth), screen (5-10'), water level at 9',
Pump was stopped because no more water came out after 1 min. Tubing was lowered to 1 ft above bottom. No water came out - Foot valve was lost.
pump on at 12.35 after replacing foot valve and tubing is 2' above bottom. water turpid at pump start.
pump stopped at 12.48 - no water very low flow rate. Purged 5 vols. turpidity constant at ~94-102 NTU.
Bottom Felt hard, no sediments stuck on foot valve.

Water Quality Meter

Meter Number: NA

Calibrated on/by: JM / 9/14/07

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS P

Project No.: FR1093

Monitoring Well: ~~MW~~ 15

Date: 1.08.08

Well Condition: completed

PID (ppm): N/A

Initial Depth to Water (ft): 23.5

Initial Depth to Bottom (ft): 42.7

Well Diameter (in): 2

Height of Water (ft): 19.2

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 3.13

Final Depth to Water (ft): 39.4

Final Depth to Bottom (ft): 42.7

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
15:31	—	—	—	dark brown
15:37	—	—	—	dark brown
1539	—	1.5g	>999	dark brown
1546	—	3g	>999	dark brown

Stopped

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

1537 - replaced tubing at depth 40.2
1539 - started pumping
1547 - stopped, water at 39.4
1550 ~~total~~ Unable to develop.

Water Quality Meter

Meter Number: Lamotte 2020

Calibrated on/by: Pine 1.4.07

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: P-15

Date: 9/18/07

Well Condition: concrete base (well pad) loose, need well casing top

PID (ppm): NA

Initial Depth to Water (ft): 26.18

Initial Depth to Bottom (ft): 42.68

Well Diameter (in): NA

Height of Water (ft): 16.5

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 2.7

Final Depth to Water (ft): NA

Final Depth to Bottom (ft): NA

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
12.06 – 12.10	NA	1.5	NA	turbid.
12.10 – 12.11		0.25	"	"
12.12 – 12.13		0.5	"	turbid

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

Mud at bottom. tubing set at about 37.5' screen (35-40). Surged well. started pump 12.06 water looks muddy. no more water came up. after one minute pumping. Decide it to lower it 1.5'
1.5 gallons
pump re-started at 12.10. Pump stopped after 1 min (0.25 gal). tubing lowered to 40' (bottom of screen). Pump on at 12.12 and off at 12.13 (only 0.5 gal came out)
well was surged again, and again tubing at 40'. only 0.1 gal came out.
stopped at 12.16, after removing only 2.5 gals (about one volume).
Recharge was found too slow after ≈ 30 min of waiting. ~~[illegible]~~.
NA

Water Quality Meter

Meter Number: NA

Calibrated on/by: 9/18/07 JM

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: P-15A

Date: 9/18/07

Well Condition: no lock, has well cap, well pad loose, need fix well casing top

PID (ppm): NA

Initial Depth to Water (ft): 24.26

Initial Depth to Bottom (ft): 27.68

Well Diameter (in): 2"

Height of Water (ft): 3.42

multiply height by 0.163 for 2" well; 0.64 for 4" well = Total Volume in Well (g): 0.55

Final Depth to Water (ft): NA

Final Depth to Bottom (ft): NA

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
10.33-10.34	NA	0	NA	NA
10.38-10.40	NA	0	NA	NA

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

Screen 20-25
water level at 24.26', Mud at Bottom
10.33 start pump. surged well at tubing placed at 26' (1ft below screen). pump turned off. No water came out. Next attempt to put tubing at 25'
turn pump on 10.38, no water came out, muddy water in tube when tube was lifted. decided to stop trying at this well. pump off at 10.40

Water Quality Meter

Meter Number: NA

Calibrated on/by: 9/18/07 JM

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: P-15A
Well Condition: completed
Initial Depth to Water (ft): 21.70
Well Diameter (in): 2
multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 0.90
Final Depth to Water (ft): 24.24

Date: 1.08.08
PID (ppm): N/A
Initial Depth to Bottom (ft): 27.2
Height of Water (ft): 5.5
Final Depth to Bottom (ft): 27.2

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
1555	-	-	-	-
1610	24.8	0.25	7 999	dark brown

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

1555 Pumping begins
1600 stopped pumping; moved tubing to 24.5 ft BTOC; re started pumping
1614 Stopped pumping; unable to develop. Final

Water Quality Meter
Meter Number: Horiba U-22
Calibrated on/by: [illegible] 1.4.08

Stabilization Parameters
turbidity: ± 10% or < 10 NTU

Geosyntec consultants

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: P-17

Date: 9/17/07

Well Condition: well cap missing, no lock

PID (ppm): NA

Initial Depth to Water (ft): 32.2

Initial Depth to Bottom (ft): 49.86

Well Diameter (in): 2

Height of Water (ft): 17.66

multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 2.87

Final Depth to Water (ft): NA

Final Depth to Bottom (ft): NA

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
start 15.09 - 15.19	NA	7.0	609	Brown / turpid.
15.23		10.0	301	cloudy, light Brown turpid
15.26		12.0	228	Gray turpid
15.29		14.00	176	light Brown turpid.
15.33		16.0	100.1	Gray "
15.35		18.0	69.3	clear
15.37		20.0	54.2	"
15.39		21.0	41.2	"
15.41		23.0	38.5	"
15.43		25.0	32.5	"
15.44		26.0	31.6	"
15.46		27.0	29.5	"

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

screen 38-48', tubing placed at 43'
well was surged, start pump at 15.09, water looks muddy.
well turbidity constant at about ≤ 30 NTU. 27.0 gals purged.
Pump turned off at 15.46. Bottom felt hard.

Water Quality Meter

Meter Number: NA

Calibrated on/by: 9/17/07 JM

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

PART (1)

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: P-18
Date: 9/14/07
Well Condition: NA
PID (ppm): NA
Initial Depth to Water (ft): 46.82
Initial Depth to Bottom (ft): 61.88
Well Diameter (in): 2
Height of Water (ft): 15.06
multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 2.45
Final Depth to Water (ft): NA
Final Depth to Bottom (ft): NA

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
16.20-16.24	NA	2.5	109.2	Gray turpid
16.24		5.0	85.3	light gray "
16.27		6.0	83.9	cloudy "
16.29		7.0	91.3	Gray "
16.31		8.0	83.3	" "
16.32		9.0	80.3	clear
16.33		10.0	81.9	"
16.34		11.0	94.7	Gray
16.36		12.25	106.2	"
16.37		13.0	99.5	"
16.39		14.0	86.9	"
16.40		15.0	80.4	clear - cloudy
16.41		16.0	75.0	"
16.42		17.0	70.3	"

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

SURGED WELL - muddy water.
TURBIDITY Constant 75 NTU
Bottom feels hard.

Water Quality Meter

Meter Number: NA
Calibrated on/by: 9/14/07 JM

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Geosyntec consultants

PART (2)

Form #130

Well Development

Site: M&H RI/FS

Project No.: FR1093

Monitoring Well: P-18
Well Condition: ~~&~~ NA
Initial Depth to Water (ft): 46.82
Well Diameter (in): 2
multiply height by 0.163 for 2" well, 0.64 for 4" well = Total Volume in Well (g): 2.45
Final Depth to Water (ft): NA

Date: 9/14/07
PID (ppm): NA
Initial Depth to Bottom (ft): 61.88
Height of Water (ft): 15.06
Final Depth to Bottom (ft): NA

Time	Depth to Water (ft)	Volume Removed (g)	Turbidity (NTU)	Appearance of Water (color, odor, turbidity)
16.43	NA	17.0	70.3	clear - cloudy
16.44	↓	18.0	71.1	" "
16.45	↓	19.0	76.0	" "

Describe Development Method (e.g., pumping, surging, instrumentation total volume removed, rest periods, problems, deviations from plan, etc.)

Water Quality Meter

Meter Number: NA
Calibrated on/by: 9/14/07 JM

Stabilization Parameters

turbidity: ± 10% or < 10 NTU

Appendix G-4-1
Metals and Cyanide Results for Shallow Soil Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (mg/kg)	Industrial RSL (mg/kg)	Location ID Sample ID Date Units Depth Surface BTV (mg/Kg)	C-8 C-8 11/11/1993 mg/Kg 0'	C-9 C-9 11/9/1993 mg/Kg 0'	C-10 C-10 11/10/1993 mg/Kg 0'	C-11 C-11 11/9/1993 mg/Kg 0'	SB-311 OU1-SS-SB311-0-1 10/3/2007 mg/Kg 0 - 1'	SB-312 OU1-SS-SB312-0-1 10/3/2007 mg/Kg 0 - 1'	SB-313 OU1-SS-SB313-0-1 10/3/2007 mg/Kg 0 - 1'	SB-314 OU1-SS-SB314-0-1 10/3/2007 mg/Kg 0 - 1'	SB-315 OU1-SS-SB315-0-1 10/3/2007 mg/Kg 0 - 1'	SB-317 OU1-SS-SB317-0-1 10/3/2007 mg/Kg 0 - 1'	SB-318 OU1-SS-SB318-0-1 10/3/2007 mg/Kg 0 - 1'	SB-319 OU1-SS-SB319-0-1 10/3/2007 mg/Kg 0 - 1'	SSI-X102 SSI-X102 11/20/1991 mg/Kg 0'	SSI-X105 SSI-X105 11/20/1991 mg/Kg 0 - 0.667'	SSI-X207 SSI-X207 11/20/1991 mg/Kg 0 - 0.25'
Aluminum	7429-90-5	77,000	990,000	15,400	**5,330**	**9,260**	**12,400**	**4,580**	**3,190**	**25,100**	**7,200**	**16,700**	**8,560**	**873**	**7,470**	**17,300**	0.0 U	**10,900**	**5,580**
Antimony	7440-36-0	31	410		5.6 U	5.6 U	6.1 U	5.6 U	**0.77 J**	**5.4 J**	**1.2 J**	**2.9 J**	**20.2 J**	0.44 U	**5.2 J**	**3.8 J**	NM	5.5 U	**19.9**
Arsenic	7440-38-2	0.39	1.6	10.7	**5.4 J**	**3.3 J**	**11.9 J**	**21.1**	**6.6**	**4.8**	**4.9**	**3**	**33.6 J**	**3**	**16.6**	**6.3**	0.0 U	**27.1**	**6.8**
Barium	7440-39-3	15,000	190,000	276	**25.6**	**29.3**	**190**	**217**	**59.7**	**196**	**93.2**	**95**	**158**	**3.5**	**146**	**445**	0.0 U	**159**	**99.5**
Beryllium	7440-41-7	160	2,000	0.81	**0.34 J**	**0.54 J**	**0.97 J**	**0.76 J**	**0.18 J**	**0.63 J**	**0.26 J**	**0.59 J**	**1.9**	**0.090 J**	**0.82 J**	**0.83 J**	NM	**0.88 J**	**1.0 J**
Cadmium	7440-43-9	70	800	7.1	0.90 U	0.90 U	**9.8**	**38.3**	**0.68 J**	**4.5**	**0.70 J**	**0.87 J**	**44.6**	**0.28 J**	**18.8**	**0.65 J**	0.0 U	**10.6**	**5.4**
Chromium	7440-47-3	280	1,400	21.2	**9.8**	**16.6**	**44.2**	**22.1**	**16.1**	**25.9**	**13.1**	**22.9**	**167**	**7.4**	**18.5**	**19.2**	NM	**24.7**	**19.5**
Cobalt	7440-48-4	23	300	12.9	**8.5 J**	**12.1**	**14.7**	**16**	**4**	**5.1 J**	**4.6**	**9.8**	**15.7**	**1.4**	**8.4**	**6.9**	NM	**20.9**	**8.5 J**
Copper	7440-50-8	3,100	41,000	31.5	**17.2**	**12.8**	**59.1**	**232**	**17.3**	**20.5**	**8.7**	**30**	**357**	**3**	**169**	**20.4**	**409**	**42.3**	**73.4**
Cyanide	57-12-5	1,600	20,000		0.53 U	0.55 U	0.60 U	0.56 U	1.3 U	NM	NM	NM	1.1 U	NM	NM	1.2 U	NM	0.26 U	0.28 U
Iron	7439-89-6	55,000	720,000	24,691	**16,700**	**14,300**	**20,000**	**59,100**	**19,000**	**31,000**	**10,800**	**23,700**	**160,000**	**3,990**	**38,400**	**23,000**	NM	**18,800**	**14,100**
Lead	7439-92-1	400	800	103	**14.6**	**6**	**190**	**3,660**	**28**	**12.4**	**7.3**	**130**	**336**	**2.8**	**2,280**	**10.5**	0.0 U	**324**	**363**
Manganese	7439-96-5	1,800	23,000	1,527	**395**	**1,530**	**3,980**	**1,480**	**1,520**	**231**	**350**	**2,500**	**5,350**	**295**	**2,670**	**697**	**118,000**	**10,500**	**2,030**
Mercury	7439-97-6	5.6	34	1.32	0.11 U	0.11 U	**0.76**	**1.8**	**0.054 J**	**0.064 J**	**0.052 J**	**0.020 J**	**0.18**	**0.052 J**	**8.6**	**0.044 J**	0.0 U	**0.19**	**0.1**
Nickel	7440-02-0	1,500	20,000	19.9	**22**	**30.4 J**	**37**	**22**	**17**	**17**	**12**	**33**	**20.5 J**	**8**	**21**	**44**	**44.7**	**38**	**21**
Selenium	7782-49-2	390	5,100		0.23 U	1.1 U	**4**	**2.4 J**	**0.49 J**	**0.49 J**	**0.45 J**	**0.44 J**	17.3 U	**0.44 J**	**2.2 J**	**1.0 J**	NM	4.5 U	4.4 U
Silver	7440-22-4	390	5,100		1.1 U	1.1 U	1.2 U	1.1 U	0.077 U	0.081 U	0.073 U	0.072 U	0.35 U	0.065 U	**0.28 J**	0.073 U	**20.6**	2.0 U	1.9 U
Thallium	7440-28-0	5.1	66		**0.24 J**	0.23 U	0.24 U	**0.25 J**	0.053 U	**0.19 J**	**0.050 J**	**0.10 J**	**0.26 J**	0.043 U	**0.22 J**	**0.12 J**	NM	0.67 U	0.67 U
Vanadium	7440-62-2	390	5,200	39.5	**10.6 J**	**1**	**20**	**28**	**20**	**39**	**26**	**16**	**68**	**15.8**	**30**	**31**	NM	**16**	**17**
Zinc	7440-66-6	23,000	310,000	1,310	**72**	**49**	**2,390**	**8,550**	**220 J**	**136**	**61**	**399 J**	**26,500**	**14.1 J**	**6,230**	**60.3 J**	0.0 U	**1,700**	**1,810**

Notes:

Exceedance of Industrial and Residential RSLs (in the case of Arsenic, red signifies an exceedance of the Surface Background Threshold Value (BTV)).

Exceedance of Residential RSL (does not apply in the case of Arsenic)

Exceedance of Industrial and/or Residential RSL but does not exceed the Surface BTV (ONLY applies in the case of Arsenic)

1,000 Bold indicates a detection

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NM Not Measured

Appendix G-4-1
Metals and Cyanide Results for Deep Soil Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (mg/kg)	Industrial RSL (mg/kg)	Location ID Sample ID Date Units Depth Subsurface BTV (mg/kg)	C-5 C-5 11/11/1993 mg/Kg 3'	C-9 C-9 11/9/1993 mg/Kg 7'	C-10 C-10 11/10/1993 mg/Kg 7'	C-11 C-11 11/9/1993 mg/Kg 10'	C-11 C-11 11/9/1993 mg/Kg 15'	G-03 G-03 11/9/1993 mg/Kg 15'	G-03 G-03 11/9/1993 mg/Kg 5'	SB-311 OU1-SS-SB311-2-4 10/3/2007 mg/Kg 2 - 4'
Aluminum	7429-90-5	77,000	990,000	15,847	**9,560**	**11,600**	**12,900**	**23,100**	**14,600**	**10,900**	**15,000**	**6,820**
Antimony	7440-36-0	31	410	1.05	5.9 U	5.7 U	6.1 U	5.5 U	6.1 U	5.3 U	5.8 U	**2.2 J**
Arsenic	7440-38-2	0.39	1.6	12.44	**2.3 J**	**8.2 J**	**3.0 J**	**6.7 J**	**2.8 J**	1.1 U	**4.0 J**	**9.3**
Barium	7440-39-3	15,000	190,000	274	**53**	**81.9**	**107**	**79.9**	**59.2**	**19.9**	**179**	**81.6**
Beryllium	7440-41-7	160	2,000	0.878	**0.66 J**	**2.4**	**0.88 J**	**2.9**	**1.1 J**	**0.57**	**1.1 J**	**0.30 J**
Cadmium	7440-43-9	70	800	4.68	**2.7**	**8.3**	**8.4**	**2.4**	**20.9**	**0.97**	0.93 U	**0.67 J**
Chromium	7440-47-3	280	1,400	25.2	**14.4**	**22.6**	**20.7**	**6.1**	**40**	**23.1**	**26.8**	**10.3**
Cobalt	7440-48-4	23	300	13.8	**9.5 J**	**6.9 J**	**15**	**3.5 J**	**16.4**	**8.2 J**	**10.9 J**	**6.6**
Copper	7440-50-8	3,100	41,000	35.9	**20.3**	**54.1**	**38.9**	**27.1**	**29.5**	**11.9**	**46.8**	**20.2**
Cyanide	57-12-5	1,600	20,000		0.57 U	0.54 U	0.61 U	0.52 U	0.60 U	0.52 U	0.53 U	NM
Iron	7439-89-6	55,000	720,000	25,035	**16,400**	**41,000**	**18,700**	**9,980**	**18,600**	**8.2**	**25,700**	**53,700**
Lead	7439-92-1	400	800	66.1	**18.6**	**49.1**	**225**	**77.4**	**510**	**3**	**20.9**	**13**
Manganese	7439-96-5	1,800	23,000	2,726	**600**	**81**	**1,350**	**122**	**1,440**	**1,560**	**417**	**1,680**
Mercury	7439-97-6	5.6	34	1.33	0.11 U	0.11 U	0.12 U	0.11 U	0.12 U	0.10 U	0.12 U	**0.034 J**
Nickel	7440-02-0	1,500	20,000	45	**29.4**	**16.8**	**36.7**	**7.2**	**48.6**	**27.2**	**29.4**	**21.4**
Selenium	7782-49-2	390	5,100		0.24 U	1.1 U	0.25 U	1.1 U	1.2 U	0.21 U	1.2 U	**0.40 J**
Silver	7440-22-4	390	5,100		1.2 U	1.1 U	1.2 U	1.1 U	1.2 U	1.1 U	1.2 U	0.072 U
Thallium	7440-28-0	5.1	66		0.24 U	0.23 U	0.25 U	0.22 U	0.24 U	0.21 U	0.23 U	**0.33 J**
Vanadium	7440-62-2	390	5,200	37.8	**12.3**	**53.7**	**16**	**27**	**28.4**	**13.5**	**30**	**11.9**
Zinc	7440-66-6	23,000	310,000	740	**443**	**506**	**4,130**	**2,160**	**390**	**39.4**	**45.5**	**112 J**

Analyte	CAS #	Residential RSL (mg/kg)	Industrial RSL (mg/kg)	Location ID Sample ID Date Units Depth Subsurface BTV (mg/kg)	SB-312 OU1-SS-SB312-2-4 10/3/2007 mg/Kg 2 - 4'	SB-313 OU1-SS-SB313-2-4 10/3/2007 mg/Kg 2 - 4'	SB-314 OU1-SS-SB314-2-4 10/3/2007 mg/Kg 2 - 4'	SB-315 OU1-SS-SB315-2-4 10/3/2007 mg/Kg 2 - 4'	SB-317 OU1-SS-SB317-2-4 10/3/2007 mg/Kg 2 - 4'	SB-318 OU1-SS-SB318-2-4 10/3/2007 mg/Kg 2 - 4'	SB-319 OU1-SS-SB319-2-4 10/3/2007 mg/Kg 2 - 4'
Aluminum	7429-90-5	77,000	990,000	15,847	**9,870**	**18,300**	**18,100**	**16,100**	**9,760**	**17,400**	**9,150**
Antimony	7440-36-0	31	410	1.05	**2.2 J**	**4.1 J**	**4.4 J**	**3.5 J**	**2.6 J**	**6.5 J**	0.47 U
Arsenic	7440-38-2	0.39	1.6	12.44	**1.3**	**0.21 J**	**50.5**	**6.9**	**5**	**35.7**	**0.26 J**
Barium	7440-39-3	15,000	190,000	274	**160**	**560**	**131**	**167**	**328**	**354**	**260**
Beryllium	7440-41-7	160	2,000	0.878	**0.60 J**	**1.0 J**	**0.56 J**	**0.75 J**	**0.59 J**	**1.5**	**0.41 J**
Cadmium	7440-43-9	70	800	4.68	**0.37 J**	**0.56 J**	**1.4**	**18.5**	**3.7**	**21.9**	**0.57 J**
Chromium	7440-47-3	280	1,400	25.2	**12**	**21.4**	**14**	**22.2**	**11.5**	**39.9**	**14.1**
Cobalt	7440-48-4	23	300	13.8	**4.7**	**12.1**	**24.7**	**12.1**	**14.9**	**15.3**	**8.4**
Copper	7440-50-8	3,100	41,000	35.9	**29.5**	**5.5**	**98.2**	**29.6**	**10.8**	**81.9**	**6.3**
Cyanide	57-12-5	1,600	20,000		1.2 U	NM	NM	NM	NM	NM	NM
Iron	7439-89-6	55,000	720,000	25,035	**13,600**	**34,300**	**29,300**	**24,600**	**13,500**	**49,800**	**16,900**
Lead	7439-92-1	400	800	66.1	**5.4**	**7**	**35.7**	**77**	**71**	**323**	**8**
Manganese	7439-96-5	1,800	23,000	2,726	**342**	**2,750**	**412**	**3,870**	**1,140**	**9,380**	**5,860**
Mercury	7439-97-6	5.6	34	1.33	**0.018 J**	**0.0080 J**	**0.077 J**	**0.53**	**0.026 J**	**0.46**	**0.0080 J**
Nickel	7440-02-0	1,500	20,000	45	**29.1**	**42.4**	**44.6**	**38.3**	**19.2**	**44.3**	**23.1**
Selenium	7782-49-2	390	5,100		**0.43 J**	**0.60 J**	**0.47 J**	**0.69 J**	**0.69 J**	**1.4**	**0.50 J**
Silver	7440-22-4	390	5,100		0.071 U	0.071 U	0.071 U	0.073 U	0.072 U	0.073 U	0.068 U
Thallium	7440-28-0	5.1	66		0.051 U	**0.095 J**	**0.16 J**	**0.12 J**	**0.19 J**	**0.56 J**	0.047 U
Vanadium	7440-62-2	390	5,200	37.8	**12.6**	**21.7**	**8.1**	**13**	**28.6**	**31**	**8.5**
Zinc	7440-66-6	23,000	310,000	740	**35.3 J**	**45.6**	**630**	**3,470**	**930**	**3,320**	**30**

Notes:

Exceedance of Industrial and Residential RSLs (in the case of Arsenic, red signifies an exceedance of the Subsurface Background Threshold Value (BTV) and in the case of Manganese, red signifies an exceedance of the Industrial RSL only).

Exceedance of Residential RSL (does not apply in the case of Arsenic; in the case of Manganese, yellow signifies an exceedance of the Subsurface BTV but not an exceedance of the Industrial RSL).

Exceedance of Industrial and/or Residential RSL but does not exceed the Surface BTV (applies in the case of Arsenic and Manganese; for Manganese, gray signifies an exceedance of the Residential RSL but not an exceedance of the Subsurface BTV).

1,000 Bold indicates a detection

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NM Not Measured

Appendix G-4-1
Metals and Cyanide Results for Shallow Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (mg/kg)	Industrial RSL (mg/kg)	Location ID / Sample ID / Date / Units / Depth / Surface BTV (mg/kg)	ISA-X104 / ISA-X104 / 12/14/1993 / mg/Kg / 0 - 0.833'	ISA-X105 / ISA-X105 / 12/14/1993 / mg/Kg / 0 - 0.833'	ISA-X106 / ISA-X106 / 12/14/1993 / mg/Kg / 0 - 0.833'	MW-301H / OU1-SS-SB301-0-1 / 10/9/2007 / mg/Kg / 0 - 1'	MW-303H / OU1-SS-SB303-0-1 / 10/11/2007 / mg/Kg / 0 - 1'	MW-304S / OU1-SS-SB304-0-1 / 10/10/2007 / mg/Kg / 0 - 1'	MW-305H / OU1-SS-SB305-0-1 / 10/18/2007 / mg/Kg / 0 - 1'	MW-306S / OU1-SS-SB306-0-1 / 10/16/2007 / mg/Kg / 0 - 1'
Aluminum	7429-90-5	77,000	990,000	15,400	**35,300**	**22,700**	**14,100**	**12,400**	**25,700**	**9,600**	**13,200**	**15,400 J**
Antimony	7440-36-0	31	410		NM	NM	NM	**1.8 J**	**13**	**6.5 J**	**6.0 J**	**4.2 J**
Arsenic	7440-38-2	0.39	1.6	10.7	**21.5**	**65**	**110**	**115**	**251**	**28.1**	**39.5**	**40.1**
Barium	7440-39-3	15,000	190,000	276	**169**	**410**	**191**	**1,530**	**13,800**	**175**	**1,030**	**390**
Beryllium	7440-41-7	160	2,000	0.81	**1.6**	**12.7**	**1.7**	1.0 U	**5.1 J**	**1.3 J**	**1.2 J**	**0.92 J**
Cadmium	7440-43-9	70	800	7.1	**36.1**	**59.9**	**181**	**88.1**	**10.3**	**109**	**36.8**	**13.4**
Chromium	7440-47-3	280	1,400	21.2	**43.3**	**31.9**	**28.1**	**18.2 J**	**17.6 J**	**19.4 J**	**47.5**	**20.1**
Cobalt	7440-48-4	23	300	12.9	0.0 U	**46.4**	0.0 U	**26.7**	**273**	**10.4 J**	**12.5**	**10.1**
Copper	7440-50-8	3,100	41,000	31.5	**906**	**429**	**4,340**	**522**	**185**	**296**	**203**	**44.5**
Cyanide	57-12-5	1,600	20,000		0.0 U	0.0 U	0.0 U	1.4 U	NM	NM	NM	1.3 U
Iron	7439-89-6	55,000	720,000	24,691	0.0 U	0.0 U	0.0 U	**49,000**	**51,600**	**21,900**	**35,300**	**34,500**
Lead	7439-92-1	400	800	103	**905**	**342**	**1,370**	**4,400**	**215**	**627**	**1,650**	**116**
Manganese	7439-96-5	1,800	23,000	1,527	0.0 U	**5,450**	**1,290**	**289**	**123,000**	**918**	**4,860**	**11,500**
Mercury	7439-97-6	5.6	34	1.32	0.0 U	**1.4**	**2.1**	**18.5**	**2.3**	**0.69**	**5**	**0.2**
Nickel	7440-02-0	1,500	20,000	19.9	0.0 U	**105**	**119**	**39.9 J**	**668**	**45.9**	**39**	**30.8**
Selenium	7782-49-2	390	5,100		**17.7**	0.0 U	**28**	21.3 U	**3.2**	**4.4 J**	**10.4**	**0.87 J**
Silver	7440-22-4	390	5,100		0.0 U	0.0 U	**18**	**15**	**11**	**3**	0.37 U	**1.3 J**
Thallium	7440-28-0	5.1	66		**0.72 J**	0.0 U	**0.98 J**	**2**	**4**	**0.62 J**	**1**	**0.40 J**
Vanadium	7440-62-2	390	5,200	39.5	0.0 U	**110**	0.0 U	**27**	**899**	**24**	**45**	**52**
Zinc	7440-66-6	23,000	310,000	1,310	**10,200**	**42,000**	**37,500**	**79,900**	**1,970**	**46,000**	**12,500**	**1,830**

Analyte	CAS #	Residential RSL (mg/kg)	Industrial RSL (mg/kg)	Location ID / Sample ID / Date / Units / Depth / Surface BTV (mg/kg)	SB-302 / OU1-SS-SB302-0-1 / 10/9/2007 / mg/Kg / 0 - 1'	SB-307 / OU1-SS-SB307-0-1 / 10/24/2007 / mg/Kg / 0 - 1'	SB-308 / OU1-SS-SB308-0-1 / 10/17/2007 / mg/Kg / 0 - 1'	SB-309 / OU1-SS-SB309-0-1 / 10/17/2007 / mg/Kg / 0 - 1'	SB-316 / OU1-SS-SB316-0-1 / 10/3/2007 / mg/Kg / 0 - 1'	SLP-415 / OU1-SS-SLP415S-0908 / 8/13/2009 / mg/Kg / 0'	SLP-415 / OU1-SS-SLP415T-0908 / 8/13/2009 / mg/Kg / 0'	SSI-X103 / SSI-X103 / 11/21/1991 / mg/Kg / 0 - 0.5'
Aluminum	7429-90-5	77,000	990,000	15,400	**27,700**	**5,060**	**11,900**	**9,460**	**12,100**	**14,800**	**1,600**	**9,360**
Antimony	7440-36-0	31	410		**1.0 J**	**10.2**	**13.3**	**9.8**	**11.2 J**	0.0 U	0.0 U	**30.4**
Arsenic	7440-38-2	0.39	1.6	10.7	**39.4**	**16.9**	**122**	**53.6**	**25.7**	**3.3**	**57.9**	**245**
Barium	7440-39-3	15,000	190,000	276	**611**	**612**	**3,550**	**341**	**673**	**63.7**	**66.8**	**820**
Beryllium	7440-41-7	160	2,000	0.81	**1.6**	**1.0 J**	**2.6**	**2.3**	**1.2**	**1.8**	**0.33**	**1.6**
Cadmium	7440-43-9	70	800	7.1	**54.9**	**13.8**	**24.5**	**68.3**	**37.7**	**4.3**	**6.5**	**40.5**
Chromium	7440-47-3	280	1,400	21.2	**25.5**	**11.8**	**49.7**	**17.5**	**18.8**	**2.8**	**6.7**	**46.7**
Cobalt	7440-48-4	23	300	12.9	**8.1**	**6**	**35.1**	**14**	**17.6**	**2.8**	**22.8**	**3.6**
Copper	7440-50-8	3,100	41,000	31.5	**190**	**51.4**	**607**	**1,460**	**199**	**78**	**1,770**	**278**
Cyanide	57-12-5	1,600	20,000		NM	NM	NM	NM	NM	NM	NM	0.29 U
Iron	7439-89-6	55,000	720,000	24,691	**39,200**	**34,300**	**49,500**	**29,100**	**43,000**	**18,100**	**48,200**	**40,000**
Lead	7439-92-1	400	800	103	**944**	**393**	**1,210**	**799**	**1,530**	**116**	**206**	**38,700**
Manganese	7439-96-5	1,800	23,000	1,527	**1,220**	**332**	**10,700**	**1,510**	**9,650**	**443**	**1,210**	**287**
Mercury	7439-97-6	5.6	34	1.32	**12.5**	**1.1**	**0.92**	**0.16**	**0.82**	NM	NM	0.074 U
Nickel	7440-02-0	1,500	20,000	19.9	**22.5**	**20.1**	**79**	**27.8**	**34.2**	**13**	**23**	**4.0 J**
Selenium	7782-49-2	390	5,100		**4.2 J**	**0.64 J**	**1.4**	**2**	**2.3**	0.39 U	1.9 U	4.4 U
Silver	7440-22-4	390	5,100		0.089 U	0.33 U	0.35 U	0.36 U	**4.3 J**	0.0 U	0.0 U	2.0 U
Thallium	7440-28-0	5.1	66		**0.28 J**	**0.59 J**	**1**	**0.29 J**	**0.38 J**	0.028 U	**0.029 J**	0.66 U
Vanadium	7440-62-2	390	5,200	39.5	**61**	**28**	**86**	**35**	**25**	**8**	**12**	**34**
Zinc	7440-66-6	23,000	310,000	1,310	**12,100**	**3,110**	**10,600**	**8,310**	**22,600**	**2,620**	**13,600**	**3,490**

Appendix G-4-1
Metals and Cyanide Results for Shallow Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (mg/kg)	Industrial RSL (mg/kg)	Location ID Sample ID Date Units Depth Surface BTV (mg/kg)	SSI-X104 SSI-X104 11/21/1991 mg/Kg 0 - 0.5'
Aluminum	7429-90-5	77,000	990,000	15,400	**13,600**
Antimony	7440-36-0	31	410		4.8 U
Arsenic	7440-38-2	0.39	1.6	10.7	**20.6**
Barium	7440-39-3	15,000	190,000	276	**259**
Beryllium	7440-41-7	160	2,000	0.81	**1.5**
Cadmium	7440-43-9	70	800	7.1	**70.7**
Chromium	7440-47-3	280	1,400	21.2	**35**
Cobalt	7440-48-4	23	300	12.9	**14.3**
Copper	7440-50-8	3,100	41,000	31.5	**417**
Cyanide	57-12-5	1,600	20,000		**0**
Iron	7439-89-6	55,000	720,000	24,691	**29,400**
Lead	7439-92-1	400	800	103	**730**
Manganese	7439-96-5	1,800	23,000	1,527	**2,510**
Mercury	7439-97-6	5.6	34	1.32	**1.3**
Nickel	7440-02-0	1,500	20,000	19.9	**39**
Selenium	7782-49-2	390	5,100		4.1 U
Silver	7440-22-4	390	5,100		1.7 U
Thallium	7440-28-0	5.1	66		0.62 U
Vanadium	7440-62-2	390	5,200	39.5	**28**
Zinc	7440-66-6	23,000	310,000	1,310	**43,700**

Notes:

	Exceedance of Industrial and Residential RSLs (in the case of Arsenic, red signifies an exceedance of the Surface Background Threshold Value (BTV)).
	Exceedance of Residential RSL (does not apply in the case of Arsenic)
	Exceedance of Industrial and/or Residential RSL but does not exceed the Surface BTV (ONLY applies in the case of Arsenic)
1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NM	Not Measured

Appendix G-4-1
Metals and Cyanide Results for Deep Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (mg/kg)	Industrial RSL (mg/kg)	Location ID / Sample ID / Date / Units / Depth / Subsurface BTV (mg/kg)	MW-301H OU1-SS-SB301-40-41 10/9/2007 mg/Kg 40 - 41'	MW-301H OU1-SS-SB301-44-50 10/9/2007 mg/Kg 44 - 50'	MW-303H OU1-SS-SB303-108-109 10/11/2007 mg/Kg 108 - 109'	MW-303H OU1-SS-SB303-85-86 10/11/2007 mg/Kg 85 - 86'	MW-303H OU1-SS-SB303-89-90 10/11/2007 mg/Kg 89 - 90'	MW-304S OU1-SS-SB304-58-59 10/10/2007 mg/Kg 58 - 59'	MW-304S OU1-SS-SB304-59-60 10/10/2007 mg/Kg 59 - 60'	MW-305H OU1-SS-SB305-89-90 10/18/2007 mg/Kg 89 - 90'
Aluminum	7429-90-5	77,000	990,000	15,847	**12,600**	**20,000**	**3,850**	**6,180**	**20,900**	**6,090**	**7,760**	**13,600**
Antimony	7440-36-0	31	410	1.05	**2.5 J**	0.95 U	**1.2 J**	**9.6 J**	**7.5 J**	0.92 U	0.91 U	**3.2 J**
Arsenic	7440-38-2	0.39	1.6	12.44	**45.5 J**	**15.5**	**8.4**	**15.5 J**	**4.2**	**4.4**	**4.3**	**10.3**
Barium	7440-39-3	15,000	190,000	274	**167**	**45.1**	**37.2**	**248**	**73.2**	**203**	**63.1**	**153**
Beryllium	7440-41-7	160	2,000	0.878	**1.6**	**1.5 J**	**0.25 J**	**5.9 J**	**2**	**2.1**	**0.46 J**	**0.78 J**
Cadmium	7440-43-9	70	800	4.68	**21.2**	**0.70 J**	**3.4**	**29.7**	**521**	**97.6**	**212**	**21.6**
Chromium	7440-47-3	280	1,400	25.2	**5.4**	**22.3**	**8.6**	**9.1 J**	**21**	**8.2**	**16.1**	**8.9**
Cobalt	7440-48-4	23	300	13.8	**10**	**35**	**5**	**21**	**39**	**18**	**55**	**4**
Copper	7440-50-8	3,100	41,000	35.9	**239**	**23.4**	**12.6**	**1,200**	**337**	**289**	**175**	**380**
Cyanide	57-12-5	1,600	20,000		NM	NM	NM	NM	1.3 U	NM	1.2 U	NM
Iron	7439-89-6	55,000	720,000	25,035	**21,800**	**22,500**	**24,100**	**29,700**	**60,000**	**18,400**	**13,700**	**32,400**
Lead	7439-92-1	400	800	66.1	**86.1**	**18.4**	**18**	**683**	**108**	**206**	**14.9**	**1,490**
Manganese	7439-96-5	1,800	23,000	2,726	**179**	**289**	**983**	**324**	**371**	**388**	**1,940**	**126**
Mercury	7439-97-6	5.6	34	1.33	0.0030 U	**0.016 J**	**0.082**	**0.0070 J**	**0.25**	0.0030 U	**0.0050 J**	**6.1**
Nickel	7440-02-0	1,500	20,000	45	**41.4 J**	**44.3**	**25.1**	**16.8 J**	**54.2**	**22.5**	**71.8**	**12.6**
Selenium	7782-49-2	390	5,100		18.2 U	**0.59 J**	**1**	16.3 U	**3**	**2**	**4**	**5**
Silver	7440-22-4	390	5,100		**0.18 J**	0.089 U	0.14 U	2.7 U	0.17 U	0.087 U	0.086 U	0.40 U
Thallium	7440-28-0	5.1	66		0.051 U	**0.30 J**	**0.092 J**	0.46 U	**0.25 J**	**0.064 J**	**0.091 J**	**0.21 J**
Vanadium	7440-62-2	390	5,200	37.8	**24**	**20.2**	**29**	**13**	**35**	**29**	**16.7**	**24**
Zinc	7440-66-6	23,000	310,000	740	**41,900**	**63**	**123**	**6,010**	**8,890**	**20,500**	**48,200**	**3,340**

Analyte	CAS #	Residential RSL (mg/kg)	Industrial RSL (mg/kg)	Location ID / Sample ID / Date / Units / Depth / Subsurface BTV (mg/kg)	MW-305H OU1-SS-SB305-90-91 10/18/2007 mg/Kg 90 - 91'	MW-306S OU1-SS-SB306-66-67 10/16/2007 mg/Kg 66 - 67'	MW-306S OU1-SS-SB306-67-68 10/16/2007 mg/Kg 67 - 68'	P-1 P-1 10/3/1994 mg/Kg 21'	P-1 P-1 10/3/1994 mg/Kg 80'	P-2 P-2 10/3/1994 mg/Kg 19'	P-2 P-2 DP 10/4/1994 mg/Kg 42'	P-2 P-2 10/4/1994 mg/Kg 42'
Aluminum	7429-90-5	77,000	990,000	15,847	**16,700**	**33,000 J**	**13,900 J**	NM	NM	NM	NM	NM
Antimony	7440-36-0	31	410	1.05	**3.8 J**	**5.1 J**	**4.8 J**	NM	NM	NM	NM	NM
Arsenic	7440-38-2	0.39	1.6	12.44	**6.8**	**0.19 J**	**11.3**	NM	NM	NM	NM	NM
Barium	7440-39-3	15,000	190,000	274	**136**	**51.3**	**155**	**161**	**54.5**	**152**	**84.6**	**80.4**
Beryllium	7440-41-7	160	2,000	0.878	**1.1 J**	**1.3**	**2.1 J**	NM	NM	NM	NM	NM
Cadmium	7440-43-9	70	800	4.68	**38.1**	**7.2**	**62**	**1.9**	**9.5**	**228**	**8.1**	**8.4**
Chromium	7440-47-3	280	1,400	25.2	**18**	**1.8 J**	**25.8**	**6.3**	**12.9**	**19.3**	**26.6**	**27.3**
Cobalt	7440-48-4	23	300	13.8	**16**	**3**	**40**	NM	NM	NM	NM	NM
Copper	7440-50-8	3,100	41,000	35.9	**51**	**30.9**	**31.7**	NM	NM	NM	NM	NM
Cyanide	57-12-5	1,600	20,000		NM	NM	NM	0.55 U	0.53 U	0.50 U	**0.74**	0.53 U
Iron	7439-89-6	55,000	720,000	25,035	**35,700**	**13,000**	**26,100**	**14,100**	**24,500**	**35,100**	**94,600**	**97,800**
Lead	7439-92-1	400	800	66.1	**161**	**1.4**	**30.7**	**1,470**	**2.1**	**2,300**	**261**	**267**
Manganese	7439-96-5	1,800	23,000	2,726	**332**	**173**	**1,740**	**38.1**	**185**	**1,170**	**28.1**	**23.6**
Mercury	7439-97-6	5.6	34	1.33	**0.39**	0.0030 U	**0.0050 J**	0.12 U	0.11 U	0.11 U	0.11 U	0.12 U
Nickel	7440-02-0	1,500	20,000	45	**37.1**	**8.5**	**76.9**	**10.5**	**75.1**	**9.1 J**	**15.1**	**13.3**
Selenium	7782-49-2	390	5,100		**0.67 J**	0.33 U	**3**	NM	NM	NM	NM	NM
Silver	7440-22-4	390	5,100		3.8 U	0.13 U	0.16 U	NM	NM	NM	NM	NM
Thallium	7440-28-0	5.1	66		**0.26 J**	0.046 U	**0.16 J**	NM	NM	NM	NM	NM
Vanadium	7440-62-2	390	5,200	37.8	**26**	**16**	**35**	NM	NM	NM	NM	NM
Zinc	7440-66-6	23,000	310,000	740	**9,560**	**1,500**	**10,300**	**1,090**	**8,860**	**5,400**	**489**	**488**

Appendix G-4-1
Metals and Cyanide Results for Deep Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (mg/kg)	Industrial RSL (mg/kg)	Location ID / Sample ID / Date / Units / Depth / Subsurface BTV (mg/kg)	P-15A / P-15A / 9/29/1994 / mg/Kg / 20'	P-17 / P-17 / 9/10/1994 / mg/Kg / 10'	P-17 / P-17 / 9/10/1994 / mg/Kg / 42'	P-18 / P-18 / 9/28/1994 / mg/Kg / 39'	P-19 / P-19 / 9/29/1994 / mg/Kg / 20'	P-19 / P-19 / 9/29/1994 / mg/Kg / 42'	P-21 / P-21 / 9/30/1994 / mg/Kg / 21'	P-21 / P-21 / 9/30/1994 / mg/Kg / 41'
Aluminum	7429-90-5	77,000	990,000	15,847	NM	NM	NM	NM	NM	NM	NM	NM
Antimony	7440-36-0	31	410	1.05	NM	NM	NM	NM	NM	NM	NM	NM
Arsenic	7440-38-2	0.39	1.6	12.44	NM	NM	NM	NM	NM	NM	NM	NM
Barium	7440-39-3	15,000	190,000	274	**258**	**236**	**189**	**608**	**49.8**	**16.7 J**	**124**	**117**
Beryllium	7440-41-7	160	2,000	0.878	NM	NM	NM	NM	NM	NM	NM	NM
Cadmium	7440-43-9	70	800	4.68	**49.5**	**51.5**	**45.4**	**22.9**	**6.1**	**15.1**	**2.1**	**4.6**
Chromium	7440-47-3	280	1,400	25.2	**37.1**	**97.5**	**11.7**	**22**	**6.7**	**21.8**	**41.1**	**2.8**
Cobalt	7440-48-4	23	300	13.8	NM	NM	NM	NM	NM	NM	NM	NM
Copper	7440-50-8	3,100	41,000	35.9	NM	NM	NM	NM	NM	NM	NM	NM
Cyanide	57-12-5	1,600	20,000		0.59 U	0.56 U	0.60 U	0.45 U	0.52 U	0.61 U	0.55 U	0.53 U
Iron	7439-89-6	55,000	720,000	25,035	**33,000**	**55,800**	**60,300**	**54,900**	**10,600**	**55,700**	**209,000**	**7,920**
Lead	7439-92-1	400	800	66.1	**2,340**	**1,400**	**47.9**	**290**	**23**	**34.1**	**221**	**99.3**
Manganese	7439-96-5	1,800	23,000	2,726	**40,600**	**1,500**	**2,030**	**2,280**	**56.5**	**217**	**203**	**50.2**
Mercury	7439-97-6	5.6	34	1.33	**2.3**	**0.42**	0.12 U	0.11 U	0.10 U	0.12 U	0.11 U	**0.15**
Nickel	7440-02-0	1,500	20,000	45	**53.1**	**88.7**	**37.7**	**65.5**	**19.4**	**41**	**24.4**	**4.4**
Selenium	7782-49-2	390	5,100		NM	NM	NM	NM	NM	NM	NM	NM
Silver	7440-22-4	390	5,100		NM	NM	NM	NM	NM	NM	NM	NM
Thallium	7440-28-0	5.1	66		NM	NM	NM	NM	NM	NM	NM	NM
Vanadium	7440-62-2	390	5,200	37.8	NM	NM	NM	NM	NM	NM	NM	NM
Zinc	7440-66-6	23,000	310,000	740	**21,600**	**15,100**	**21,800**	**9,700**	**9,120**	**3,000**	**2,960**	**852**

Analyte	CAS #	Residential RSL (mg/kg)	Industrial RSL (mg/kg)	Location ID / Sample ID / Date / Units / Depth / Subsurface BTV (mg/kg)	P-21 / P-21 / 9/30/1994 / mg/Kg / 60'	P-21 / P-21 / 10/3/1994 / mg/Kg / 2.5'	P-22 / P-22 / 10/4/1994 / mg/Kg / 41'	P-22 / P-22 / 10/5/1994 / mg/Kg / 106'	SB-302 / OU1-SS-SB302-10.5-11 / 10/9/2007 / mg/Kg / 10.5 - 11.5'	SB-302 / OU1-SS-SB302-12-13 / 10/9/2007 / mg/Kg / 12 - 13'	SB-307 / OU1-SS-SB307-7-8 / 10/24/2007 / mg/Kg / 7 - 8'	SB-307 / OU1-SS-SB307-8-9 / 10/24/2007 / mg/Kg / 8 - 9'
Aluminum	7429-90-5	77,000	990,000	15,847	NM	NM	NM	NM	**14,400**	**3,130**	**4,620**	**4,640**
Antimony	7440-36-0	31	410	1.05	NM	NM	NM	NM	0.95 U	0.86 U	**2.9 J**	**3.3 J**
Arsenic	7440-38-2	0.39	1.6	12.44	NM	NM	NM	NM	**14.7**	**5.6**	**3.7**	**33**
Barium	7440-39-3	15,000	190,000	274	**65.4**	**471**	**136**	**32.0 J**	**182**	**24.6**	**65.3**	**68.9**
Beryllium	7440-41-7	160	2,000	0.878	NM	NM	NM	NM	**0.74 J**	**0.23 J**	**1.1**	**4.9**
Cadmium	7440-43-9	70	800	4.68	**18.2**	**6.3**	**2.6**	**7.2**	**42.6**	**279**	**7.3**	**9.2**
Chromium	7440-47-3	280	1,400	25.2	**4.1**	**4**	**8.6**	**8.7**	**29.4**	**7.5**	**7.4**	**10.2**
Cobalt	7440-48-4	23	300	13.8	NM	NM	NM	NM	**11.4**	**12**	**6**	**12**
Copper	7440-50-8	3,100	41,000	35.9	NM	NM	NM	NM	**46.6**	**20.2**	**39.6**	**56.3**
Cyanide	57-12-5	1,600	20,000		0.54 U	0.53 U	0.48 U	0.45 U	1.3 U	NM	1.2 U	NM
Iron	7439-89-6	55,000	720,000	25,035	**5,240**	**60,800**	**26,900**	**39,700**	**48,600**	**13,500**	**44,100**	**54,200**
Lead	7439-92-1	400	800	66.1	**75.5**	**3,850**	**48.3**	**5.5**	**110**	**73.5**	**90.8**	**88.5**
Manganese	7439-96-5	1,800	23,000	2,726	**66.8**	**95.6**	**81.9**	**859**	**1,800**	**874**	**239**	**1,630**
Mercury	7439-97-6	5.6	34	1.33	**0.16**	0.11 U	0.10 U	0.12 U	**0.024 J**	**0.037**	**0.030 J**	**0.061**
Nickel	7440-02-0	1,500	20,000	45	**4.9 J**	**41.3**	**16.2**	**19.9**	**59.2**	**22.8**	**13.3**	**37.1**
Selenium	7782-49-2	390	5,100		NM	NM	NM	NM	**1**	**1**	**0.56 J**	**1.3 J**
Silver	7440-22-4	390	5,100		NM	NM	NM	NM	0.090 U	0.082 U	0.34 U	0.38 U
Thallium	7440-28-0	5.1	66		NM	NM	NM	NM	**0.49 J**	**0.26 J**	**0.43 J**	**0.69 J**
Vanadium	7440-62-2	390	5,200	37.8	NM	NM	NM	NM	**43**	**13**	**15**	**29**
Zinc	7440-66-6	23,000	310,000	740	**1,270**	**26,100**	**3,770**	**687**	**4,260**	**18,100**	**1,480**	**1,300**

Appendix G-4-1
Metals and Cyanide Results for Deep Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (mg/kg)	Industrial RSL (mg/kg)	Location ID Sample ID Date Units Depth Subsurface BTV (mg/kg)	SB-308 OU1-SS-SB308-26.5-27.5 10/17/2007 mg/Kg 26.5 - 27'	SB-308 OU1-SS-SB308-36.5-37.5 10/17/2007 mg/Kg 36.5 - 37'	SB-309 OU1-SS-SB309-18.25-19.25 10/17/2007 mg/Kg 18.25 - 19.25'	SB-309 OU1-SS-SB309-28.25-29.25 10/17/2007 mg/Kg 28.25 - 29'	SB-309 OU1-SS-SB309-48-49 10/17/2007 mg/Kg 48 - 49'	SB-316 OU1-SS-SB316-2-4 10/3/2007 mg/Kg 2 - 4'
Aluminum	7429-90-5	77,000	990,000	15,847	**5,400**	**9,800**	**17,200**	**8,110**	**4,340**	**8,060**
Antimony	7440-36-0	31	410	1.05	**16**	**35.6 J**	**17.5**	**81.4**	**5.9 J**	**4.9 J**
Arsenic	7440-38-2	0.39	1.6	12.44	**46.5**	**6.3**	**53.1**	**117**	**17.1**	**13.4**
Barium	7440-39-3	15,000	190,000	274	**2,130**	**45**	**372**	**812**	**133**	**728**
Beryllium	7440-41-7	160	2,000	0.878	**1.1 J**	**1.2**	**2.8**	**1.6**	**0.36 J**	**0.46 J**
Cadmium	7440-43-9	70	800	4.68	**53.5**	**189**	**68.5**	**26.7**	**21.4**	**19.1**
Chromium	7440-47-3	280	1,400	25.2	**78.7**	**5.7**	**15.6**	**27.8**	**11.1**	**18.2**
Cobalt	7440-48-4	23	300	13.8	**31**	**23**	**15**	**31**	**32**	**9**
Copper	7440-50-8	3,100	41,000	35.9	**1,410**	**35.9**	**754**	**2,810**	**17.1**	**81.8**
Cyanide	57-12-5	1,600	20,000		NM	1.1 U	NM	NM	NM	1.2 U
Iron	7439-89-6	55,000	720,000	25,035	**64,800**	**34,100**	**33,800**	**123,000**	**34,700**	**29,100**
Lead	7439-92-1	400	800	66.1	**500**	**53**	**2,640**	**328**	**9.4**	**568**
Manganese	7439-96-5	1,800	23,000	2,726	**7,870**	**3,440**	**8,030**	**13,800**	**5,830**	**5,000**
Mercury	7439-97-6	5.6	34	1.33	**2.5 J**	**0.071**	**0.96**	**0.39**	**0.020 J**	**0.36**
Nickel	7440-02-0	1,500	20,000	45	**50.3**	**33.1**	**28.6**	**62.8**	**50**	**27.1**
Selenium	7782-49-2	390	5,100		**2**	**5**	**3**	**2**	**2**	**1**
Silver	7440-22-4	390	5,100		**9**	3.3 U	**0.66 J**	**52**	3.4 U	**0.77 J**
Thallium	7440-28-0	5.1	66		**0.34 J**	0.048 U	**0.57 J**	**0.29 J**	**0.18 J**	**0.19 J**
Vanadium	7440-62-2	390	5,200	37.8	**38**	**11**	**35**	**29**	**36**	**17**
Zinc	7440-66-6	23,000	310,000	740	**10,300**	**170,000**	**21,300**	**18,600**	**43,000**	**9,970**

Notes:

Exceedance of Industrial and Residential RSLs (in the case of Arsenic, red signifies an exceedance of the Subsurface Background Threshold Value (BTV) and in the case of Manganese, red signifies an exceedance of the Industrial RSL only).

Exceedance of Residential RSL (does not apply in the case of Arsenic; in the case of Manganese, yellow signifies an exceedance of the Subsurface BTV but not an exceedance of the Industrial RSL).

Exceedance of Industrial and/or Residential RSL but does not exceed the Surface BTV (applies in the case of Arsenic and Manganese; for Manganese, gray signifies an exceedance of the Residential RSL but not an exceedance of the Subsurface BTV).

1,000 Bold indicates a detection

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NM Not Measured

Geosyntec consultants

1531 Dick Lonas Road, Building A
Knoxville, TN 37909
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Memorandum

TO: Nandra Weeks

DATE: March 5, 2008

FROM: Geosyntec Consultants QA/QC Group

SITE: Mattheissen and Hegeler Zinc Company Site, OU1

SUBJECT: Summary of Tier III Validation of analytical results for CAS Report R2740161

Introduction
This report summarizes the findings of the full validation of eighteen soil samples and one trip blank collected on behalf of the Mattheissen and Hegeler Zinc Company Site, OU1project. These samples were collected on October 3, 2007. The samples were analyzed by Columbia Analytical Services, Inc. (CAS), Rochester, New York. The samples were analyzed for Volatile Organic Compounds by EPA Method 8260B, Semivolatile Organic Compounds by EPA Method 8270C, Organochlorine Pesticides by EPA Method 8081A, Polychlorinated Biphenyls (PCBs) by EPA Method 8082, Total Metals by EPA Methods 6020 and 6010B, Mercury by EPA Method 7471A, Cyanide by EPA Method 9012 and Percent Solids by Modified EPA Method 160.3.

The data were reviewed in accordance with the principles presented in *USEPA National Functional Guidelines for Laboratory Data Review, Organics* (EPA, 2005), *USEPA National Functional Guidelines for Laboratory Data Review, Inorganics* (EPA, 2004), and per the requirements of the QAPP, the laboratory standard operating procedures and the specified methods.

Data for the following samples were reviewed.

Field Sample ID	CAS Job Number
OU1-SS-SB316-2-4	1043069
OU1-SS-SB312-2-4	1043070
OU1-SS-SB311-0-4	1043071
OU1-SS-SB315-0-1	1043072
OU1-SS-SB319-0-1	1043076
OU1-SS-SB406	1043079
OU1-SS-SB406	1043080
OU1-MW-402	1043081

Geosyntec consultants

2240 Sutherland Avenue, Suite 107
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Memorandum

TO: Richard Berggreen

DATE: March 9, 2010

FROM: Geosyntec Consultants QA/QC Group

SITE: Mattheissen and Hegeler Zinc Company Site, OU1

SUBJECT: Summary of Tier II Validation of analytical results for CAS Report R0907209,

Revised March 9, 2010

Introduction
This report summarizes the findings of the Tier II validation of six soil samples collected on behalf of the Mattheissen and Hegeler Zinc Company Site, OU1 project. These samples were collected on August 11-13, 2009. The samples were analyzed by Columbia Analytical Services, Inc. (CAS), Rochester, New York. The samples were analyzed for total metals by EPA Methods 6020 and 6010B.

The data were reviewed in accordance with the principles presented in *USEPA National Functional Guidelines for Laboratory Data Review, Inorganics* (EPA, 2004), and per the requirements of the QAPP, the laboratory standard operating procedures and the specified methods.

Data for the following samples were reviewed.

CAS Job No.	Client ID
R0904518-001	OU1-SS-LRS412S-0908
R0904518-002	OU1-SS-LRS412T-0908
R0904518-003	OU1-SS-SLP415S-0908
R0904518-004	OU1-SS-SLP415T-0908
R0904518-005	OU1-SS-LRS413S-0908
R0904518-006	OU1-SS-LRS413T-0908

Matrix – soil

Executive Summary

The analyses were performed as requested in the email of 12/22/09; the email was not included in the data package. The chain of custody (COC) forms and samples were originally received at the laboratory in August 2009. Copies of the COCs were included in the data package.

All holding times were met.

1.0 Metals (EPA Methods 6020/6010B)

The soil samples were analyzed for the requested metals (EPA 6020/6010B) following total metals digestion. Tier II validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPs and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ⊗ Blanks
- ✓ Laboratory Control Sample
- ⊗ Matrix Spike Sample
- ⊗ Laboratory Duplicate Sample
- ⊗ Internal Standards

1.1 Data Completeness

The analyses were performed as requested on the email dated 12/22/09.

1.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

1.3 Blanks

1.3.1 Preparation (Method) Blank

The soil preparation blank met the acceptance criteria with the following exceptions; chromium, silver, zinc, calcium and antimony were detected in the soil preparation blanks at estimated concentrations less than the reporting limits (RL) but greater than the instrument detection limits (IDL). The concentrations of chromium, zinc and calcium in the associated samples were either not detected or greater than the RL; therefore, no sample qualifications were required for chromium, zinc and calcium. However, the estimated concentrations of antimony and silver detected in the associated samples less than the RL but greater than the IDL are U qualified as not detected at the RL.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SS-LRS412T-0908	Silver	0.838 J	11.5 U
OU1-SS-SLP415S-0908	Silver	2.9 J	10.1 U
	Antimony	4.4 J	60.4 U
OU1-SS-SLP415T-0908	Silver	4.3 J	10.2 U
	Antimony	20.8 J	61.2 U
OU1-SS-LRS413S-0908	Antimony	59.0 J	65.5 U
OU1-SS-LRS413T-0908	Silver	3.7 J	11.3 U
	Antimony	5.8 J	67.6 U

1.3.1 Field Blanks

The field and equipment blanks associated with samples OU1-SS-LRS412S-0908 and OU1-SS-LRS412T-0908 were reported in CAS report R0904518. Field blank OU1-GW-MW405-0908 had sodium detected at an estimated concentration less than the reporting limit and greater than the IDL. Equipment blank OU1-GW-MW401B-0908 had zinc detected at an estimated concentration less than the reporting limit and greater than the IDL. Samples OU1-SS-LRS412S-0908 and OU1-SS-LRS412T-0908 had sodium and zinc concentrations greater than the reporting limits; therefore, no sample qualifications are required.

The field and equipment blanks associated with samples OU1-SS-SLP415S-0908, OU1-SS-SLP415T-0908, OU1-SS-LRS413S-0908 and OU1-SS-LRS413T-0908 were reported in CAS report R0904599.

Barium and calcium were detected in equipment blank OU1-GW-MW401A-090812 and calcium was detected in equipment blank OU1-GW-MW401B-090812, at estimated concentrations less than the reporting limit and greater than the IDL. The concentrations of barium and calcium in the associated samples (OU1-SS-LRS413S-0908 and OU1-SS-LRS413T-0908) are greater than the reporting limits; therefore, no sample qualifications are required.

Copper and thallium were detected in equipment blank OU1-GW-MW401A-090812 at estimated concentrations. The copper concentrations in the associated samples (OU1-SS-LRS413S-0908 and OU1-SS-LRS413T-0908) are greater than ten times the equipment blank concentration; therefore, no copper qualifications are required. The estimated thallium concentration in associated sample OU1-SS-LRS413S-0908 is less than the reporting limit and greater than the IDL; therefore, the thallium concentration in sample OU1-SS-LRS413S-0908 is U qualified as not detected at the reporting limit. Thallium was not detected in sample OU1-SS-LRS413T-0908.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SS-LRS413S-0908	Thallium	0.050 J	0.109 U

Calcium and manganese were detected in field blank OU1-GW-MW405-090813 at estimated concentrations less than the reporting limit and greater than the IDL. No sample qualifications were required since the calcium and manganese concentrations in the associated samples (OU1-SS-SLP415S-0908, OU1-SS-SLP415T-0908) are greater than the reporting limits.

Copper was detected in equipment blank OU1-GW-MW401B-090813 at an estimated concentration. The copper concentrations in the associated samples (OU1-SS-SLP415S-0908, OU1-SS-SLP415T-0908) are greater than ten times the equipment blank concentrations; therefore, no copper qualifications are required.

Barium, calcium and cobalt were detected in equipment blank OU1-GW-MW401A-090813 at estimated concentrations less than the reporting limits and greater than the IDL. The barium, calcium and cobalt concentrations in the associated samples (OU1-SS-SLP415S-0908, OU1-SS-SLP415T-0908) are greater than the reporting limits; therefore, no barium, calcium and cobalt qualifications are required.

Copper and nickel were detected in equipment blank OU1-GW-MW401A-090813 at estimated concentrations. The copper and nickel concentrations in the associated samples (OU1-SS-SLP415S-0908, OU1-SS-SLP415T-0908) are greater than ten times the equipment blank concentrations; therefore, no copper and nickel qualifications are required.

Iron, manganese and zinc were detected in equipment blank OU1-GW-MW401A-090813 at concentrations greater than the reporting limits. However, the iron, manganese and zinc concentrations in the associated samples (OU1-SS-SLP415S-0908, OU1-SS-SLP415T-0908) are greater than ten times the equipment blank concentrations; therefore, no sample qualifications are required.

1.4 Laboratory Control Samples (LCS)

All percent recoveries in the soil LCS were within the acceptance limits.

1.5 Matrix Spike (MS)

Sample OU1-SS-LRS412S-0908 was analyzed as the soil MS sample. The concentrations of silver, aluminum, calcium, iron, magnesium, manganese and zinc in the unspiked sample exceeded the spike concentration by a factor of four or greater; therefore, the spike recovery control limits do not apply and qualification of the data is not required.

Sample OU1-SS-LRS412T-0908 was analyzed as the soil MS sample. The concentrations of barium, copper, lead, nickel and vanadium in the unspiked sample exceeded the spike concentration by a factor of four or greater; therefore, the spike recovery control limits do not apply and qualification of the data is not required. The recovery of beryllium was low and the recoveries of cadmium, chromium and cobalt were high, outside the laboratory recovery limits. Therefore, the concentration of beryllium in sample OU1-SS-LRS412T-0908 is J- qualified as estimated with low

bias and the concentrations of cadmium, chromium and cobalt are J+ qualified as estimated with high bias.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SS-LRS412T-0908	Beryllium	0.558 J	0.558 J-
	Cadmium	3.0	3.0 J+
	Cobalt	5.6	5.6 J+
	Chromium	5.3	5.3 J+

1.6 Laboratory Duplicate Samples

Samples OU1-SS-LRS412S-0908 and OU1-SS-LRS412T-0908 were analyzed as the soil duplicate samples. The results were within the laboratory acceptance limits for relative percent difference (RPD), with the following exceptions. The RPDs in laboratory duplicate OU1-SS-LRS412S-0908 were high and outside the laboratory acceptance limits for aluminum, calcium and manganese. The RPDs in laboratory duplicate OU1-SS-LRS412T-0908 were high and outside the laboratory acceptance limits for arsenic, barium, cobalt, copper, lead, nickel and vanadium. Therefore the concentrations with RPDs outside the laboratory limits in the duplicate samples are J qualified as estimated.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SS-LRS412S-0908	Aluminum	9290	9290 J
	Calcium	32300	32300 J
	Manganese	3580	3580 J
OU1-SS-LRS412T-0908	Arsenic	8.7	8.7 J
	Barium	120	120 J
	Cobalt	5.6	5.6 J
	Copper	184	184 J
	Lead	45.5	45.5 J
	Nickel	23.1	23.1 J
	Vanadium	10.8	10.8 J

1.7 Internal Standards

The internal standard recoveries are not part of the Level II data package; however, the report narrative indicated that the internal standard recoveries for Ge were high and outside the laboratory acceptance criteria in samples OU1-SS-SLP415T-0908 and OU1-SS-LRS413S-0908. However, the concentrations of the associated metals (iron, manganese and zinc) in samples OU1-SS-SLP415T-0908 and OU1-SS-LRS413S-0908 were reported from separate analyses that had acceptable internal standard recoveries; therefore, no qualifications are required.

ATTACHMENT A
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Review Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher that the concentration of the analyte in the sample due to bias attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower that the concentration of the analyte in the sample due to bias attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Geosyntec consultants

2240 Sutherland Avenue, Suite 107
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Memorandum

TO: Richard Berggreen

DATE: December 16, 2009

FROM: Geosyntec Consultants QA/QC Group

SITE: Mattheissen and Hegeler Zinc Company Site, OU1

SUBJECT: Summary of Tier II Validation of analytical results for CAS Report R0904671

Introduction
This report summarizes the findings of the Tier II validation of six water samples, three field blanks and three equipment blanks collected on behalf of the Mattheissen and Hegeler Zinc Company Site, OU1 project. These samples were collected on August 17-20, 2009. The samples were analyzed by Columbia Analytical Services, Inc. (CAS), Rochester, New York. The samples were analyzed for total and dissolved metals by EPA Methods 6020 and 6010B and total and dissolved mercury by EPA Method 7470A and hardness by Standard Method 2340C.

The data were reviewed in accordance with the principles presented in *USEPA National Functional Guidelines for Laboratory Data Review, Inorganics* (EPA, 2004), and per the requirements of the QAPP, the laboratory standard operating procedures and the specified methods.

Data for the following samples were reviewed.

Lab ID	Client ID
R0904671-001	OU1-SW-AS0411-090817
R0904671-002	OU1-SW-AS0411-090817 DISSOLVED
R0904671-003	OU1-SW-CS0410-090817
R0904671-004	OU1-SW-CS0410-090817 DISSOLVED
R0904671-005	OU1-GW-MW405-090817
R0904671-006	OU1-GW-MW401B-090817
R0904671-007	OU1-SW-AS0411-090818
R0904671-008	OU1-SW-AS0411-090818 DISSOLVED
R0904671-009	OU1-GW-MW405-090818
R0904671-010	OU1-GW-MW401B-090818
R0904671-011	OU1-GW-ISW001-0908
R0904671-012	OU1-GW-ISW002-0908
R0904671-013	OU1-SW-AS0411-090820
R0904671-014	OU1-GW-MW405-090820

R0904671-015	OU1-GW-MW401B-090820
R0904671-016	OU1-GW- ISW001-0908 DISSOLVED
R0904671-017	OU1-GW- ISW002-0908 DISSOLVED
R0904671-018	OU1-SW-ASO411-090820 DISSOLVED

Matrix – water

Executive Summary

All analyses were performed as requested on the chain of custody (COC).

According to the Columbia Analytical Services cooler receipt and preservation check form, the following samples were not received for analysis: OU1-GW-MW-405-090820 Dissolved and OU1-GW-MW-401B-090820 Dissolved. The COC was then edited by someone on 9/3/09 to mark these analyses off of the COC. Sample results were not reported for OU1-GW-MW-405-090820 Dissolved and OU1-GW-MW-401B-090820 Dissolved.

All holding times were met.

1.0 Metals (EPA Methods 6020/6010B/7470A)

The water samples were analyzed for the requested total and dissolved metals and mercury (EPA 6020/6010B/7470A) following metals and mercury digestion. Tier II validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPS and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Data Completeness
✓ Holding Times and Preservation
⊗ Blanks
✓ Laboratory Control Samples
✓ Matrix Spike/Matrix Spike Duplicate Samples
✓ Laboratory Duplicate Samples
✓ Serial Dilutions
✓ Total and Dissolved Results Comparison
✓ Field Duplicate Samples

1.1 Data Completeness

The analyses were performed as requested on the COC, with the following exceptions. According to the Columbia Analytical Services cooler receipt and preservation check form, samples OU1-GW-MW-405-090820 Dissolved and OU1-GW-MW-401B-090820 Dissolved were listed on the COC, but not received for analysis. The COC was edited by someone in the laboratory on 9/3/09 to mark the dissolved analyses off of the COC for these two samples.

Sample results were not reported for OU1-GW-MW-405-090820. Dissolved and OU1-GW-MW-401B-090820 Dissolved; therefore, the completeness is 90%.

1.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

1.3 Blanks

1.3.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria, with the following exceptions. Barium, cadmium, calcium, cobalt, copper, lead, nickel, sodium, magnesium and manganese were detected in the method blanks at estimated concentrations less than the reporting limit and greater than the instrument detection limit (IDL). Therefore, the associated samples with estimated concentrations less than the reporting limit and greater than the IDL are U qualified as not detected at the reporting limits.

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-GW- ISW001-0908 DISSOLVED	Lead	0.308 J	1.0 U
OU1-GW-MW401B-090817	Calcium	27.8 J	1000 U
	Cobalt	0.100 J	1.0 U
	Magnesium	51.3 J	1000 U
	Manganese	0.893 J	10.0 U
	Sodium	53.5 J	1000 U
OU1-GW-MW401B-090818	Calcium	22.1 J	1000 U
	Magnesium	36.4 J	1000 U
	Manganese	0.571 J	10.0 U
	Sodium	45.9 J	1000 U
OU1-GW-MW401B-090820	Calcium	26.8 J	1000 U
	Cobalt	0.131 J	1.0 U
	Magnesium	44.3 J	1000 U
	Manganese	0.708 J	10.0 U
	Sodium	58.3 J	1000 U
OU1-GW-MW405-090817	Barium	0.145 J	1.0 U
	Calcium	14.4 J	1000 U
	Cobalt	0.096 J	1.0 U
	Magnesium	49.9 J	1000 U
	Manganese	0.695 J	10.0 U
	Sodium	23.1 J	1000 U
OU1-GW-MW405-090818	Barium	0.180 J	1.0 U
	Calcium	10.8 J	1000 U
	Cobalt	0.194 J	1.0 U
	Magnesium	41.0 J	1000 U
	Manganese	0.583 J	10.0 U
	Sodium	46.8 J	1000 U

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-GW-MW405-090820	Magnesium	65.0 J	1000 U
	Manganese	1.1 J	10.0 U
	Sodium	44.2 J	1000 U
OU1-SW-AS0411-090817	Cobalt	0.946 J	1.0 U
	Manganese	2.2 J	10.0 U
OU1-SW-AS0411-090817 DISSOLVED	Cobalt	0.968 J	1.0 U
	Manganese	2.3 J	10.0 U
OU1-SW-AS0411-090818	Cobalt	0.938 J	1.0 U
	Manganese	1.1 J	10.0 U
OU1-SW-AS0411-090818 DISSOLVED	Cobalt	1.0 J	1.0 U
	Manganese	1.4 J	10.0 U
OU1-SW-AS0411-090820	Cobalt	0.948 J	1.0 U
	Manganese	1.1 J	10.0 U
OU1-SW-ASO411-090820 DISSOLVED	Cobalt	0.862 J	1.0 U
	Manganese	0.894 J	10.0 U
OU1-SW-AS0411-090820	Cobalt	0.948 J	1.0 U
	Manganese	1.1 J	10.0 U

1.3.1 Field Blanks

The field blanks and equipment blanks met the acceptance criteria, with the following exceptions. Equipment blank OU1-GW-MW401B-090817 had zinc detected at an estimated concentration less than the reporting limit and greater than the IDL. No sample qualifications were required since the zinc concentrations in the associated samples are greater than the reporting limit.

Field blank OU1-GW-MW405-090818 had antimony detected at an estimated concentration less than the reporting limit and greater than the IDL. No sample qualifications were required since the antimony concentrations in the associated samples are not detected.

Equipment blank OU1-GW-MW401B-090820 had antimony and zinc detected at estimated concentrations less than the reporting limits and greater than the IDLs. Zinc was detected in the associated samples at concentrations greater than the reporting limits or not detected, so no sample qualifications are required for zinc. The associated antimony sample concentrations less than the reporting limit and greater than the IDL are U qualified as not detected at the reporting limit.

Barium was detected in equipment blank OU1-GW-MW401B-090820 at an estimated concentration. The barium concentrations in the associated samples were greater than the reporting limit; therefore, no sample qualifications are required.

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-GW-ISW001-0908	Antimony	4.2 J	60.0 U
OU1-GW-ISW002-0908	Antimony	17.9 J	60.0 U

1.4 Laboratory Control Samples (LCS)

All percent recoveries in the LCSs were within the acceptance limits.

1.5 Matrix Spike (MS)

Samples OU1-SW-AS0411-090817 DISSOLVED, OU1-GW-MW405-090818 and OU1-GW-ISW001-0908 were analyzed as the matrix spikes; the compound recoveries were within the laboratory control limits, with the following exceptions. Calcium, iron, and magnesium recoveries were outside of the laboratory QC critieria; however, the spike recovery control limits do not apply in this case, since the concentrations of calcium, iron and magnesium in the unspiked sample exceeded the spike concentration by a factor of four or greater. No sample qualifications are required.

1.6 Laboratory Duplicate Samples

Samples OU1-SW-AS0411-090817 DISSOLVED, OU1-GW-MW405-090818 and OU1-GW-ISW001-0908 were analyzed as the laboratory duplicates. All relative percent difference (RPD) results were acceptable.

1.7 Serial Dilutions

The percent differences for the compounds for the serial dilutions of samples OU1-SW-AS0411-090817 DISSOLVED, OU1-GW-MW405-090818 and OU1-GW-ISW001-0908 were within of the laboratory acceptance criteria.

1.8 Total and Dissolved Results Comparison

The six samples were analyzed for both total and dissolved metals. In most cases, the total metals concentrations were greater than or equal to the dissolved metals concentrations. However, for the samples and metals listed in the table below, the total metals concentrations are less than the dissolved metals concentrations. If the concentrations are estimated (J qualified by the laboratory), the RPDs between the total and dissolved concentrations are not calculable (NC). Based on professional judgment, sample results that result in RPDs for total and dissolved metals that were less than 10% are not qualified.

Total Sample ID	Dissolved Sample ID	Metal	Total Concentration (ug/L)	Dissolved Concentration (ug/L)	RPD
OU1-SW-AS0411-090817	OU1-SW-AS0411-090817 DISSOLVED	Manganese	2.2 J	2.3 J	NC
OU1-SW-AS0411-090817	OU1-SW-AS0411-090817 DISSOLVED	Cobalt	0.946 J	0.968 J	NC
OU1-SW-CS0410-090817	OU1-SW-CS0410-090817 DISSOLVED	Selenium	3.4 J	3.9 J	NC
OU1-SW-CS0410-090817	OU1-SW-CS0410-090817 DISSOLVED	Magnesium	48500	50900	5

Total Sample ID	Dissolved Sample ID	Metal	Total Concentration (ug/L)	Dissolved Concentration (ug/L)	RPD
OU1-SW-CS0410-090817	OU1-SW-CS0410-090817 DISSOLVED	Nickel	57.9	59.9	3
OU1-SW-CS0410-090817	OU1-SW-CS0410-090817 DISSOLVED	Manganese	282	290	3
OU1-SW-CS0410-090817	OU1-SW-CS0410-090817 DISSOLVED	Cadmium	169	172	2
OU1-SW-CS0410-090817	OU1-SW-CS0410-090817 DISSOLVED	Zinc	56100	56600	1
OU1-SW-AS0411-090818	OU1-SW-AS0411-090818 DISSOLVED	Manganese	1.1 J	1.4 J	NC
OU1-SW-AS0411-090818	OU1-SW-AS0411-090818 DISSOLVED	Cobalt	0.938 J	1 J	NC
OU1-SW-AS0411-090818	OU1-SW-AS0411-090818 DISSOLVED	Zinc	58800	61000	4
OU1-SW-AS0411-090818	OU1-SW-AS0411-090818 DISSOLVED	Barium	24.5	25	2
OU1-SW-AS0411-090818	OU1-SW-AS0411-090818 DISSOLVED	Cadmium	298	303	2
OU1-SW-AS0411-090818	OU1-SW-AS0411-090818 DISSOLVED	Magnesium	59700	59900	<1
OU1-SW-AS0411-090820	OU1-SW-ASO411-090820 DISSOLVED	Selenium	10.9 J	11.9 J	9
OU1-SW-AS0411-090820	OU1-SW-ASO411-090820 DISSOLVED	Barium	24.1	24.9	3
OU1-SW-AS0411-090820	OU1-SW-ASO411-090820 DISSOLVED	Copper	22.9	23.5	3

NC-not calculable

1.9 Field Duplicate

No field duplicate samples were collected with this data set.

2.0 Hardness (SM 2340C)

The water samples were analyzed for hardness (Standard Method 2340C). Tier II validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPs and the quality of the data reported. The following summarizes the results of this review. In addition, the percent solids data was reviewed and found to be acceptable.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Blanks
- ✓ Laboratory Control Sample
- ✓ Matrix Spike Sample

✓ Laboratory Duplicate Sample

2.1 Data Completeness
All analyses were performed as requested on the COC.

2.2 Holding Times and Preservation
All analyses were performed within the method-specified holding times.

2.3 Preparation (Method) Blank
The preparation blank met the acceptance criteria for hardness.

2.4 Laboratory Control Sample (LCS)
The LCS recovery was within the acceptance criteria for hardness.

2.5 Matrix Spike (MS)
Sample OU1-GW-ISW001-0908 was analyzed as the matrix spike for hardness. The MS recovery was within the acceptance criteria for hardness.

.

2.6 Laboratory Duplicate Samples
Sample OU1-GW-ISW001-0908 was analyzed as the laboratory duplicate for hardness. The duplicate was within the acceptance criteria for hardness.

ATTACHMENT A
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by GeoSyntec's Data Review Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher that the concentration of the analyte in the sample due to bias attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower that the concentration of the analyte in the sample due to bias attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Geosyntec consultants

2240 Sutherland Avenue, Suite 107
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Memorandum

TO: Richard Berggreen

DATE: December 16, 2009

FROM: Geosyntec Consultants QA/QC Group

SITE: Mattheissen and Hegeler Zinc Company Site, OU1

SUBJECT: Summary of Tier II Validation of analytical results for CAS Report R0904612

Introduction
This report summarizes the findings of the Tier II validation of four soil samples, four water samples, one field blank, one filter blank and two equipment blanks collected on behalf of the Mattheissen and Hegeler Zinc Company Site, OU1 project. These samples were collected on August 14, 2009. The samples were analyzed by Columbia Analytical Services, Inc. (CAS), Rochester, New York. The samples were analyzed for total and dissolved metals by EPA Methods 6020 and 6010B, total and dissolved mercury by EPA Methods 7470A and 7471A, hardness by Standard Methods 2340C, pH by EPA Method 9045D and percent solids by Modified EPA Method 160.3.

The data were reviewed in accordance with the principles presented in *USEPA National Functional Guidelines for Laboratory Data Review, Inorganics* (EPA, 2004), and per the requirements of the QAPP, the laboratory standard operating procedures and the specified methods.

Data for the following samples were reviewed.

CAS Job No.	Client ID
R0904612-001	OU1-SE-LVR406-0908
R0904612-002	OU1-SE-LVR407-0908
R0904612-003	OU1-SE-LVR408-0908
R0904612-004	OU1-SE-LVR409-0908
R0904612-005	OU1-SW-LVR408-0908
R0904612-006	OU1-SW-LVR408-0908 DISS
R0904612-007	OU1-SW-LVR409-0908
R0904612-008	OU1-SW-LVR409-0908 DISS
R0904612-009	OU1-SW-ASO411-090814

R0904612-010	OU1-SW-ASO411-090814 DISS
R0904612-011	OU1-GW-MW404-090814
R0904612-012	OU1-GW-MW404-090814 DISS
R0904612-013	OU1-GW-MW401A-090814
R0904612-014	OU1-GW-MW401B-090814
R0904612-015	OU1-GW-MW405-090814
R0904612-016	OU1-GW-MW403-090814

Matrix – soil and water

Executive Summary
All analyses were performed as requested on the chain of custody (COC).

All holding times were met.

1.0 Metals (EPA Methods 6020/6010B/7470A/74741A)
The soil and water samples were analyzed for the requested metals and mercury (EPA 6020/6010B/7470A/7471A) following total and dissolved metals digestion and mercury digestion. Tier II validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPS and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ⊗ Blanks
- ✓ Laboratory Control Sample
- ✓ Matrix Spike Sample
- ✓ Laboratory Duplicate Sample
- ⊗ Serial Dilutions
- ⊗ Total and Dissolved Results Comparison
- ⊗ Field Duplicate

1.1 Data Completeness
All analyses were performed as requested on the COC.

1.2 Holding Times and Preservation
All analyses were performed within the method-specified holding times.

1.3 Blanks

1.3.1 Preparation (Method) Blank

The soil preparation blank met the acceptance criteria with the following exceptions; chromium, iron, magnesium, nickel, antimony and sodium were detected in the soil preparation blank at estimated concentrations less than the reporting limit (RL) but greater than the instrument detection limits (IDL). The concentrations of chromium, iron, magnesium and nickel in the associated samples were either not detected or greater than the RL; therefore, no sample qualifications were required for chromium, iron, magnesium and nickel. However, the estimated concentrations of antimony and sodium detected in the associated samples less than the RL but greater than the IDL are U qualified as not detected at the RL.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SE-LVR406-0908	Antimony	0.580 J	8.6 U
OU1-SE-LVR407-0908	Sodium	104 J	147 U
OU1-SE-LVR408-0908	Sodium	65.2 J	137 U
OU1-SE-LVR409-0908	Antimony	0.498 J	7.2 U
	Sodium	65.6 J	120 U

Barium, chromium, cobalt, copper, lead, nickel and sodium were detected in the water preparation blank at estimated concentrations less than the RL, but greater than the IDL. Therefore, the estimated concentrations of barium, chromium, cobalt, copper, lead, nickel and sodium detected in the associated samples less than the RL but greater than the IDL are U qualified as not detected at the RL.

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-SW-LVR408-0908	Cobalt	0.730 J	10.0 U
OU1-SW-LVR408-0908 DISS	Cobalt	0.476 J	10.0 U
	Lead	0.628 J	10.0 U
OU1-SW-LVR409-0908	Cobalt	0.748 J	10.0 U
OU1-SW-LVR409-0908 DISS	Cobalt	0.520 J	10.0 U
	Lead	0.439 J	10.0 U
OU1-GW-MW404-090814 DISS	Barium	0.180 J	10.0 U
	Cobalt	0.133 J	10.0 U
	Nickel	0.378 J	10.0 U
	Sodium	98.9 J	1000 U
	Lead	0.554 J	10.0 U
OU1-GW-MW401A-090814	Cobalt	0.066 J	10.0 U
	Sodium	29.9 J	1000 U

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
	Lead	0.503 J	10.0 U
OU1-GW-MW401B-090814	Cobalt	0.181 J	10.0 U
	Sodium	41.2 J	1000 U
	Lead	0.508 J	10.0 U
OU1-GW-MW403-090814	Barium	0.168 J	10.0 U
	Cobalt	0.101 J	10.0 U
	Nickel	0.741 J	10.0 U
	Sodium	74.9 J	1000 U
	Lead	0.424 J	10.0 U

1.3.1 Field Blanks

The equipment blanks, field blank and filter blank met the acceptance criteria, with the following exceptions. Equipment blank OU1-GW-MW401A-090814 had chromium detected at an estimated concentration at the reporting limit and zinc detected at an estimated concentration greater than the IDL and less than the reporting limit. In addition, equipment blank OU1-GW-MW401B-090814 had chromium detected at an estimated concentration and zinc detected at an estimated concentration greater than the IDL and less than the reporting limit. Therefore, the estimated concentrations of chromium and zinc in the associated samples that are less than the reporting limit are U qualified as not detected at the reporting limit.

Field blank OU1-GW-MW405-090814 had the following metals detected at concentrations greater than the reporting limits: barium, cadmium, calcium, cobalt, copper, lead, magnesium, manganese, nickel, potassium, selenium, sodium and zinc. In addition, selenium was detected at an estimated concentration and iron was detected at an estimated concentration less than the reporting limit and greater than the IDL. Therefore, the concentrations of barium, cadmium, calcium, cobalt, copper, lead, magnesium, manganese, nickel, potassium, selenium, sodium and zinc in the associated samples that are less than ten times the field blank concentrations are J+ qualified as estimated with a high bias. The estimated concentrations of barium, cadmium, calcium, cobalt, copper, lead, magnesium, manganese, nickel, potassium, selenium, sodium and zinc that are less than the reporting limit are U qualified as not detected at the reporting limit. The estimated concentrations of iron in the associated samples that are less than the RL but greater than the IDL are U qualified as not detected at the reporting limit. The estimated concentrations of selenium and the estimated concentrations of selenium that are less than the reporting limit but greater than the IDL are U qualified as not detected at the reporting limit.

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-SW-LVR408-0908	Barium	87.0	87.0 J+
	Calcium	79600	79600 J+
	Copper	8.7 J	10.0 U
	Lead	1.5 J	10.0 U
	Magnesium	39500	39500 J+
	Manganese	55.0	55.0 J+
	Nickel	5.5 J	10.0 U
	Potassium	2880	2880 J+
	Sodium	29500	29500 J+
	Zinc	17.4 J	20.0 U
OU1-SW-LVR408-0908 DISS	Barium	82.9	82.9 J+
	Calcium	80300	80300 J+
	Chromium	7.8 J	10.0 U
	Copper	7.9 J	10.0 U
	Iron	93.4 J	100 U
	Magnesium	40300	40300 J+
	Manganese	34.3	34.3 J+
	Nickel	6.1 J	10.0 U
	Potassium	2840	2840 J+
	Sodium	30900	30900 J+
	Zinc	13.1 J	20.0 U
OU1-SW-LVR409-0908	Barium	80.3	80.3 J+
	Calcium	76800	76800 J+
	Chromium	5.6 J	10.0 U
	Copper	3.5 J	10.0 U
	Magnesium	38600	38600 J+
	Manganese	46.1	46.1 J+
	Nickel	4.7 J	4.7 J+
	Potassium	2830	2830 J+
	Selenium	1.1 J	20.0 U
	Sodium	31900	31900 J+
	Zinc	11.1 J	20.0 U
OU1-SW-LVR409-0908 DISS	Barium	75.8	75.8 J+
	Calcium	76800	76800 J+
	Cadmium	0.355 J	10.0 U
	Chromium	2.9 J	10.0 U
	Copper	4.3 J	10.0 U
	Iron	75.3 J	100 U
	Magnesium	38900	38900 J+
	Manganese	25.7	25.7 J+
	Nickel	4.8 J	10.0 U

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
	Potassium	2650	2650 J+
	Selenium	1.3 J	20.0 U
	Sodium	31900	31900 J+
	Zinc	10.9 J	20.0 U
OU1-SW-ASO411-090814	Barium	22.5	22.5 J+
	Cadmium	294	294 J+
	Calcium	40500	40500 J+
	Cobalt	1.3 J	10.0 U
	Copper	21.0	21.0 J+
	Iron	38.7 J	100 U
	Lead	77.9	77.9 J+
	Magnesium	60000	60000 J+
	Manganese	15.7	15.7 J+
	Nickel	67.6	67.6 J+
	Potassium	22900	22900 J+
	Selenium	12.6 J	20.0 U
	Sodium	30200	30200 J+
	Zinc	57900	57900 J+
OU1-SW-ASO411-090814 DISS	Barium	23.4	23.4 J+
	Calcium	419000	419000 J+
	Cadmium	300	300 J+
	Cobalt	1.3 J	10.0 U
	Copper	21.0	21.0 J+
	Iron	47.7 J	100 U
	Lead	77.7	77.7 J+
	Magnesium	60600	60600 J+
	Manganese	15.3	15.3 J+
	Nickel	67.2	67.2 J+
	Potassium	23200	23200 J+
	Selenium	12.8 J	20.0 U
	Sodium	30500	30500 J+
	Zinc	58000	58000 J+
OU1-GW-MW404-090814	Barium	24.1	24.1 J+
	Calcium	426000	426000 J+
	Cadmium	305	305 J+
	Cobalt	1.3 J	10.0 U
	Copper	21.4	21.4 J+
	Iron	40.6 J	100 U
	Lead	79.1	79.1 J+
	Magnesium	59700	59700 J+
	Manganese	15.3	15.3 J+

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
	Nickel	70.0	70.0 J+
	Potassium	23500	23500 J+
	Selenium	13.0 J	20.0 U
	Sodium	30900	30900 J+
	Zinc	55500	55500 J+
OU1-GW-MW404-090814 DISS	Barium	0.180 J	10.0 U
	Calcium	182 J	1000 U
	Cadmium	0.384 J	10.0 U
	Chromium	3.1 J	10.0 U
	Cobalt	0.133 J	10.0 U
	Copper	1.1 J	10.0 U
	Iron	39.4 J	100 U
	Manganese	0.591 J	10.0 U
	Zinc	21.0	21.0 J+

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SE-LVR406-0908	Cadmium	10.5	10.5 J+
	Calcium	30300	30300 J+
	Magnesium	6.2	6.2 J+
	Manganese	7060	7060 J+
	Nickel	35.5	35.5 J+
	Potassium	1970	1970 J+
	Selenium	0.538 J	0.715 U
	Sodium	147	147 J+
	Zinc	4340	4340 J+
OU1-SE-LVR407-0908	Cadmium	8.4	8.4 J+
	Calcium	16300	16300 J+
	Copper	17.4	17.4 J+
	Lead	16.3	16.3 J+
	Magnesium	6630	6630 J+
	Manganese	667	667 J+
	Nickel	18.1	18.1 J+
	Potassium	1320	1320 J+
	Selenium	0.701 J	0.734 U
	Zinc	1760	1760 J+
OU1-SE-LVR408-0908	Cadmium	1.3	1.3 J+
	Calcium	17800	17800 J+
	Copper	10.4	10.4 J+
	Lead	16.5	16.5 J+
	Magnesium	6360	6360 J+

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
	Nickel	10.9	10.9 J+
	Potassium	565	565 J+
	Selenium	0.288 J	0.687 U
	Zinc	116	116 J+
OU1-SE-LVR409-0908	Cadmium	0.713	0.713 J+
	Calcium	18700	18700 J+
	Copper	6.5	6.5 J+
	Lead	8.6	8.6 J+
	Magnesium	6060	6060 J+
	Nickel	7.0	7.0 J+
	Potassium	406	406 J+
	Selenium	0.285 J	0.602 U
	Zinc	97.7	97.7 J+

Filter blank OU1-GW-MW403-090814 had calcium, iron, manganese and zinc detected at an estimated concentration less than the reporting limit and greater than the IDL. Chromium and copper were also detected at estimated concentrations in filter blank OU1-GW-MW403-090814. However, since the samples are qualified based on the field blank concentrations, no additional sample qualifications are required for chromium and copper calcium, iron, manganese and zinc.

1.4 Laboratory Control Samples (LCS)

All percent recoveries in the soil and water LCSs were within the acceptance limits.

1.5 Matrix Spike (MS)

No specific samples from this data set were used for the soil MS sample. No information was provided on the batch QC sample results in the laboratory report.

Samples OU1-SW-ASO411-090814 and OU1-SW-ASO411-090814 Dissolved were analyzed as the water MS samples. The concentrations of cadmium, calcium, magnesium and zinc in the unspiked sample exceeded the spike concentration by a factor of four or greater; therefore, the spike recovery control limits do not apply and qualification of the data is not required. The recoveries of all other metals were within the laboratory recovery limits. Post digestion spikes were also analyzed with acceptable results.

1.6 Laboratory Duplicate Samples

No specific samples from this data set were used for the soil duplicate sample. No information was provided on the batch QC sample results in the laboratory report.

Samples OU1-SW-ASO411-090814 and OU1-SW-ASO411-090814 Dissolved were analyzed as the water duplicate samples. The results were within the laboratory acceptance limits for RPD.

1.7 Serial Dilutions

Samples OU1-SE-LVR406-0908 and OU1-SE-LVR409-0908 were analyzed as the soil serial dilution samples. The percent differences were within the laboratory acceptance criteria, with the following exception. The percent difference for magnesium was high and outside the laboratory acceptance limits for RPD in the serial dilution of OU1-SE-LVR406-0908. Therefore, the concentration of magnesium in sample OU1-SE-LVR406-0908 is J qualified as estimated.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SE-LVR406-0908	Magnesium	7060	7060 J

Samples OU1-SW-ASO411-090814 and OU1-SW-ASO411-090814 Dissolved were analyzed as the water serial dilution samples. The percent differences were within the laboratory acceptance criteria.

1.8 Total and Dissolved Results Comparison

The four water samples were analyzed for both total and dissolved metals. In most cases, the total metals concentrations were greater than or equal to the dissolved metals concentrations. However, for the samples and metals listed in the table below, the total metals concentrations are less than the dissolved metals concentrations.

Total Sample ID	Dissolved Sample ID	Metal	Total Concentration (ug/L)	Dissolved Concentration (ug/L)	% Difference
OU1-SW-LVR408-0908	OU1-SW-LVR408-0908 DISS	Nickel	5.5 J	6.1 J	NC
OU1-SW-LVR408-0908	OU1-SW-LVR408-0908 DISS	Magnesium	39500	40300	2
OU1-SW-LVR408-0908	OU1-SW-LVR408-0908 DISS	Mercury	ND	0.026 J	NC
OU1-SW-LVR408-0908	OU1-SW-LVR408-0908 DISS	Calcium	79600	80300	1
OU1-SW-LVR408-0908	OU1-SW-LVR408-0908 DISS	Sodium	29500	30900	5
OU1-SW-LVR409-0908	OU1-SW-LVR409-0908 DISS	Copper	3.5 J	4.3 J	NC
OU1-SW-LVR409-0908	OU1-SW-LVR409-0908 DISS	Selenium	1.1 J	1.3 J	NC
OU1-SW-LVR409-0908	OU1-SW-LVR409-0908 DISS	Nickel	4.7 J	4.8 J	NC
OU1-SW-LVR409-0908	OU1-SW-LVR409-0908 DISS	Magnesium	38600	38900	1
OU1-SW-	OU1-SW-LVR409-	Mercury	ND	0.032 J	NC

LVR409-0908	0908 DISS				
OU1-SW-LVR409-0908	OU1-SW-LVR409-0908 DISS	Cadmium	ND	0.355 J	NC
OU1-SW-ASO411-090814	OU1-SW-ASO411-090814 DISS	Iron	38.7 J	47.7 J	NC
OU1-SW-ASO411-090814	OU1-SW-ASO411-090814 DISS	Barium	22.5	23.4	4
OU1-SW-ASO411-090814	OU1-SW-ASO411-090814 DISS	Cadmium	294	300	2
OU1-SW-ASO411-090814	OU1-SW-ASO411-090814 DISS	Selenium	12.6 J	12.8 J	NC
OU1-SW-ASO411-090814	OU1-SW-ASO411-090814 DISS	Magnesium	60000	60600	1
OU1-SW-ASO411-090814	OU1-SW-ASO411-090814 DISS	Zinc	57900	58000	<1
OU1-SW-ASO411-090814	OU1-SW-ASO411-090814 DISS	Calcium	405000	419000	3
OU1-SW-ASO411-090814	OU1-SW-ASO411-090814 DISS	Potassium	22900	23200	1
OU1-SW-ASO411-090814	OU1-SW-ASO411-090814 DISS	Sodium	30200	30500	1
OU1-GW-MW404-090814	OU1-GW-MW404-090814 DISS	Chromium (total)	ND	3.1 J	NC

If both the total and dissolved concentrations are estimated (J qualified by the laboratory), the RPD between the total and dissolved concentrations are not calculable (NC) and not further qualification is added. In the cases where the total concentration is not detected (ND) and the dissolved concentration is estimated, the total undetected concentration is UJ qualified as estimated less than the detection limit and the dissolved concentration remains J qualified as estimated. For the metals concentrations that are not estimated and the RPDs are less than or equal to 10%, based on professional judgment, no sample qualifications are required. In cases where the RPD is >10%, both results are J qualified as estimated.

Total Sample ID	**Dissolved Sample ID**	**Metal**	**Validation Total Concentration (ug/L)**	**Validation Dissolved Concentration (ug/L)**
OU1-SW-LVR408-0908	OU1-SW-LVR408-0908 DISS	Mercury	0.0189 UJ	0.026 J
OU1-SW-LVR409-0908	OU1-SW-LVR409-0908 DISS	Mercury	0.0189 UJ	0.032 J
OU1-SW-LVR409-0908	OU1-SW-LVR409-0908 DISS	Cadmium	0.325 UJ	0.355 J
OU1-GW-MW404-090814	OU1-GW-MW404-090814 DISS	Chromium (total)	1.8 UJ	3.1 J

1.9 Field Duplicate

Two field duplicate samples (OU1-GW-MW404-090814 and OU1-GW-MW404-090814 Dissolved) were collected, prepared and measured with this data set. The RPD between the results was compared to a criterion of <40%. Acceptable precision was demonstrated for the field duplicate pair OU1-SW-ASO411-090814/ OU1-GW-MW404-090814.

Parent Sample ID	Field Duplicate Sample ID	Metals	Parent Conc.(ug/L)	Field Dup Conc (ug/L)	RPD
OU1-SW-ASO411-090814	OU1-GW-MW404-090814	Barium	22.5	24.1	7
OU1-SW-ASO411-090814	OU1-GW-MW404-090814	Calcium	405000	426000	5
OU1-SW-ASO411-090814	OU1-GW-MW404-090814	Iron	38.7 J	40.6 J	NC
OU1-SW-ASO411-090814	OU1-GW-MW404-090814	Zinc	57900	55500	4
OU1-SW-ASO411-090814	OU1-GW-MW404-090814	Cadmium	294	305	4
OU1-SW-ASO411-090814	OU1-GW-MW404-090814	Nickel	67.6	70	3
OU1-SW-ASO411-090814	OU1-GW-MW404-090814	Selenium	12.6 J	13 J	NC
OU1-SW-ASO411-090814	OU1-GW-MW404-090814	Potassium	22900	23500	3
OU1-SW-ASO411-090814	OU1-GW-MW404-090814	Manganese	15.7	15.3	3
OU1-SW-ASO411-090814	OU1-GW-MW404-090814	Sodium	30200	30900	2
OU1-SW-ASO411-090814	OU1-GW-MW404-090814	Copper	21	21.4	2
OU1-SW-ASO411-090814	OU1-GW-MW404-090814	Lead	77.9	79.1	2
OU1-SW-ASO411-090814	OU1-GW-MW404-090814	Magnesium	60000	59700	1
OU1-SW-ASO411-090814	OU1-GW-MW404-090814	Cobalt	1.3 J	1.3 J	NC
OU1-SW-ASO411-090814	OU1-GW-MW404-090814	Aluminum	ND	ND	0
OU1-SW-ASO411-090814	OU1-GW-MW404-090814	Antimony	ND	ND	0
OU1-SW-ASO411-090814	OU1-GW-MW404-090814	Arsenic	ND	ND	0
OU1-SW-ASO411-090814	OU1-GW-MW404-090814	Beryllium	ND	ND	0
OU1-SW-ASO411-090814	OU1-GW-MW404-090814	Chromium (total)	ND	ND	0
OU1-SW-ASO411-090814	OU1-GW-MW404-090814	Mercury	ND	ND	0

Parent Sample ID	Field Duplicate Sample ID	Metals	Parent Conc.(ug/L)	Field Dup Conc (ug/L)	RPD
OU1-SW-ASO411-090814	OU1-GW-MW404-090814	Silver	ND	ND	0
OU1-SW-ASO411-090814	OU1-GW-MW404-090814	Thallium	ND	ND	0
OU1-SW-ASO411-090814	OU1-GW-MW404-090814	Vanadium	ND	ND	0

Acceptable precision was not demonstrated for all of the metals in the field duplicate pair OU1-SW-ASO411-090814 DISS/ OU1-GW-MW404-090814 DISS; zinc, magnesium and potassium had RPD results >40%. The RPDs for calcium, cadmium, sodium, nickel, lead, barium, manganese and copper could not be calculated (NC) since one result was above the reporting limit and the other result was estimated. The concentrations for selenium in the duplicate pair were also not calculable, since one concentration was estimated and the other was not detected.

Parent Sample ID	Field Duplicate Sample ID	Metals	Parent Conc.(ug/L)	Field Dup Conc (ug/L)	RPD
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Zinc	58000	21	200
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Calcium	419000	182 J	NC
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Cadmium	300	0.384 J	NC
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Sodium	30500	98.9 J	NC
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Nickel	67.2	0.378 J	NC
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Lead	77.7	0.554 J	NC
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Barium	23.4	0.18 J	NC
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Manganese	15.3	0.591 J	NC
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Copper	21	1.1 J	NC

Parent Sample ID	Field Duplicate Sample ID	Metals	Parent Conc.(ug/L)	Field Dup Conc (ug/L)	RPD
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Cobalt	1.3 J	0.133 J	NC
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Iron	47.7 J	39.4 J	NC
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Magnesium	60600	ND	200
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Potassium	23200	ND	200
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Selenium	12.8 J	ND	NC
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Chromium (total)	ND	ND	0
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Aluminum	ND	ND	0
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Antimony	ND	ND	0
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Arsenic	ND	ND	0
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Beryllium	ND	ND	0
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Mercury	ND	ND	0
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Silver	ND	ND	0
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Thallium	ND	ND	0
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Vanadium	ND	ND	0

Therefore, the concentrations of zinc, magnesium, potassium, calcium, cadmium, sodium, nickel, lead, barium, manganese and copper are J qualified as estimated; the undetected concentration of selenium in OU1-GW-MW404-090814 DISS is UJ qualified as estimated less than the reporting limit.

Parent Sample ID	Field Duplicate Sample ID	Metals	Parent Validation Conc.(ug/L)	Field Dup Validation Conc (ug/L)
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Zinc	58000 J	21 J
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Calcium	419000 J	182 J
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Cadmium	300 J	0.384 J
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Sodium	30500 J	98.9 J
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Nickel	67.2 J	0.378 J
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Lead	77.7 J	0.554 J
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Barium	23.4 J	0.18 J
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Manganese	15.3 J	0.591 J
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Copper	21 J	1.1 J
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Selenium	12.8 J	0.555 UJ
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Magnesium	60600 J	9.8 UJ
OU1-SW-ASO411-090814 DISS	OU1-GW-MW404-090814 DISS	Potassium	23200 J	78.7 J

2.0 Hardness (SM 2340C), pH (EPA Method 9045) and Percent Solids (Modified Method 160.3)

The soil samples were analyzed for pH, (EPA Method 9045) and percent solids (EPA Modified Method 160.3); the water samples were analyzed for hardness (Standard Method 2340C). Tier II validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPs and the quality of the data reported. The following summarizes the results of this review. In addition, the percent solids data was reviewed and found to be acceptable.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Blanks
- ✓ Laboratory Control Sample

- ✓ Matrix Spike Sample
- ✓ Laboratory Duplicate Sample

2.1 Data Completeness

All analyses were performed as requested on the COC.

2.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

2.3 Preparation (Method) Blank

The preparation blank met the acceptance criteria for total solids and hardness.

2.4 Laboratory Control Sample (LCS)

The LCS recovery was within the acceptance criteria for hardness.

2.5 Matrix Spike (MS)

Sample OU1-SW-ASO411-090814 was analyzed as the matrix spike for hardness. The MS recovery was within the acceptance criteria for hardness.

.

2.6 Laboratory Duplicate Samples

Sample OU1-SW-ASO411-090814 was analyzed as the laboratory duplicate for hardness. The duplicate was within the acceptance criteria for hardness.

ATTACHMENT A
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by GeoSyntec's Data Review Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher that the concentration of the analyte in the sample due to bias attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower that the concentration of the analyte in the sample due to bias attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Geosyntec consultants

2240 Sutherland Avenue, Suite 107
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Memorandum

TO: Richard Berggreen

DATE: December 16, 2009

FROM: Geosyntec Consultants QA/QC Group

SITE: Mattheissen and Hegeler Zinc Company Site, OU1

SUBJECT: Summary of Tier II Validation of analytical results for CAS Report R0904599

Introduction
This report summarizes the findings of the Tier II validation of sixteen soil samples, fourteen water samples, four equipment blanks and two field blanks collected on behalf of the Mattheissen and Hegeler Zinc Company Site, OU1 project. These samples were collected on August 12-13, 2009. The samples were analyzed by Columbia Analytical Services, Inc. (CAS), Rochester, New York. The samples were analyzed for total and dissolved metals by EPA methods 6020 and 6010B, total and dissolved mercury by EPA method 7470A and 7471A, SPLP metals by EPA methods 1312, 6010B and 7470A, total hardness by Standard Method 2340C, pH by EPA method 9045D and total solids by EPA modified method 160.3.

The data were reviewed in accordance with the principles presented in *USEPA National Functional Guidelines for Laboratory Data Review, Inorganics* (EPA, 2004), and per the requirements of the QAPP, the laboratory standard operating procedures and the specified methods.

Data for the following samples were reviewed.

Lab ID	Client ID
R0904599-001	OU1-SE-LVR404C-0908
R0904599-002	OU1-SE-LVR404E-0908
R0904599-005	OU1-SE-LVR403C-0908
R0904599-006	OU1-SE-LVR403E-0908
R0904599-007	OU1-SE-LVR403W-0908
R0904599-008	OU1-GW-MW401A-090812
R0904599-010	OU1-GW-MW401B-090812
R0904599-011	OU1-GW-MW405-090812
R0904599-012	OU1-SW-LVR403C-0908

R0904599-013	OU1-SW-LVR403C-0908 DISSOLVED
R0904599-014	OU1-SW-LVR403W-0908
R0904599-015	OU1-SW-LVR403W-0908 DISSOLVED
R0904599-016	OU1-SW-LVR403E-0908
R0904599-017	OU1-SW-LVR403E-0908 DISSOLVED
R0904599-018	OU1-SE-LVR402E-0908
R0904599-019	OU1-SE-LVR402E-0908 DISSOLVED
R0904599-020	OU1-SW-LVR402W-0908
R0904599-021	OU1-SW-LVR402W-0908 DISSOLVED
R0904599-022	OU1-SW-LVR402C-0908
R0904599-023	OU1-SW-LVR402C-0908 DISSOLVED
R0904599-024	OU1-SE-LVR402E-0908
R0904599-025	OU1-SE-LVR402C-0908
R0904599-026	OU1-SE-LVR402W-0908
R0904599-027	OU1-SW-ASO411-090812
R0904599-028	OU1-SW-ASO411-090812 DISSOLVED
R0904599-029	OU1-SW-LVR404C-0908
R0904599-030	OU1-SW-LVR404C-0908 DISSOLVED
R0904599-031	OU1-SW-LVR404E-0908
R0904599-032	OU1-SW-LVR404E-0908 DISSOLVED
R0904599-033	OU1-SW-LVR404W-0908
R0904599-034	OU1-SW-LVR404W-0908 DISSOLVED
R0904599-035	OU1-SW-ASO411-090813
R0904599-036	OU1-SW-ASO411-090813 DISSOLVED
R0904599-037	OU1-SW-LVR405C-0908
R0904599-038	OU1-SW-LVR405C-0908 DISSOLVED
R0904599-039	OU1-SW-LVR405E-0908
R0904599-040	OU1-SW-LVR405E-0908 DISSOLVED
R0904599-041	OU1-GW-MW405-090813
R0904599-042	OU1-GW-MW401A-090813
R0904599-043	OU1-GW-MW401B -090813
R0904599-044	OU1-SS-SLP415S-0908
R0904599-045	OU1-SS-SLP415T-0908
R0904599-046	OU1-SE-LVR405W-0908
R0904599-047	OU1-SE-LVR405C-0908
R0904599-048	OU1-SE-LVR405E-0908
R0904599-049	OU1-SW-LVR405W-0908
R0904599-050	OU1-SW-LVR405W-0908 DISSOLVED
R0904599-051	OU1-SE-LVR404W-0908
R0904599-052	OU1-SS-LRS413S-0908
R0904599-053	OU1-SS-LRS413T-0908

Matrix – water and soil

Executive Summary

All analyses were performed as requested on the chain of custody (COC).

The laboratory report had the wrong sample ID on the CAS ASP/CLP Batching Form/Login Sheet (page 6 of the data package) for sample R0904599-028. The correct sample ID listed on the COC is OU1-SW-ASO411-090812 DISSOLVED. In addition, results for this sample were not included in the laboratory report. The laboratory emailed the corrected page 6 and the results for sample R0904599-028. A revised laboratory report will be reissued.

The CAS Cooler Receipt and Preservation Check form indicated the following:

1. Samples OU1-GW-MW401B -090813, OU1-SW-LVR404W-0908, OU1-SW-LVR404E-0908 and OU1-SW-LVR403E-0908 were received at pH >2. Nitric acid was added to the samples by the laboratory.

All holding times were met.

1.0 Metals Analyses of Water Samples (EPA Methods 6020/6010B/7470A)

The water samples were analyzed for total and dissolved metals and mercury (EPA 6020/6010B/7470A) following metals and mercury digestion. Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPS and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ⊗ Blanks
- ✓ Laboratory Control Samples
- ⊗ Matrix Spike/Matrix Spike Duplicate Samples
- ✓ Laboratory Duplicate Samples
- ✓ Serial Dilutions
- ⊗ Total and Dissolved Results Comparison
- ✓ Field Duplicate Samples

1.1 Data Completeness

All analyses were performed as requested on the COC.

1.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

1.3 Blanks

1.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria, with the following exceptions. Barium, chromium, copper, lead, magnesium, manganese, nickel, sodium, antimony and zinc were detected in the method blanks at estimated concentrations less than the reporting limit and greater than the instrument

detection limit (IDL). Therefore, the associated samples with estimated concentrations of barium, chromium, copper, lead, magnesium, manganese, nickel, sodium, antimony and zinc less than the reporting limit and greater than the IDL are U qualified as not detected at the reporting limits.

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-GW-MW401A-090812	Lead	0.724 J	10.0 U
	Magnesium	57.2 J	1000 U
	Manganese	2.1 J	10.0 U
	Nickel	0.441 J	10.0 U
	Sodium	45.0 J	1000 U
	Zinc	7.1 J	20.0 U
OU1-GW-MW401B-090812	Copper	0.948 J	10.0 U
	Lead	0.269 J	10.0 U
	Magnesium	47.1 J	1000 U
	Manganese	1.1 J	10.0 U
	Nickel	0.436 J	10.0 U
	Sodium	31.0 J	1000 U
	Zinc	3.0 J	20.0 U
OU1-GW-MW405-090812	Magnesium	48.6 J	1000 U
	Manganese	0.810 J	10.0 U
	Nickel	0.740 J	10.0 U
	Sodium	16.1 J	1000 U
OU1-SW-LVR403C-0908 DISSOLVED	Lead	0.396 J	10.0 U
OU1-SW-LVR403W-0908 DISSOLVED	Lead	0.421 J	10.0 U
OU1-SW-LVR403E-0908 DISSOLVED	Lead	0.313 J	10.0 U
OU1-SE-LVR402E-0908 DISSOLVED	Lead	0.345 J	10.0 U
OU1-SW-LVR404E-0908 DISSOLVED	Lead	0.365 J	10.0 U
OU1-SW-LVR404W-0908	Chromium	2.6 J	20.0 U
OU1-SW-LVR404W-0908 DISSOLVED	Lead	0.282 J	10.0 U
OU1-SW-LVR405C-0908	Lead	0.701 J	10.0 U
OU1-SW-LVR405E-0908	Lead	0.596 J	10.0 U
OU1-GW-MW405-090813	Chromium	1.9 J	20.0 U
	Lead	0.258 J	10.0 U
	Magnesium	19.1 J	1000 U
	Sodium	39.1 J	1000 U
OU1-GW-MW401A-	Chromium	2.2 J	20.0 U

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
090813	Magnesium	52.2 J	1000 U
	Sodium	51.0 J	1000 U
OU1-GW-MW401B - 090813	Lead	0.270 J	10.0 U
	Sodium	31.6 J	1000 U
OU1-SW-LVR405W-0908	Lead	0.502 J	10.0 U

1.4.1 Field Blanks

The field blanks and equipment blanks met the acceptance criteria, with the following exceptions.

Barium and calcium were detected in equipment blank OU1-GW-MW401A-090812 and calcium was detected in equipment blank OU1-GW-MW401B-090812, all at estimated concentrations less than the reporting limit and greater than the IDL. The concentrations of barium and calcium in the associated samples are all greater than the reporting limit; therefore, no sample qualifications are required.

Copper and thallium were detected in equipment blank OU1-GW-MW401A-090812 at estimated concentrations. The estimated copper and thallium concentrations in the equipment blank resulted in qualifications at the reporting limits for copper and thallium in the associated samples (all samples analyzed at 10X dilutions); the concentrations in the associated samples greater than the reporting limits and less than ten times the equipment blank concentrations are J+ qualified as estimated with a high bias.

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-SW-LVR403C-0908	Copper	2.3 J	10.0 U
OU1-SW-LVR403C-0908 DISSOLVED	Copper	1.9 J	10.0 U
OU1-SW-LVR403W-0908	Copper	2.4 J	10.0 U
OU1-SW-LVR403W-0908 DISSOLVED	Copper	1.8 J	10.0 U
OU1-SW-LVR403E-0908	Copper	2.1 J	10.0 U
OU1-SW-LVR403E-0908 DISSOLVED	Copper	1.8 J	10.0 U
OU1-SE-LVR402E-0908	Copper	2.6 J	10.0 U
OU1-SE-LVR402E-0908 DISSOLVED	Copper	2.2 J	10.0 U

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-SW-LVR402W-0908	Copper	2.3 J	10.0 U
OU1-SW-LVR402W-0908 DISSOLVED	Copper	1.7 J	10.0 U
OU1-SW-LVR402C-0908	Copper	2.2 J	10.0 U
OU1-SW-LVR402C-0908 DISSOLVED	Copper	2.4 J	10.0 U
OU1-SW-LVR404C-0908	Copper	2.3 J	10.0 U
OU1-SW-LVR404C-0908 DISSOLVED	Copper	2.2 J	10.0 U
OU1-SW-LVR404E-0908	Copper	2.2 J	10.0 U
OU1-SW-LVR404E-0908 DISSOLVED	Copper	2.4 J	10.0 U
	Thallium	1.7 J	10.0 U
OU1-SW-LVR404W-0908	Copper	2.9 J	10.0 U
OU1-SW-LVR404W-0908 DISSOLVED	Copper	1.7 J	10.0 U

Calcium and manganese were detected in field blank OU1-GW-MW405-090813 at estimated concentrations less than the reporting limit and greater than the IDL. No sample qualifications were required since the calcium and manganese concentrations in the associated samples are greater than the reporting limits.

Copper was detected in equipment blank OU1-GW-MW401B-090813 at an estimated concentration. The estimated copper concentration in the equipment blank resulted in qualification at the reporting limit for copper in the associated samples that also had copper reported at estimated concentrations (all samples analyzed at 10X dilutions).

Barium, calcium, and cobalt were detected in equipment blank OU1-GW-MW401A-090813 at estimated concentrations less than the reporting limits and greater than the IDL. Therefore, the estimated concentrations in the associated samples less than the reporting limit and greater than the IDL are U qualified as not detected at the reporting limit.

Copper and nickel were detected in equipment blank OU1-GW-MW401A-090813 at estimated concentrations. The estimated copper and nickel concentrations in the equipment blank resulted in elevated reporting limits for copper and nickel in the associated samples that also had copper and nickel reported at estimated concentrations (all samples analyzed at 10X dilutions).

Iron, manganese and zinc were detected in equipment blank OU1-GW-MW401A-090813 at concentrations greater than the reporting limits. Therefore, the estimated iron, manganese and zinc concentrations less than the reporting limits and greater than the IDL in the associated samples are U qualified as not detected at the reporting limits; the

concentrations in the associated sample greater than the reporting limits and less than ten times the equipment blank concentrations are J+ qualified as estimated with a high bias.

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-SW-ASO411-090813	Iron	10.0 J	100 U
	Manganese	23.4	23.4 J+
OU1-SW-ASO411-090813 DISSOLVED	Manganese	24.6	24.6 J+
OU1-SW-LVR405C-0908	Cobalt	0.525 J	10.0 U
	Copper	1.9 J	10.0 U
	Iron	539	539 J+
	Manganese	52.7	52.7 J+
	Nickel	3.6 J	10.0 U
	Zinc	53.5	53.5 J+
OU1-SW-LVR405C-0908 DISSOLVED	Cobalt	0.329 J	10.0 U
	Copper	2.4 J	10.0 U
	Iron	16.4 J	100 U
	Manganese	33.4	33.4 J+
	Nickel	4.1	10.0 U
	Zinc	39.9	39.9 J+
OU1-SW-LVR405E-0908	Cobalt	0.502 J	10.0 U
	Copper	1.8 J	10.0 U
	Iron	438	438 J+
	Manganese	49.3	49.3 J+
	Nickel	3.6 J	10.0 U
	Zinc	35.9	35.9 J+
OU1-SW-LVR405E-0908 DISSOLVED	Cobalt	0.332 J	10.0 U
	Copper	3.2 J	10.0 U
	Iron	14.9 J	100 U
	Manganese	33.5	33.5 J+
	Nickel	4.0 J	10.0 U
	Zinc	39.7	39.7 J+
OU1-SW-LVR405W-0908	Cobalt	0.499 J	10.0 U
	Copper	1.8 J	10.0 U
	Iron	508	508 J+
	Manganese	51.0	51.0 J+
	Nickel	3.6 J	10.0 U
	Zinc	49.0	49.0 J+
OU1-SW-LVR405W-0908 DISSOLVED	Cobalt	0.342 J	10.0 U
	Copper	2.2 J	10.0 U
	Iron	16.0 J	100 U
	Manganese	31.0	31.0 J+

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
	Nickel	4.1 J	10.0 U
	Zinc	33.9	33.9 J+

1.4 Laboratory Control Samples (LCS)

All percent recoveries in the LCSs were within the acceptance limits.

1.5 Matrix Spike (MS)

Samples OU1-GW-MW401A-090812, OU1-GW-MW401B-090812, OU1-SW-LVR404E-0908 DISSOLVED, OU1-SW-LVR404W-0908, OU1-SW-LVR405C-0908, and OU1-GW-MW401A-090813 were analyzed as the matrix spikes; the compound recoveries were within the laboratory acceptance criteria, with the following exceptions. The spike recovery acceptance criteria do not apply for calcium and magnesium, since the concentrations of calcium and magnesium in the unspiked samples exceeded the spike concentration by a factor of four or greater. The recoveries of copper and lead in sample OU1-SW-LVR404W-0908 were high and outside the laboratory acceptance limits. Therefore, the concentrations of copper and lead in sample OU1-SW-LVR404W-0908 are J+ qualified as estimated with a high bias. In addition, the recovery of nickel in the MS of sample OU1-GW-MW401A-090813 was high and outside the laboratory acceptance limits. Therefore the concentration of nickel in sample OU1-GW-MW401A-090813 is J+ qualified as estimated with a high bias.

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-SW-LVR404W-0908	Copper	2.9 J	2.9 J+
	Lead	1.6 J	1.6 J+
OU1-GW-MW401A-090813	Nickel	4.9 J	4.9 J+

1.6 Laboratory Duplicate Samples

Samples OU1-GW-MW401A-090812, OU1-GW-MW401B-090812, OU1-SW-LVR404E-0908 DISSOLVED, OU1-SW-LVR404W-0908, OU1-SW-LVR405C-0908, and OU1-GW-MW401A-090813 were analyzed as the laboratory duplicates. The results for the laboratory duplicate samples were within the laboratory acceptance criteria.

1.7 Serial Dilutions

The percent differences for the compounds for the serial dilutions of samples OU1-GW-MW401A-090812, OU1-GW-MW401B-090812, OU1-SW-LVR404E-0908 DISSOLVED, OU1-SW-LVR404W-0908, OU1-SW-LVR405C-0908, and OU1-GW-MW401A-090813 were within of the laboratory acceptance criteria.

1.8 Total and Dissolved Results Comparison

The fourteen water samples were analyzed for both total and dissolved metals. In most cases, the total metals concentrations were greater than or equal to the dissolved metals concentrations. However, for the samples and metals listed in the table below, the total metals concentrations are less than the dissolved metals concentrations. If both the total and dissolved concentrations are estimated (J qualified by the laboratory), the RPD between the total and dissolved concentrations are not calculable (NC).

Total Sample ID	Dissolved Sample ID	Metal	Total Concen-tration (ug/L)	Dissolved Concen-tration (ug/L)	RPD
OU1-SW-LVR403C-0908	OU1-SW-LVR403C-0908 DISSOLVED	Sodium	37300	37500	1
OU1-SW-LVR403C-0908	OU1-SW-LVR403C-0908 DISSOLVED	Mercury	ND	0.044 J	NC
OU1-SW-LVR403W-0908	OU1-SW-LVR403W-0908 DISSOLVED	Magnesium	37600	37800	1
OU1-SW-LVR403W-0908	OU1-SW-LVR403W-0908 DISSOLVED	Calcium	81800	86300	5
OU1-SW-LVR403W-0908	OU1-SW-LVR403W-0908 DISSOLVED	Sodium	36900	38800	5
OU1-SW-LVR403E-0908	OU1-SW-LVR403E-0908 DISSOLVED	Mercury	ND	0.039 J	NC
OU1-SW-LVR403E-0908	OU1-SW-LVR403E-0908 DISSOLVED	Calcium	80400	85600	6
OU1-SW-LVR403E-0908	OU1-SW-LVR403E-0908 DISSOLVED	Potassium	3340	3430	3
OU1-SW-LVR403E-0908	OU1-SW-LVR403E-0908 DISSOLVED	Sodium	36300	38900	7
OU1-SW-LVR402W-0908	OU1-SW-LVR402W-0908 DISSOLVED	Mercury	ND	0.022 J	NC
OU1-SW-LVR402W-0908	OU1-SW-LVR402W-0908 DISSOLVED	Potassium	3320	3470	4
OU1-SW-LVR402W-0908	OU1-SW-LVR402W-0908 DISSOLVED	Sodium	35700	36400	2
OU1-SW-LVR402C-0908	OU1-SW-LVR402C-0908 DISSOLVED	Nickel	4.2 J	5.0 J	NC
OU1-SW-LVR402C-0908	OU1-SW-LVR402C-0908 DISSOLVED	Copper	2.2 J	2.4 J	NC
OU1-SW-LVR402C-0908	OU1-SW-LVR402C-0908 DISSOLVED	Cobalt	0.619 J	0.649 J	NC
OU1-SW-LVR402C-0908	OU1-SW-LVR402C-0908 DISSOLVED	Sodium	36600	36800	1
OU1-SW-ASO411-090812	OU1-SW-ASO411-090812 DISSOLVED	Cobalt	1.3 J	1.4 J	NC
OU1-SW-ASO411-090812	OU1-SW-ASO411-090812 DISSOLVED	Barium	22.8	23.6	4
OU1-SW-ASO411-	OU1-SW-ASO411-090812	Selenium	11.4 J	11.5 J	NC

Total Sample ID	Dissolved Sample ID	Metal	Total Concen-tration (ug/L)	Dissolved Concen-tration (ug/L)	RPD
090812	DISSOLVED				
OU1-SW-ASO411-090812	OU1-SW-ASO411-090812 DISSOLVED	Manganese	27.1	27.3	1
OU1-SW-ASO411-090812	OU1-SW-ASO411-090812 DISSOLVED	Zinc	62200	62300	0
OU1-SW-LVR404C-0908	OU1-SW-LVR404C-0908 DISSOLVED	Magnesium	38200	39000	2
OU1-SW-LVR404C-0908	OU1-SW-LVR404C-0908 DISSOLVED	Calcium	84200	85000	1
OU1-SW-LVR404C-0908	OU1-SW-LVR404C-0908 DISSOLVED	Sodium	35000	35500	1
OU1-SW-LVR404E-0908	OU1-SW-LVR404E-0908 DISSOLVED	Nickel	4.1 J	8.7 J	NC
OU1-SW-LVR404E-0908	OU1-SW-LVR404E-0908 DISSOLVED	Copper	2.2 J	2.4 J	NC
OU1-SW-LVR404W-0908	OU1-SW-LVR404W-0908 DISSOLVED	Selenium	0.803 J	0.956 J	NC
OU1-SW-LVR404W-0908	OU1-SW-LVR404W-0908 DISSOLVED	Magnesium	37600	38100	1
OU1-SW-LVR404W-0908	OU1-SW-LVR404W-0908 DISSOLVED	Calcium	82800	83400	1
OU1-SW-LVR404W-0908	OU1-SW-LVR404W-0908 DISSOLVED	Sodium	34300	35000	2
OU1-SW-ASO411-090813	OU1-SW-ASO411-090813 DISSOLVED	Manganese	23.4	24.6	5
OU1-SW-ASO411-090813	OU1-SW-ASO411-090813 DISSOLVED	Magnesium	53800	55900	4
OU1-SW-ASO411-090813	OU1-SW-ASO411-090813 DISSOLVED	Potassium	22800	24200	6
OU1-SW-ASO411-090813	OU1-SW-ASO411-090813 DISSOLVED	Sodium	31200	32600	4
OU1-SW-LVR405C-0908	OU1-SW-LVR405C-0908 DISSOLVED	Mercury	0.019 J	0.035 J	NC
OU1-SW-LVR405C-0908	OU1-SW-LVR405C-0908 DISSOLVED	Copper	1.9 J	2.4 J	NC
OU1-SW-LVR405C-0908	OU1-SW-LVR405C-0908 DISSOLVED	Nickel	3.6 J	4.1 J	NC
OU1-SW-LVR405C-0908	OU1-SW-LVR405C-0908 DISSOLVED	Selenium	0.669 J	0.757 J	NC
OU1-SW-LVR405C-0908	OU1-SW-LVR405C-0908 DISSOLVED	Magnesium	37300	39700	6
OU1-SW-LVR405C-0908	OU1-SW-LVR405C-0908 DISSOLVED	Calcium	80600	83700	4
OU1-SW-LVR405C-0908	OU1-SW-LVR405C-0908 DISSOLVED	Potassium	2950	2990	1
OU1-SW-LVR405C-0908	OU1-SW-LVR405C-0908	Sodium	31800	33600	6

Total Sample ID	Dissolved Sample ID	Metal	Total Concen-tration (ug/L)	Dissolved Concen-tration (ug/L)	RPD
	DISSOLVED				
OU1-SW-LVR405E-0908	OU1-SW-LVR405E-0908 DISSOLVED	Copper	1.8 J	3.2 J	NC
OU1-SW-LVR405E-0908	OU1-SW-LVR405E-0908 DISSOLVED	Mercury	0.02 J	0.031 J	NC
OU1-SW-LVR405E-0908	OU1-SW-LVR405E-0908 DISSOLVED	Selenium	0.834 J	0.968 J	NC
OU1-SW-LVR405E-0908	OU1-SW-LVR405E-0908 DISSOLVED	Nickel	3.6 J	4.0 J	NC
OU1-SW-LVR405E-0908	OU1-SW-LVR405E-0908 DISSOLVED	Zinc	35.9	39.7	10
OU1-SW-LVR405E-0908	OU1-SW-LVR405E-0908 DISSOLVED	Sodium	32500	32600	<1
OU1-SW-LVR405W-0908	OU1-SW-LVR405W-0908 DISSOLVED	Selenium	0.676 J	0.786 J	NC
OU1-SW-LVR405W-0908	OU1-SW-LVR405W-0908 DISSOLVED	Nickel	3.6 J	4.1 J	NC
OU1-SW-LVR405W-0908	OU1-SW-LVR405W-0908 DISSOLVED	Chromium (total)	2 J	2.1 J	NC

In the cases where the total concentration is not detected (ND) and the dissolved concentration is estimated, the total undetected concentration is UJ qualified as estimated less than the detection limit and the dissolved concentration remains J qualified as estimated. For the metals concentrations that are not estimated and the RPDs are less than or equal to 10%, based on professional judgment, no sample qualifications are required. In cases where the RPD is >10%, both results are J qualified as estimated.

Total Sample ID	Dissolved Sample ID	Metal	Validation Total Concen-tration (ug/L)	Validation Dissolved Concentration (ug/L)
OU1-SW-LVR403C-0908	OU1-SW-LVR403C-0908 DISSOLVED	Mercury	0.019 UJ	0.044 J
OU1-SW-LVR403E-0908	OU1-SW-LVR403E-0908 DISSOLVED	Mercury	0.019 UJ	0.039 J
OU1-SW-LVR402W-0908	OU1-SW-LVR402W-0908 DISSOLVED	Mercury	0.019 UJ	0.022 J

1.9 Field Duplicate

No field duplicate samples were collected with this data set.

2.0 Metals Analyses of Soil Samples (EPA Methods 6020/6010B/7471A)

The soil samples were analyzed for the requested metals and mercury (EPA 6020/6010B/7471A) following metals and mercury digestion. Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPS and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ⊗ Internal Standards
- ✓ Holding Times and Preservation
- ⊗ Blanks
- ✓ Laboratory Control Samples
- ⊗ Matrix Spike/Matrix Spike Duplicate Samples
- ⊗ Laboratory Duplicate Samples
- ⊗ Serial Dilutions

2.1 Data Completeness

All analyses were performed as requested on the COC.

2.2 Internal Standards

The internal standard recoveries are not part of the Level II data package; however, the report narrative indicated that the internal standard recoveries for Sc were high and outside the laboratory acceptance criteria in samples OU1-SE-LVR405W-0908 and OU1-SE-LVR405C-0908. No qualifications are required for sample OU1-SE-LVR405C-0908 since the internal standard recovery in another dilution (two-fold dilution) of the sample was acceptable. A two-fold dilution of sample OU1-SE-LVR405W-0908 was not analyzed; therefore, the concentrations of the detected metals analyzed by ICP-MS (method 6020) in sample OU1-SE-LVR405W-0908 are J qualified as estimated.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SE-LVR405W-0908	Beryllium	0.518 J	0.518 J
	Chromium (total)	9.6	9.6 J
	Vanadium	19.3	19.3 J
	Lead	14.7	14.7 J
	Nickel	16.1	16.1 J
	Thallium	0.461	0.461 J
	Arsenic	9.6	9.6 J
	Barium	77	77 J
	Cadmium	1.5	1.5 J
	Cobalt	7.4	7.4 J
	Copper	10.8	10.8 J
	Selenium	0.458 J	0.458 J

2.3 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

2.4 Blanks

2.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria, with the following exceptions. Chromium, iron, magnesium, nickel and sodium were detected in the method blank at estimated concentrations less than the reporting limit and greater than the IDL. However, since the concentrations of chromium, iron, magnesium, nickel and sodium in the associated samples are greater than the reporting limits, no sample qualifications are required.

2.4.1 Field Blanks

Barium and calcium were detected in equipment blank OU1-GW-MW401A-090812 and calcium was detected in equipment blank OU1-GW-MW401B-090812, all at estimated concentrations less than the reporting limit and greater than the IDL. The concentrations of barium and calcium in the associated samples are all greater than the reporting limit; therefore, no sample qualifications are required.

Copper and thallium were detected in equipment blank OU1-GW-MW401A-090812 at estimated concentrations. The copper concentrations in the associated samples are all greater than ten times the equipment blank concentration (not estimated concentrations); therefore, no copper qualifications are required. The estimated thallium concentration in the associated samples listed below are all less than the reporting limit and greater than the IDL; therefore, the thallium concentrations in the associated samples are U qualified as not detected at the reporting limit.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SE-LVR404C-0908	Thallium	0.050 J	0.112 U
OU1-SE-LVR404E-0908		0.046 J	0.119 U
OU1-SE-LVR403C-0908		0.067 J	0.114 U
OU1-SE-LVR403E-0908		0.045 J	0.120 U
OU1-SE-LVR403W-0908		0.064 J	0.118 U
OU1-SE-LVR402C-0908		0.074 J	0.125 U
OU1-SE-LVR402W-0908		0.121 J	0.121 U
OU1-SE-LVR404W-0908		0.034 J	0.116 U

Calcium and manganese were detected in field blank OU1-GW-MW405-090813 at estimated concentrations less than the reporting limit and greater than the IDL. No sample qualifications were required since the calcium and manganese concentrations in the associated samples are greater than the reporting limits.

Copper was detected in equipment blank OU1-GW-MW401B-090813 at an estimated concentration. The copper concentrations in the associated samples are all greater than ten times the equipment blank concentrations (not estimated concentrations); therefore, no copper qualifications are required.

Barium, calcium and cobalt were detected in equipment blank OU1-GW-MW401A-090813 at estimated concentrations less than the reporting limits and greater than the IDL. The barium, calcium and cobalt concentrations in the associated samples are all greater than the reporting limits; therefore, no barium, calcium and cobalt qualifications are required.

Copper and nickel were detected in equipment blank OU1-GW-MW401A-090813 at estimated concentrations. The copper and nickel concentrations in the associated samples are all greater than ten times the equipment blank concentrations (not estimated concentrations); therefore, no copper and nickel qualifications are required.

Iron, manganese and zinc were detected in equipment blank OU1-GW-MW401A-090813 at concentrations greater than the reporting limits. However, the iron, manganese and zinc concentrations in the associated samples are greater than ten times the equipment blank concentrations; therefore, no sample qualifications are required.

2.5 Laboratory Control Samples (LCS)

All percent recoveries in the LCSs were within the acceptance limits.

2.6 Matrix Spike (MS)

Samples OU1-SE-LVR404C-0908 and OU1-SE-LVR404E-0908 were analyzed as the matrix spikes; the compound recoveries were within the laboratory acceptance criteria, with the following exceptions. The spike recovery acceptance criteria do not apply in sample OU1-SE-LVR404C-0908 for barium, copper, lead, nickel and vanadium since the concentrations of barium, copper, lead, nickel and vanadium in the unspiked sample exceeded the spike concentration by a factor of four or greater. The recovery of mercury was high and outside the laboratory control limit. However, since mercury was not detected in sample OU1-SE-LVR404C-0908, no sample qualifications are required. In addition, the recoveries of arsenic, cadmium, chromium, cobalt and selenium were outside the laboratory acceptance criteria. Therefore, the concentrations of arsenic, cadmium, chromium, cobalt and selenium are J+ (for high recoveries) or J- (for low recoveries) qualified as estimated with high bias or low bias, respectively.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SE-LVR404C-	Arsenic	6.2	6.2 J+

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
0908	Cadmium	2.6	2.6 J-
	Chromium	3.4	3.4 J+
	Cobalt	5.2	5.2 J+
	Selenium	0.288 J	0.288 J-

The spike recovery acceptance criteria do not apply in sample OU1-SE-LVR404E-0908 for aluminum, calcium, iron, magnesium manganese and zinc since the concentrations of aluminum, calcium, iron, magnesium manganese and zinc in the unspiked sample exceeded the spike concentration by a factor of four or greater. The recovery of silver was low and outside the laboratory acceptance criteria. Therefore, the concentration of silver in sample OU1-SE-LVR404E-0908 is J- qualified as estimated with a low bias.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SE-LVR404E-0908	Silver	7.7	7.7 J-

2.7 Laboratory Duplicate Samples

Samples OU1-SE-LVR404C-0908 and OU1-SE-LVR404E-0908 were analyzed as the laboratory duplicates. The RPD results were acceptable, with the following exceptions.

The RPD duplicate results for sample OU1-SE-LVR404C-0908 for arsenic, barium, copper, lead and vanadium were high and outside the laboratory acceptance criteria. Therefore, the concentrations of arsenic, barium, copper, lead and vanadium in the sample are J qualified as estimated.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SE-LVR404C-0908	Arsenic	6.2	6.2 J
	Barium	72.6	72.6 J
	Copper	91.0	91.0 J
	Lead	34.1	34.1 J
	Vanadium	11.6	11.6 J

The RPD duplicate results for sample OU1-SE-LVR404E-0908 for silver, calcium, iron, magnesium, manganese and zinc were high and outside the laboratory acceptance criteria. Therefore, the concentrations of silver, calcium, iron, magnesium, manganese and zinc in sample OU1-SE-LVR404E-0908 are J qualified as estimated.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SE-LVR404E-0908	Silver	7.7	7.7 J
	Calcium	59900	59900 J
	Iron	19800	19800 J
	Magnesium	20000	20000 J
	Manganese	671	671 J
	Zinc	2770	2770 J

2.8 Serial Dilutions

The percent differences for the compounds for the serial dilutions of samples OU1-SE-LVR404C-0908 and OU1-SE-LVR404E-0908 were within of the laboratory acceptance criteria, with the following exception. The serial dilution of sample OU1-SE-LVR404C-0908 was outside the laboratory acceptance limits for copper. Therefore, the concentration of copper in sample OU1-SE-LVR404C-0908 remains J qualified as estimated.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SE-LVR404C-0908	Copper	0.556 J	0.556 J

3.0 SPLP Metals Analyses (EPA Methods 1312/6010B/7470A)

The soil samples were analyzed for the requested SPLP metals and mercury (EPA 6020/6010B/7470A) following SPLP digestion. Tier II validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPS and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Data Completeness
✓ Holding Times and Preservation
⊗ Blanks
✓ Laboratory Control Samples
✓ Matrix Spike/Matrix Spike Duplicate Samples
✓ Laboratory Duplicate Samples
⊗ Serial Dilutions

3.1 Data Completeness

All analyses were performed as requested on the COC.

3.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

3.3 Blanks

3.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria, with the following exceptions. Barium, chromium, magnesium, manganese and sodium were detected in the method blank at estimated concentrations less than the reporting limit and greater than the IDL. Therefore, the associated samples with estimated concentrations less than the reporting limit and greater than the IDL are U qualified as not detected at the reporting limits.

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-SS-LRS413S-0908	Chromium	3.3 J	10 U
OU1-SS-LRS413T-0908	Chromium	2.1 J	10 U
	Manganese	1.6 J	10 U
OU1-SS-SLP415S-0908	Chromium	1.0 J	10 U
	Magnesium	621 J	1000 U
OU1-SS-SLP415T-0908	Chromium	1.5 J	10 U
	Magnesium	401 J	1000 U

3.4 Laboratory Control Samples (LCS)

All percent recoveries in the LCSs were within the acceptance limits.

3.5 Matrix Spike (MS)

Sample OU1-SS-SLP415S-0908 was analyzed as the matrix spike; the compound recoveries were within the laboratory acceptance criteria.

3.6 Laboratory Duplicate Samples

Sample OU1-SS-SLP415S-0908 was analyzed as the laboratory duplicate. All RPD results were acceptable.

3.7 Serial Dilutions

The percent differences for the compounds for the serial dilutions of sample OU1-SS-SLP415S-0908 were within of the laboratory acceptance criteria, with the exception of barium and magnesium. The concentration of magnesium in sample OU1-SS-SLP415S-0908 is U qualified as not detected due to the method blank results; no additional qualification is required. However, the concentration of barium in sample OU1-SS-SLP415S-0908 is J qualified as estimated.

Sample ID	Compound	Laboratory Result (mg/L)	Validation Result (mg/L)
OU1-SS-SLP415S-0908	Barium	48.4	48.4 J

4.0 Total Hardness by Standard Method 2340C, pH by EPA method 9045D and total solids by EPA modified method 160.3

The water samples were analyzed for total hardness by Standard Method 2340C and the soil samples were analyzed for pH by EPA method 9045D and total solids by EPA modified method 160.3. Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPS and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Blanks
- ✓ Laboratory Control Samples
- ✓ Matrix Spike Samples
- ✓ Laboratory Duplicate Samples

4.1 Data Completeness

All analyses were performed as requested on the COC.

4.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

4.3 Blanks

4.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria

4.4.1 Field Blanks

The field blanks and equipment blanks met the acceptance criteria.

4.4 Laboratory Control Samples (LCS)

The percent recovery in the hardness LCS was within the laboratory acceptance limits.

4.5 Matrix Spike (MS)

Samples OU1-SW-LVR403C-0908, OU1-SW-LVR402C-0908 and OU1-SW-LVR405W-0908 were analyzed as the hardness matrix spikes; the recoveries were within the laboratory acceptance criteria.

4.6 Laboratory Duplicate Samples

Samples OU1-SW-LVR403C-0908, OU1-SW-LVR402C-0908 and OU1-SW-LVR405W-0908 were analyzed as the hardness laboratory duplicates; the results were within the laboratory acceptance criteria.

ATTACHMENT A
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by GeoSyntec's Data Review Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher that the concentration of the analyte in the sample due to bias attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower that the concentration of the analyte in the sample due to bias attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Geosyntec consultants

2240 Sutherland Avenue, Suite 107
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Memorandum

TO: Richard Berggreen

DATE: December 16, 2009

FROM: Geosyntec Consultants QA/QC Group

SITE: Mattheissen and Hegeler Zinc Company Site, OU1

SUBJECT: Summary of Tier II Validation of analytical results for CAS Report R0904518

Introduction
This report summarizes the findings of the Tier II validation of six soil samples, nine water samples, one equipment blank, two field blanks and one filter blank collected on behalf of the Mattheissen and Hegeler Zinc Company Site, OU1 project. These samples were collected on August 10-11, 2009. The samples were analyzed by Columbia Analytical Services, Inc. (CAS), Rochester, New York and Jacksonville, Florida. The samples were analyzed at CAS Rochester, NY for total and dissolved metals by EPA Methods 6020 and 6010B, mercury by EPA Methods 7470A and 7471A, hardness by Standard Methods 2340C, pH by EPA Method 9045D and percent solids by Modified EPA Method 160.3. The samples were analyzed at CAS Jacksonville, FL for metals by EPA Methods 6020 and 6010B and mercury by EPA Methods 7470A following SPLP extraction by EPA method 1312.

The data were reviewed in accordance with the principles presented in *USEPA National Functional Guidelines for Laboratory Data Review, Inorganics* (EPA, 2004), and per the requirements of the QAPP, the laboratory standard operating procedures and the specified methods.

Data for the following samples were reviewed.

CAS Job No.	Client ID
R0904518-001	OU1-SW-LVR401C-0908
R0904518-002	OU1-SW-LVR401C-0908 DISSOLVED
R0904518-003	OU1-SW-LVR401E-0908
R0904518-004	OU1-SW-LVR401E-0908 DISSOLVED
R0904518-005	OU1-SW-LVR401W-0908
R0904518-006	OU1-SW-LVR401W-0908 DISSOLVED
R0904518-007	OU1-GW-MW404-0908

R0904518-008	OU1-GW-MW404-0908 DISSOLVED
R0904518-009	OU1-SS-LRS412S-0908
R0904518-010	OU1-SS-LRS412T-0908
R0904518-011	OU1-SE-LVR401C-0908
R0904518-012	OU1-SE-LVR401W-0908
R0904518-013	OU1-SW-CS0410-090810
R0904518-014	OU1-SW-CS0410-090810 DISSOLVED
R0904518-015	OU1-GW-MW405-0908
R0904518-016	OU1-GW-MW403-0908
R0904518-017	OU1-GW-MW401-0908
R0904518-018	OU1-GW-MW401A-0908 DISSOLVED
R0904518-019	OU1-GW-MW401B-0908
R0904518-020	OU1-GW-MW405-0908
R0904518-021	OU1-SE-LVR401E-0908
R0904518-022	OU1-SS-SB406-0908
R0904518-023	OU1-SS-SB406-0908
R0904518-024	OU1-SW-ASO411-0908
R0904518-025	OU1-SW-ASO411-0908 DISSOLVED
R0904518-026	OU1-SW-CS0410-0908
R0904518-027	OU1-SW-CS0410-0908 DISSOLVED

Matrix – soil and water

Executive Summary

All analyses were performed as requested on the chain of custody (COC), with the following exceptions.

Samples OU1-SW-ASO411-0908, OU1-SW-ASO411-0908 DISSOLVED, OU1-SW-CS0410-0908 and OU1-SW-CS0410-0908 DISSOLVED were received at the CAS Rochester, NY laboratory, but were not listed on the COC. The samples were analyzed for total and dissolved metals, total and dissolved mercury and hardness, based on the analyses listed on the sample labels. These analyses were later confirmed by Joey McKinnon of Geosyntec Consultants.

The COC sent from CAS Rochester, NY to CAS Jacksonville, FL lists total solids by EPA modified method 160.3 for samples OU1-SS-LRS412S-0908, OU1-SS-LRS412T-0908 and OU1-SS-SB406-0908. This analysis was not listed on the original COC sent from Geosyntec Consultants to CAS and not requested by Geosynted. Therefore the total solids results for these three samples were not reported.

The CAS Cooler Receipt and Preservation Check form indicated the following:

1. Samples OU1-SW-LVR401W-0908, OU1-SW-LVR401E-0908 and OU1-GW-MW404-0908 were received at pH >2. Nitric acid was added to the samples by the laboratory.
2. The sample IDs listed on the COC for OU1-SW-CS0410-090810 and OU1-SW-CS0410-090810 DISSOLVED did not match the sample IDs on the labels (labels ended in 0908). The sample IDs from the COC were used.

3. The sample IDs listed on the COC for OU1-GW-MW403-0908 and OU1-GW-MW401-0908 did not match the sample IDs on the labels (labels ended in 090810). The sample IDs from the COC were used.
4. Samples OU1-SW-ASO411-0908, OU1-SW-ASO411-0908 DISSOLVED, OU1-SW-CS0410-0908 and OU1-SW-CS0410-0908 DISSOLVED were received at the laboratory, but were not listed on the COC. The samples were analyzed for total and dissolved metals and mercury per the sample labels.

All holding times were met.

1.0 Metals (EPA Methods 6020/6010B/7470A/74741A)

The soil and water samples were analyzed for the requested metals and mercury (EPA 6020/6010B/7470A/7471A) following total metals digestion and mercury digestion. Tier II validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPs and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Data Completeness
✓ Holding Times and Preservation
⊗ Blanks
✓ Laboratory Control Sample
⊗ Matrix Spike Sample
⊗ Laboratory Duplicate Sample
⊗ Serial Dilutions
⊗ Total and Dissolved Results Comparison
⊗ Field Duplicate

1.1 Data Completeness

All analyses were performed as requested on the COC. As noted above, samples OU1-SW-ASO411-0908, OU1-SW-ASO411-0908 DISSOLVED, OU1-SW-CS0410-0908 and OU1-SW-CS0410-0908 DISSOLVED were received at the laboratory, but were not listed on the COC. The samples were analyzed for total and dissolved metals, total and dissolved mercury and hardness.

1.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

1.3 Blanks

1.3.1 Preparation (Method) Blank

The soil preparation blank met the acceptance criteria with the following exceptions; chromium, iron, magnesium, nickel, antimony and sodium were

detected in the soil preparation blank at estimated concentrations less than the reporting limit (RL) but greater than the instrument detection limits (IDL). The concentrations of chromium, iron, magnesium and nickel in the associated samples were either not detected or greater than the RL; therefore, no sample qualifications were required for chromium, iron, magnesium and nickel. However, the estimated concentrations of antimony and sodium detected in the associated samples less than the RL but greater than the IDL are U qualified as not detected at the RL.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SE-LVR401E-0908	Antimony	0.533 J	6.8 U
	Sodium	64.6 J	114 U
OU1-SE-LVR401W-0908	Antimony	0.676 J	7.2 U
OU1-SS-SB406-0908	Antimony	0.532 J	6.4 U

The water preparation blank met the acceptance criteria with the following exceptions; chromium, copper, lead, magnesium and manganese were detected in the water preparation blank at estimated concentrations less than the RL, but greater than the IDL. Therefore, the estimated concentrations of chromium, copper, lead, magnesium and manganese detected in the associated samples less than the RL but greater than the IDL are U qualified as not detected at the RL.

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-SW-LVR401C-0908	Chromium	1.7 J	10.0 U
OU1-SW-LVR401C-0908 DISSOLVED	Chromium	1.1 J	10.0 U
OU1-SW-LVR401E-0908	Chromium	1.7 J	10.0 U
	Lead	0.821 J	5.0 U
OU1-SW-LVR401E-0908 DISSOLVED	Chromium	1.3 J	10.0 U
OU1-SW-LVR401W-0908	Chromium	1.6 J	10.0 U
	Lead	0.546 J	5.0 U
OU1-SW-LVR401W-0908 DISSOLVED	Chromium	1.5 J	10.0 U
OU1-GW-MW404-0908	Chromium	1.8 J	10.0 U
	Lead	0.866 J	5.0 U
OU1-GW-MW404-0908 DISSOLVED	Chromium	1.7 J	10.0 U
OU1-SW-CS0410-090810	Chromium	1.2 J	10.0 U
OU1-SW-CS0410-090810 DISSOLVED	Chromium	1.1 J	10.0 U
OU1-GW-MW405-0908	Chromium	1.5 J	10.0 U
	Magnesium	32.5 J	1000 U

	Manganese	0.850 J	10.0 U
OU1-GW-MW403-0908	Chromium	1.7 J	10.0 U
	Magnesium	29.8 J	1000 U
	Manganese	0.868 J	10.0 U
OU1-GW-MW401-0908	Chromium	1.5 J	10.0 U
	Magnesium	37.5 J	1000 U
	Manganese	1.0 J	10.0 U
OU1-GW-MW401A-0908 DISSOLVED	Magnesium	42.5 J	1000 U
OU1-GW-MW401B-0908	Chromium	1.5 J	10.0 U
	Magnesium	39.8 J	1000 U
	Manganese	1.4 J	10.0 U
OU1-GW-MW405-0908	Chromium	1.5 J	10.0 U
	Magnesium	34.5 J	1000 U
	Manganese	0.873 J	10.0 U
OU1-SW-ASO411-0908	Chromium	1.0 J	10.0 U
OU1-SW-ASO411-0908 DISSOLVED	Chromium	1.3 J	10.0 U
OU1-SW-CS0410-0908	Chromium	1.2 J	10.0 U
OU1-SW-CS0410-0908 DISSOLVED	Chromium	1.4 J	10.0 U

1.3.1 Field Blanks

The field blanks, filter blank and equipment blank met the acceptance criteria, with the following exceptions. Field blank OU1-GW-MW405-0908 had sodium detected at an estimated concentration less than the reporting limit and greater than the IDL. Filter blank OU1-GW-MW403-0908 had sodium detected at an estimated concentration less than the reporting limit and greater than the IDL. Equipment blank OU1-GW-MW401B-0908 had zinc detected at an estimated concentration less than the reporting limit and greater than the IDL. The associated soil and water samples had sodium and zinc concentrations greater than the reporting limits; therefore, no sample qualifications are required.

Equipment blank OU1-GW-MW401A-0908 DISSOLVED had calcium, nickel, sodium and zinc detected at estimated concentrations less than the reporting limits and greater than the IDL. Since the calcium, nickel, sodium and zinc concentrations in the associated samples are greater than the reporting limits, no sample qualifications are required. Chromium and lead were detected at estimated concentrations in equipment blank OU1-GW-MW401A-0908 DISSOLVED. The concentrations of lead in the associated samples are either not detected or detected at concentrations greater than the reporting limits; therefore, no sample qualifications are required for lead. The estimated chromium concentrations are U qualified as not detected at the reporting limit.

Copper, iron and manganese were detected in equipment blank OU1-GW-MW401A-0908 DISSOLVED at concentrations greater than the reporting limits. The concentrations in the associated samples greater than the reporting limits and less than ten times the equipment blank concentrations are J+ qualified as estimated with a high bias. The estimated concentrations of copper, iron and manganese in the associated samples are U qualified as not detected at the reporting limit.

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-SW-LVR401C-0908 DISSOLVED	Chromium	1.1 J	10.0 U
	Copper	1.9 J	5.0 U
	Iron	48.9 J	100 U
	Manganese	39.0	39.0 J+
OU1-SW-LVR401E-0908 DISSOLVED	Chromium	1.3 J	10.0 U
	Copper	1.6 J	5.0 U
	Manganese	39.4	39.4 J+
OU1-SW-LVR401W-0908 DISSOLVED	Chromium	1.5 J	10.0 U
	Copper	2.1 J	5.0 U
	Manganese	39.1	39.1 J+
OU1-GW-MW404-0908 DISSOLVED	Chromium	1.7 J	10.0 U
	Copper	2.7 J	5.0 U
	Manganese	38.3	38.3 J+
OU1-SW-CS0410-090810 DISSOLVED	Copper	116	116 J+
	Chromium	1.1 J	10.0 U
OU1-SW-ASO411-0908 DISSOLVED	Copper	21.8	21.8 J+
	Chromium	1.3 J	10.0 U
	Manganese	29.9	29.9 J+
OU1-SW-CS0410-0908 DISSOLVED	Copper	110	110 J+
	Chromium	1.3 J	10.0 U

1.4 Laboratory Control Samples (LCS)

All percent recoveries in the soil and water LCSs were within the acceptance limits.

1.5 Matrix Spike (MS)

Sample OU1-SE-LVR401W-0908 was analyzed as the soil MS samples. The concentrations of aluminum, arsenic, barium, calcium, copper, iron, lead, magnesium, manganese, nickel, vanadium and zinc in the unspiked samples exceeded the spike concentration by a factor of four or greater; therefore, the spike recovery control limits do not apply and qualification of the data is not required. The recoveries of beryllium, cadmium and selenium were low and the recoveries of cobalt and mercury were high, all outside the laboratory recovery limits. Therefore, the concentrations of beryllium, cadmium and selenium in sample OU1-SE-LVR401W-0908 are J- qualified as estimated with low bias and the concentration of cobalt is J+

qualified as estimated with high bias. The undetected concentration of mercury is not qualified. Post digestion spikes were also analyzed with acceptable results.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SE-LVR401W-0908	Beryllium	0.405 J	0.405 J-
	Cadmium	4.3	4.3 J-
	Cobalt	5.3	5.3 J+
	Selenium	0.421 J	0.421 J-

Samples OU1-SW-LVR401W-0908 and OU1-SW-LVR401W-0908 Dissolved were analyzed as the water MS samples. The concentrations of barium, calcium and magnesium in the unspiked samples exceeded the spike concentration by a factor of four or greater; therefore, the spike recovery control limits do not apply and qualification of the data is not required. The recoveries of all other metals were within the laboratory recovery limits, with the exception of high beryllium recoveries in both matrix spikes. However, since beryllium was not detected in samples OU1-SW-LVR401W-0908 and OU1-SW-LVR401W-0908 Dissolved, no sample qualifications are required. Post digestion spikes were also analyzed with acceptable results.

1.6 Laboratory Duplicate Samples

Sample OU1-SE-LVR401W-0908 was analyzed as the soil duplicate sample. The results were within the laboratory acceptance limits for relative percent difference (RPD), with the following exceptions. The RPDs were high and outside the laboratory acceptance limits for arsenic, cadmium, calcium, cobalt, copper, iron, lead, manganese and nickel. Therefore the concentrations of arsenic, cadmium, calcium, cobalt, copper, iron, lead, manganese and nickel in sample OU1-SE-LVR401W-0908 are J qualified as estimated.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SE-LVR401W-0908	Arsenic	22.0	22.0 J
	Cadmium	4.3	4.3 J
	Calcium	77700	77700 J
	Cobalt	5.3	5.3 J
	Copper	150	150 J
	Iron	14000	14000 J
	Lead	44.8	44.8 J
	Manganese	757	757 J
	Nickel	15.1	15.1 J

Samples OU1-SW-LVR401W-0908 and OU1-SW-LVR401W-0908 Dissolved were analyzed as the water duplicate samples. The results were within the laboratory acceptance limits for RPD.

1.7 Serial Dilutions

Sample OU1-SE-LVR401W-0908 was analyzed as the soil serial dilution sample. The percent differences were within the laboratory acceptance criteria, with the exception of arsenic and nickel in the serial dilution of sample OU1-SE-LVR401W-0908. Therefore, the concentrations of arsenic and nickel in sample OU1-SE-LVR401W-0908 are J qualified as estimated.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SE-LVR401W-0908	Arsenic	22.0	22.0 J
	Nickel	15.1	15.1 J

Samples OU1-SW-LVR401W-0908 and OU1-SW-LVR401W-0908 Dissolved were analyzed as the water serial dilution samples. The percent differences were within the laboratory acceptance criteria, with the exception of manganese in the serial dilution of sample OU1-SW-LVR401W-0908 Dissolved. Therefore, the concentration of manganese in sample OU1-SW-LVR401W-0908 Dissolved is J qualified as estimated.

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-SW-LVR401W-0908 Dissolved	Manganese	39.1	39.1 J

1.8 Total and Dissolved Results Comparison

The six samples were analyzed for both total and dissolved metals. In most cases, the total metals concentrations were greater than or equal to the dissolved metals concentrations. However, for the samples and metals listed in the table below, the total metals concentrations are less than the dissolved metals concentrations. If the concentrations are estimated (J qualified by the laboratory), the RPDs between the total and dissolved concentrations are not calculable (NC).

Total Sample ID	Dissolved Sample ID	Metal	Total Concentration (ug/L)	Dissolved Concentration (ug/L)	RPD
OU1-SW-LVR401C-0908	OU1-SW-LVR401C-0908 Dissolved	Selenium	0.583 J	0.672 J	NC
OU1-SW-LVR401C-0908	OU1-SW-LVR401C-0908 Dissolved	Nickel	3.9 J	4.2 J	NC
OU1-SW-LVR401C-0908	OU1-SW-LVR401C-0908 Dissolved	Magnesium	34300	34600	1
OU1-SW-LVR401E-0908	OU1-SW-LVR401E-0908 Dissolved	Magnesium	34900	35100	1
OU1-SW-LVR401E-0908	OU1-SW-LVR401E-0908 Dissolved	Sodium	37300	37500	1

OU1-SW-LVR401W-0908	OU1-SW-LVR401W-0908 Dissolved	Copper	1.8 J	2.1 J	NC
OU1-SW-LVR401W-0908	OU1-SW-LVR401W-0908 Dissolved	Selenium	0.617 J	0.640 J	NC
OU1-SW-LVR401W-0908	OU1-SW-LVR401W-0908 Dissolved	Magnesium	35200	35400	1
OU1-SW-LVR401W-0908	OU1-SW-LVR401W-0908 Dissolved	Calcium	79700	81000	1
OU1-SW-LVR401W-0908	OU1-SW-LVR401W-0908 Dissolved	Sodium	36500	37400	2
OU1-GW-MW404-0908	OU1-GW-MW404-0908 Dissolved	Copper	1.9 J	2.7 J	NC
OU1-GW-MW404-0908	OU1-GW-MW404-0908 Dissolved	Selenium	0.677 J	0.719 J	NC
OU1-GW-MW404-0908	OU1-GW-MW404-0908 Dissolved	Calcium	80000	81600	2
OU1-GW-MW404-0908	OU1-GW-MW404-0908 Dissolved	Sodium	36600	37600	3
OU1-SW-CS0410-090810	OU1-SW-CS0410-090810 Dissolved	Mercury	ND	0.031 J	**NC**
OU1-SW-ASO411-0908	OU1-SW-ASO411-0908 Dissolved	Chromium (total)	1.0 J	1.3 J	NC
OU1-SW-ASO411-0908	OU1-SW-ASO411-0908 Dissolved	Cobalt	1.1 J	1.2 J	NC
OU1-SW-ASO411-0908	OU1-SW-ASO411-0908 Dissolved	Barium	22.7	23.7	4
OU1-SW-ASO411-0908	OU1-SW-ASO411-0908 Dissolved	Copper	21.0	21.8	4
OU1-SW-ASO411-0908	OU1-SW-ASO411-0908 Dissolved	Cadmium	291	296	2
OU1-SW-ASO411-0908	OU1-SW-ASO411-0908 Dissolved	Nickel	61.9	62.5	1
OU1-SW-ASO411-0908	OU1-SW-ASO411-0908 Dissolved	Manganese	29.7	29.9	1
OU1-SW-ASO411-0908	OU1-SW-ASO411-0908 Dissolved	Zinc	62000	62100	<1
OU1-SW-ASO411-0908	OU1-SW-ASO411-0908 Dissolved	Mercury	ND	0.021 J	NC
OU1-SW-ASO411-0908	OU1-SW-ASO411-0908 Dissolved	Calcium	455000	469000	3
OU1-SW-ASO411-0908	OU1-SW-ASO411-0908 Dissolved	Potassium	26000	26600	2
OU1-SW-ASO411-0908	OU1-SW-ASO411-0908 Dissolved	Sodium	32200	33900	5
OU1-SW-CS0410-0908	OU1-SW-CS0410-0908 Dissolved	Chromium (total)	1.2 J	1.4 J	NC
OU1-SW-CS0410-0908	OU1-SW-CS0410-0908 Dissolved	Cobalt	8.5	8.8	4
OU1-SW-CS0410-0908	OU1-SW-CS0410-0908 Dissolved	Nickel	73.5	74.7	2

OU1-SW-CS0410-0908	OU1-SW-CS0410-0908 Dissolved	Cadmium	197	199	1
OU1-SW-CS0410-0908	OU1-SW-CS0410-0908 Dissolved	Zinc	69000	69200	<1
OU1-SW-CS0410-0908	OU1-SW-CS0410-0908 Dissolved	Calcium	476000	500000	5
OU1-SW-CS0410-0908	OU1-SW-CS0410-0908 Dissolved	Potassium	51800	54100	4
OU1-SW-CS0410-0908	OU1-SW-CS0410-0908 Dissolved	Sodium	47900	49900	4

Based on professional judgement, total and dissolved differences with RPDs less than 10% are not qualified. In cases where the total concentration is not detected (ND) and the dissolved concentration is estimated, the total undetected concentration is UJ qualified as estimated less than the detection limit and the dissolved concentration remains J qualified as estimated.

Total Sample ID	Dissolved Sample ID	Metal	Validation Total Concentration (ug/L)	Validation Dissolved Concentration (ug/L)
OU1-SW-CS0410-090810	OU1-SW-CS0410-090810 Dissolved	Mercury	0.019 UJ	0.031 J
OU1-SW-ASO411-0908	OU1-SW-ASO411-0908 Dissolved	Mercury	0.019 UJ	0.021 J

1.9 Field Duplicate

Two field duplicate samples (OU1-GW-MW404-0908 and OU1-GW-MW404-0908 Dissolved) were collected, prepared and measured with this data set. The RPD between the results was compared to a criterion of ≤40%.

Parent Sample ID	Field Duplicate Sample ID	Metals	Parent Conc.(ug/L)	Field Dup Conc (ug/L)	RPD
OU1-SW-LVR401W-0908 Dissolved	OU1-GW-MW404-0908 Dissolved	Copper	2.1 J	2.7 J	NC
OU1-SW-LVR401W-0908 Dissolved	OU1-GW-MW404-0908 Dissolved	Cobalt	0.312 J	0.393 J	NC
OU1-SW-LVR401W-0908 Dissolved	OU1-GW-MW404-0908 Dissolved	Nickel	3.5 J	4.1 J	NC
OU1-SW-LVR401W-0908 Dissolved	OU1-GW-MW404-0908 Dissolved	Chromium (total)	1.5 J	1.7 J	NC

OU1-SW-LVR401W-0908 Dissolved	OU1-GW-MW404-0908 Dissolved	Selenium	0.640 J	0.719 J	NC
OU1-SW-LVR401W-0908 Dissolved	OU1-GW-MW404-0908 Dissolved	Magnesium	35400	34300	3
OU1-SW-LVR401W-0908 Dissolved	OU1-GW-MW404-0908 Dissolved	Manganese	39.1	38.3	2
OU1-SW-LVR401W-0908 Dissolved	OU1-GW-MW404-0908 Dissolved	Potassium	3570	3620	1
OU1-SW-LVR401W-0908 Dissolved	OU1-GW-MW404-0908 Dissolved	Barium	83.9	82.8	1
OU1-SW-LVR401W-0908 Dissolved	OU1-GW-MW404-0908 Dissolved	Calcium	81000	81600	1
OU1-SW-LVR401W-0908 Dissolved	OU1-GW-MW404-0908 Dissolved	Sodium	37400	37600	1
OU1-SW-LVR401W-0908 Dissolved	OU1-GW-MW404-0908 Dissolved	Zinc	102	102	0
OU1-SW-LVR401W-0908 Dissolved	OU1-GW-MW404-0908 Dissolved	Aluminum	ND	32.1	200
OU1-SW-LVR401W-0908 Dissolved	OU1-GW-MW404-0908 Dissolved	Cadmium	ND	0.168	200
OU1-SW-LVR401W-0908 Dissolved	OU1-GW-MW404-0908 Dissolved	Antimony	ND	ND	0
OU1-SW-LVR401W-0908 Dissolved	OU1-GW-MW404-0908 Dissolved	Arsenic	ND	ND	0
OU1-SW-LVR401W-0908 Dissolved	OU1-GW-MW404-0908 Dissolved	Beryllium	ND	ND	0
OU1-SW-LVR401W-0908 Dissolved	OU1-GW-MW404-0908 Dissolved	Iron	ND	ND	0
OU1-SW-LVR401W-0908 Dissolved	OU1-GW-MW404-0908 Dissolved	Lead	ND	ND	0
OU1-SW-LVR401W-0908 Dissolved	OU1-GW-MW404-0908 Dissolved	Mercury	ND	ND	0
OU1-SW-LVR401W-0908 Dissolved	OU1-GW-MW404-0908 Dissolved	Silver	ND	ND	0
OU1-SW-LVR401W-0908 Dissolved	OU1-GW-MW404-0908 Dissolved	Thallium	ND	ND	0
OU1-SW-LVR401W-0908 Dissolved	OU1-GW-MW404-0908 Dissolved	Vanadium	ND	ND	0

Parent Sample ID	Field Duplicate Sample ID	Metals	Parent Conc.(ug/L)	Field Dup Conc (ug/L)	RPD
OU1-SW-LVR401W-0908	OU1-GW-MW404-0908	Lead	0.546 J	0.866 J	NC
OU1-SW-LVR401W-0908	OU1-GW-MW404-0908	Cobalt	0.366 J	0.559 J	NC
OU1-SW-LVR401W-0908	OU1-GW-MW404-0908	Cadmium	0.223 J	0.307 J	NC
OU1-SW-LVR401W-0908	OU1-GW-MW404-0908	Aluminum	816	670	20
OU1-SW-LVR401W-0908	OU1-GW-MW404-0908	Nickel	3.8 J	4.5 J	NC
OU1-SW-LVR401W-0908	OU1-GW-MW404-0908	Iron	674	597	12
OU1-SW-LVR401W-0908	OU1-GW-MW404-0908	Chromium (total)	1.6 J	1.8 J	NC
OU1-SW-LVR401W-0908	OU1-GW-MW404-0908	Selenium	0.617 J	0.677 J	NC
OU1-SW-LVR401W-0908	OU1-GW-MW404-0908	Copper	1.8 J	1.9 J	NC
OU1-SW-LVR401W-0908	OU1-GW-MW404-0908	Manganese	65.9	63.8	3
OU1-SW-LVR401W-0908	OU1-GW-MW404-0908	Magnesium	35200	34700	1
OU1-SW-LVR401W-0908	OU1-GW-MW404-0908	Zinc	141	139	1
OU1-SW-LVR401W-0908	OU1-GW-MW404-0908	Potassium	3710	3660	1
OU1-SW-LVR401W-0908	OU1-GW-MW404-0908	Calcium	79700	80000	<1
OU1-SW-LVR401W-0908	OU1-GW-MW404-0908	Sodium	36500	36600	<1
OU1-SW-LVR401W-0908	OU1-GW-MW404-0908	Barium	85.4	85.5	<1
OU1-SW-LVR401W-0908	OU1-GW-MW404-0908	Antimony	ND	ND	0
OU1-SW-LVR401W-0908	OU1-GW-MW404-0908	Arsenic	ND	ND	0
OU1-SW-LVR401W-0908	OU1-GW-MW404-0908	Beryllium	ND	ND	0
OU1-SW-LVR401W-0908	OU1-GW-MW404-0908	Mercury	ND	ND	0
OU1-SW-LVR401W-0908	OU1-GW-MW404-0908	Silver	ND	ND	0
OU1-SW-LVR401W-0908	OU1-GW-MW404-0908	Thallium	ND	ND	0
OU1-SW-LVR401W-0908	OU1-GW-MW404-0908	Vanadium	ND	ND	0

Acceptable precision was demonstrated for the field duplicate pairs, with the exception of aluminum and cadmium in duplicate pair OU1-SW-LVR401W-0908 Dissolved /OU1-GW-MW404-0908 Dissolved. Therefore, the undetected concentrations of aluminum and cadmium in duplicate pair OU1-SW-LVR401W-0908 Dissolved /OU1-GW-MW404-0908 Dissolved are UJ qualified as estimated less than the reporting limits and the detected concentrations are J qualified as estimated.

Parent Sample ID	Field Duplicate Sample ID	Metals	Validation Parent Conc.(ug/L)	Validation Field Dup Conc (ug/L)
OU1-SW-LVR401W-0908 Dissolved	OU1-GW-MW404-0908 Dissolved	Aluminum	14.9 UJ	32.1 J
OU1-SW-LVR401W-0908 Dissolved	OU1-GW-MW404-0908 Dissolved	Cadmium	0.162 UJ	0.168 J

2.0 SPLP Metals (EPA Methods 6020/6010B/7470A/74741A)

The soil samples were analyzed for the requested metals and mercury (EPA 6010B/7470A) following SPLP extraction (EPA 1312). Tier II validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPs and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ⊗ Blanks
- ✓ Laboratory Control Sample
- ⊗ Matrix Spike/Matrix Spike Duplicate
- ✓ Laboratory Duplicate
- ✓ Serial Dilutions

2.1 Data Completeness

All analyses were performed as requested on the COC.

2.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

2.3 Blanks

2.3.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria with the following exceptions; aluminum and calcium were detected in the preparation blank at estimated concentrations less than the RL but greater than the IDL. However, since aluminum and calcium were detected in the associated samples at concentrations greater than the RL, no qualifications are required.

2.3.2 SPLP Extraction Blank

The SPLP extraction blank met the acceptance criteria with the following exceptions; nickel, vanadium and zinc were detected in the SPLP extraction blank

at estimated concentrations less than the RL but greater than the IDL. Zinc was detected in the associated samples at concentrations greater than the RL; therefore, no sample qualifications are required. However, the estimated concentrations of nickel and vanadium in the associated samples are U qualified as not detected at the RL. Aluminum, barium, cadmium, calcium, magnesium and sodium were detected in the SPLP extraction blank at concentrations greater than the RL. Therefore, the concentrations of aluminum, barium, cadmium, calcium, magnesium and sodium in the associated samples that are less than ten times the SPLP blank concentrations are J+ qualified as estimated with a high bias; estimated concentrations of aluminum, barium, cadmium, calcium, magnesium and sodium in the associated samples that are less than the RL but greater than the IDL are U qualified as not detected at the RL.

Sample ID	Compound	Laboratory SPLP Result (mg/L)	Validation Result (mg/L)
OU1-SS-LRS412S-0908	Aluminum	0.55	0.55 J+
	Cadmium	0.021	0.021 J+
	Magnesium	0.83	0.83 J+
	Sodium	19	19 J+
	Vanadium	0.004 J	0.010 U
OU1-SS-LRS412T-0908	Aluminum	0.82	0.82 J+
	Barium	0.038	0.038 J+
	Cadmium	0.010 J	0.010 U
	Nickel	0.006 J	0.050 U
	Sodium	19	19 J+
	Vanadium	0.009 J	0.010 U
OU1-SS-SB406-0908	Aluminum	0.73	0.73 J+
	Barium	0.037	0.037 J+
	Cadmium	0.005 J	0.010 U
	Nickel	0.004 J	0.050 U
	Sodium	19	19 J+

2.4 Laboratory Control Samples (LCS)

All percent recoveries in the SPLP LCSs were within the acceptance limits.

2.5 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Sample OU1-SS-LRS412T-0908 was analyzed as the SPLP MS/MSD pair. The recoveries of iron were low and outside the laboratory recovery limits. Therefore, the SPLP concentration of iron in sample OU1-SS-LRS412T-0908 is J- qualified as estimated with low bias.

Sample ID	Compound	Laboratory SPLP Result (mg/L)	Validation Result (mg/L)
OU1-SS-LRS412T-0908	Iron	5.1	5.1 J-

2.6 Laboratory Duplicate

Sample OU1-SS-LRS412T-0908 was analyzed as the SPLP laboratory duplicate. The RPDs were within the laboratory acceptance criteria.

2.7 Serial Dilutions

Sample OU1-SS-LRS412T-0908 was analyzed as the SPLP serial dilution sample. The percent differences were within the laboratory acceptance criteria.

3.0 Hardness (SM 2340C), pH (EPA Method 9045) and Percent Solids (Modified Method 160.3)

The soil samples were analyzed for pH, (EPA Method 9045) and percent solids (EPA Modified Method 160.3); the water samples were analyzed for hardness (Standard Method 2340C). Tier II validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPs and the quality of the data reported. The following summarizes the results of this review. In addition, the percent solids data was reviewed and found to be acceptable.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Blanks
- ✓ Laboratory Control Sample
- ✓ Matrix Spike Sample
- ✓ Laboratory Duplicate Sample
- ✓ Field Duplicate Sample

3.1 Data Completeness

All analyses were performed as requested on the COC.

3.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

3.3 Preparation (Method) Blank

The preparation blank met the acceptance criteria for total solids and hardness.

3.4 Laboratory Control Sample (LCS)

The LCS recovery was within the acceptance criteria for hardness.

3.5 Matrix Spike (MS)

Sample OU1-SW-LVR401W-0908 was analyzed as the matrix spike for hardness. The MS recovery was within the acceptance criteria for hardness.

.

3.6 Laboratory Duplicate Samples

Sample OU1-SW-LVR401W-0908 was analyzed as the laboratory duplicate for hardness. The duplicate was within the acceptance criteria for hardness.

Sample OU1-SE-LVR401W-0908 was analyzed as the laboratory duplicate for % solids. The duplicate was within the acceptance criteria for % solids.

3.7 Field Duplicate Sample

One field duplicate sample (OU1-GW-MW404-0908) was collected, prepared and measured with this data set. The RPD between the results was compared to a criterion of ≤40%. Acceptable precision was demonstrated for the field duplicate pair.

Parent Sample ID	Field Duplicate Sample ID	Metals	Parent Conc.(ug/L)	Field Dup Conc (ug/L)	RPD
OU1-SW-LVR401W-0908	OU1-GW-MW404-0908	Hardness (As $CaCO_3$)	351	350	0

ATTACHMENT A
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by GeoSyntec's Data Review Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher that the concentration of the analyte in the sample due to bias attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower that the concentration of the analyte in the sample due to bias attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Geosyntec consultants

2240 Sutherland Avenue, Suite 107
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Memorandum

TO: Richard Berggreen

DATE: December 16, 2009

FROM: Geosyntec Consultants QA/QC Group

SITE: Mattheissen and Hegeler Zinc Company Site**, OU1**

SUBJECT: Summary of Tier II Validation of analytical results for CAS Report K0908702

Introduction
This report summarizes the findings of the Tier II validation of 14 tissue samples collected on behalf of the Mattheissen and Hegeler Zinc Company Site, OU1 project. The fish samples were collected on August 11, 2009. The tissue samples were analyzed by Columbia Analytical Services, Inc. (CAS), Kelso, Washington. The samples were analyzed for total metals by EPA Methods 200.8, mercury by EPA Method 7471A, percent lipids by NOAA modified method.

The data were reviewed in accordance with the principles presented in *USEPA National Functional Guidelines for Laboratory Data Review, Inorganics* (EPA, 2004), and per the requirements of the QAPP, the laboratory standard operating procedures and the specified methods.

Data for the following samples were reviewed.

Lab ID	Client ID
K0908702-001	Hogsucker Composite CAR001
K0908702-002	Hogsucker Composite CAR002
K0908702-003	Hogsucker Composite CAR003
K0908702-004	Hogsucker Composite CAR004
K0908702-005	Smallmouth Bass Comp CAR004
K0908702-006	Whole Body S/M Bass CAR002
K0908702-007	Whole Body S/M Bass CAR003
K0908702-008	S/M Bass Fillet Comp CAR001
K0908702-009	S/M Bass WholeBody Comp CAR001
K0908702-010	Sauger Fillet Composite CAR003
K0908702-011	Sauger Whole Body Comp CAR003

K0908702-012	Mussel Whole Body CAR001
K0908702-013	Mussel Whole Body CAR002
K0908702-014	Mussel Whole Body CAR003

Matrix – fish tissue

Executive Summary

The fish samples were homogenized, composited (as needed) and analyzed based on email instructions from Jeanine Misiurewicz, dated 9/1/09 and included in the laboratory report. The list of metals includes arsenic, cadmium, copper, lead, mercury, silver and zinc. The chain of custody (COC) in the laboratory report is the COC for the samples sent from the CAS Rochester, NY laboratory to CAS Kelso, WA. The COC requested metals analyses as mercury by SW-846 method 7471A, lipids, total metals by EPA method 200.8 and SW-846 method 6010B and selenium by EPA method 7740. As noted above, the samples were analyzed for total metals by EPA Methods 200.8, mercury by EPA Method 7471A and percent lipids by NOAA modified method.

All holding times were met.

1.0 Metals (EPA Methods 200.8 and 7471A)

The tissue samples were analyzed for the requested metals (arsenic, cadmium, copper, lead, silver and zinc) by EPA Method 200.8 and mercury by SW-846 method 7471A following metals and mercury digestion. Tier II validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPS and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Blanks
- ✓ Laboratory Control Samples
- ✓ Matrix Spike/Matrix Spike Duplicate Samples
- ✓ Laboratory Duplicate Samples
- ✓ Whole Body and Fillet Comparison

1.1 Data Completeness

All analyses were performed as requested on in the 9/1/09 email noted above.

1.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times. No sample preservation issues were noted by the laboratory.

1.3 Blanks

1.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria, with the following exception. Zinc was detected in the preparation blank at an estimated concentration less than the reporting limit and greater than the method detection limit (MDL). However, since the zinc concentrations in the associated samples are greater than the reporting limit, no sample qualifications are required.

1.4 Laboratory Control Samples (LCS)

All percent recoveries in the LCSs were within the acceptance limits.

In addition to the LCS, two standard reference material (SRM) samples were digested analyzed and reported with the samples. The SRMs were within the acceptance limits.

1.5 Matrix Spike (MS)

Sample Hogsucker Composite CAR001 was analyzed as the matrix spike; the compound recoveries were within the laboratory control limits

1.6 Laboratory Duplicate Sample

Sample Hogsucker Composite CAR001 was analyzed as the laboratory duplicate. All relative percent difference (RPD) results were acceptable.

1.7 Whole Body and Fillet Comparison

Whole body and fillet samples were analyzed and compared for two fish types, Smallmouth Bass from Station CAR001 and Sauger from Station CAR003. The table below compares the whole body and fillet metals results for these two fish. It was noted that the mercury whole body concentration results were less than the mercury fillet concentration results which is atypical. A request was sent to the laboratory to verify the mercury results. No qualification was applied to the data.

Fish Type	**Metal**	**Whole body concentration (mg/kg)**	**Fillet concentration (mg/kg)**
Smallmouth Bass, Station CAR001	Lead	0.344	0.011 J
	Silver	0.019 U	0.020 U
	Arsenic	0.57	0.67
	Cadmium	0.233	0.018 J
	Copper	7.73	0.94
	Zinc	93.6	26.2
	Mercury	0.356	1.089
Sauger from Station CAR003.	Lead	0.619	0.009 J
	Silver	0.019 U	0.020 U
	Arsenic	0.17 J	0.13 J
	Cadmium	0.088	0.008 J
	Copper	18.6	1.20
	Zinc	75	22.3
	Mercury	0.306	0.994

ATTACHMENT A
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Review Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher that the concentration of the analyte in the sample due to bias attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower that the concentration of the analyte in the sample due to bias attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Geosyntec consultants

1531 Dick Lonas Road, Building A
Knoxville, TN 37909
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Memorandum

TO: Jill Johnson

DATE: December 26, 2007

FROM: Geosyntec Consultants QA/QC Group

SITE: Carus Chemicals, FR1347

SUBJECT: Summary of Tier IV Validation of analytical results for Metals Analyses, H7J120107

Introduction

This report summarizes the findings of the full validation of three soil samples collected on behalf of the Carus Chemical Company project. These samples were collected on October 11, 2007. The samples were analyzed by TestAmerica Laboratories, Inc., (formerly STL), Knoxville, Tennessee. The samples were analyzed for Metals by EPA Methods 6010B and 7470A following Sequential Extraction Procedure (SEP). The SEP consists of a series of seven sequential extractions which are used to determine the solid-phase association in which the metals of interest exist in the soil matrix. The various steps of the sequential extraction are designed to dissolve the fraction of metal in the sample associated with a particular matrix component, for example, carbonates or organic matter. The seven fractions analyzed for this project are the exchangeable fraction, the organic fraction, the carbonate fraction, the non-crystalline materials faction, the metal hydroxide fraction, the acid/sulfide fraction and the residual fraction. In addition, a total metals concentration is determined.

The data were reviewed in accordance with the principles presented in *USEPA National Functional Guidelines for Laboratory Data Review, Inorganics* (EPA, 2004), the laboratory standard operating procedures (SOPs) and per the requirements of the specified methods.

Data for the following TestAmerica lot number and samples (this list comprises all SEP fractions resulting from the samples submitted to the laboratory) were reviewed.

Field Sample ID/SEP Step #	Laboratory Sample ID	Lot Number
OU1-SS-SB303-89-90/Step 1	J8RP8	H7J120107
OU1-SS-SB303-89-90/Step 2	J8RQA	
OU1-SS-SB303-89-90/Step 3	J8RQC	
OU1-SS-SB303-89-90/Step 4	J8RQE	

Field Sample ID/SEP Step #	Laboratory Sample ID	Lot Number
OU1-SS-SB303-89-90/Step 5	J8RQF	H7J120107
OU1-SS-SB303-89-90/Step 6	J8RQG	
OU1-SS-SB303-89-90/Step 7	J8RQH	
OU1-SS-SB303-89-90/Total	J8RQJ	
OU1-SS-SB303-108-109/Step 1	J8RQL	
OU1-SS-SB303-108-109/Step 2	J8RQN	
OU1-SS-SB303-108-109/Step 3	J8RQP	
OU1-SS-SB303-108-109/Step 4	J8RQQ	
OU1-SS-SB303-108-109/Step 5	J8RQR	
OU1-SS-SB303-108-109/Step 6	J8RQV	
OU1-SS-SB303-108-109/Step 7	J8RQW	
OU1-SS-SB303-108-109/Total	J8RQX	
OU1-SS-SB406-89-90/Step 1	J8RQ0	
OU1-SS-SB406-89-90/Step 2	J8RQ1	
OU1-SS-SB406-89-90/Step 3	J8RQ3	
OU1-SS-SB406-89-90/Step 4	J8RQ5	
OU1-SS-SB406-89-90/Step 5	J8RQ8	
OU1-SS-SB406-89-90/Step 6	J8RRA	
OU1-SS-SB406-89-90/Step 7	J8RRC	
OU1-SS-SB406-89-90/Total	J8RRD	

Executive Summary

All samples were analyzed as requested. All holding times were met. All of the sample results are acceptable for use with the exception of results qualified as rejected (R).

1.0 Metals (EPA Methods 6010B/7470A)

The soil samples were analyzed for the requested metals (EPA 6010B/7470A) following a seven step SEP extraction and a total metals digestion. Tier III validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPS and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ⊗ Blanks
- ⊗ Laboratory Control Samples
- ✓ Matrix Spike/Matrix Spike Duplicate Samples
- ✓ Laboratory Duplicate Samples
- ✓ Serial Dilutions

⊗ Total Metals Comparison

1.1 Data Completeness

All analyses were performed as requested on the chain-of-custody records.

1.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

1.3 Calibrations

1.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for inductively coupled plasma (ICP) analysis and cold vapor atomic absorption (CVAA) initial calibrations.

1.3.2 Continuing Calibration Verification (CCV)

The percent recoveries in all associated CCVs were within the QC acceptance limits.

1.3.3 Contract Required Detection Limit (CRDL) Standard

The CRDL standards were within the control limits.

1.3.4 Interference Check Standards A and AB (ICSA/ICSAB)

ICSA/ICSAB met all acceptance criteria.

1.4 Blanks

1.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria with the following exceptions. Nickel for Step 1, Selenium for Step 5 and Zinc for Steps 2, 6, 7 and total Zinc were detected in the preparation blanks at concentrations less than the reporting limits, but greater than the method detection limits (MDL). Therefore, since Nickel, Selenium and Zinc were detected in the following samples at concentrations less than ten times the blank concentration, the Nickel, Selenium and Zinc concentrations are J+ qualified as estimated with a high bias.

Sample	Metal	Step	Laboratory Concentration (mg/kg)*	Validation concentration (mg/kg)
OU1-SS-SB303-89-90	Nickel	1	0.76 BJ	0.76 J+
	Selenium	5	0.43 BJ	0.43 J+
	Zinc	2	6.0 BJ	6.0 J+
OU1-SS-SB303-108-109	Nickel	1	2.9 BJ	2.9 J+
	Selenium	5	0.66 BJ	0.66 J+
OU1-SS-SB406-89-90	Nickel	1	2.3 BJ	2.3 J+
	Selenium	5	0.41 BJ	0.41 J+

* The laboratory J qualifier indicates method blank contamination; the laboratory B qualifier indicates an estimated concentration, less than the reporting limit but above the MDL. The validation J qualifier indicates estimated value.

1.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICBs and CCBs met the acceptance criteria with a few exceptions; in several cases, the ICBs and CCBs had metal detections at concentrations less than the reporting limit, but greater than the MDLs. However, since the metals concentrations in the associated samples were greater than the reporting limits, no sample qualifications were required.

1.5 Laboratory Control Samples (LCS/LCS Duplicate, [LCSD])

All percent recoveries in the LCS/LCSDs were within the laboratory acceptance limits (75-125% recovery), with the following exceptions.

LCS Metal	Step	LCS Recovery (%)	LCSD Recovery (%)
Arsenic	3	77	73
Cadmium	2	128	131
Cadmium	4	30	30
Chromium	3	75	73
Lead	2	53	56
Mercury	1	16	17
Mercury	2	118	127
Mercury	3	9	15
Selenium	5	5	4.1
Zinc	2	130	137

Since the LCSD recoveries for Arsenic in step 3, Chromium in step 3 and Mercury in step 2 were just outside the acceptance limits and the LCS recoveries were acceptable, based on professional judgment, no qualifications were made to the sample results for these metals. Due to low (<75%, but >50%) LCS/LCSD recoveries of Lead in step 2, the undetected concentrations of Lead in step 2 in the associated samples are UJ qualified as estimated less than the reporting limit. Additionally, due to the low (<50%) LCS/LCSD recoveries of Cadmium in step 4, Mercury in steps 1 and 3 and Selenium in step 5, the associated sample results are R qualified as rejected. Due to the high LCS/LCSD (>125%) recoveries of Cadmium in step 2 and Zinc in step 2, the concentrations of Cadmium and Zinc in step 2 for the associated samples are J+ qualified as estimated with a high bias.

Sample	Metal	Step	Laboratory Concentration* (mg/kg)	Validation concentration (mg/kg)
OU1-SS-SB303-89-90	Cadmium	2	0.42 B	0.42 J+
	Cadmium	4	0.28 U	0.28 R
	Lead	2	5.0 U	5.0 UJ
	Mercury	1	0.011 U	0.011 R
	Mercury	3	0.011 U	0.011 R
	Selenium	5	0.43 BJ	0.43 R
	Zinc	2	6.0 BJ	6.0 J+
OU1-SS-SB303-108-109	Cadmium	2	348	348 J+
	Cadmium	4	6.9	6.9 R
	Lead	2	6.2 U	6.2 UJ
	Mercury	1	0.014 U	0.014 R
	Mercury	3	0.014 U	0.014 R
	Selenium	5	0.66 BJ	0.66 R
	Zinc	2	195 J	195 J+
OU1-SS-SB406-89-90	Cadmium	2	397	397 J+
	Cadmium	4	16.3	16.3 R
	Lead	2	5.9 U	5.9 UJ
	Mercury	1	0.013 U	0.013 R
	Mercury	3	0.013 U	0.013 R
	Selenium	5	0.41 BJ	0.41 R
	Zinc	2	158 J	158 J+

* The laboratory J qualifier indicates method blank contamination; the laboratory B qualifier indicates an estimated concentration, less than the reporting limit but above the MDL. The validation J qualifier indicates estimated value.

1.6 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD pairs were not performed. Precision and accuracy were assessed from the LCS/LCSD pairs; precision was also assessed from the laboratory duplicate sample.

1.7 Laboratory Duplicate Samples

A batch sample was analyzed as the laboratory duplicate. Therefore, no sample qualifications were made.

1.8 Serial Dilutions

A batch sample was analyzed as the serial dilution. Therefore, no sample qualifications were made.

1.9 Total Metals Comparison

A comparison of the total metals concentrations and the sums of the SEP fraction results was made. The relative percent difference between the two values was compared to a criterion of 40% RPD. Most of the results compared well; the metals with RPDs >40% are in bold in the table below. No qualifications were made based on this comparison. Identified issues with sequential extraction include extraction efficiency, reagent specificity and selectivity and element redistribution; these issues may explain some of the differences between the sum of the SEP concentrations and the total concentrations.

Sample	Metal	Total Concentration* (mg/kg)	Sum of SEP Concentrations (mg/kg)	Relative Percent Difference (%)
OU1-SS-SB303-89-90	Arsenic	11.7	11.3	3
	Cadmium	4.6	4.5	2
	Chromium	**27.2**	**113**	**122**
	Copper	17.4	16.4	6
	Lead	12.8	16.0	22
	Mercury	**0.11 U**	**0.034**	**200**
	Nickel	25.7	38.6	40
	Selenium	**1.6**	**6.4**	**120**
	Zinc	129	114	12
OU1-SS-SB303-108-109	Arsenic	8.5	9.9	15
	Cadmium	737	537	31
	Chromium	115	109	5
	Copper	402	342	16
	Lead	**148**	**726**	**132**
	Mercury	0.48	0.43	3
	Nickel	101	93.6	8
	Selenium	11.3	10.1	11
	Zinc	6680 J	6680	0
OU1-SS-SB406-89-90	Arsenic	6.4	7.8	20
	Cadmium	614	858	33
	Chromium	61.3	85.5	33
	Copper	**124**	**264**	**72**
	Lead	107	149	33
	Mercury	0.56	0.68	19
	Nickel	82.5	108	27
	Selenium	**1.6**	**4.6**	**97**
	Zinc	11700	14500	21

* The laboratory J qualifier indicates method blank contamination; the laboratory UG qualifier indicates the laboratory reported an elevated reporting limit due to matrix interferences.

ATTACHMENT A
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by GeoSyntec's Data Review Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher that the concentration of the analyte in the sample due to positive bias attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Geosyntec consultants

1531 Dick Lonas Road, Building A
Knoxville, TN 37909
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Memorandum

TO: Jill Johnson

DATE: December 26, 2007

FROM: Geosyntec Consultants QA/QC Group

SITE: Carus Chemicals, FR1347

SUBJECT: Summary of Tier IV Validation of analytical results for Metals Analyses, H7J050295

Introduction

This report summarizes the findings of the full validation of four soil samples collected on behalf of the Carus Chemical Company project. These samples were collected on October 3, 2007. The samples were analyzed by TestAmerica Laboratories, Inc. (formerly STL), Knoxville, Tennessee. The samples were analyzed for Metals by EPA Methods 6010B and 7470A following a Sequential Extraction Procedure (SEP). The SEP consists of a series of seven sequential extractions which are used to determine the solid-phase association in which the metals of interest exist in the soil matrix. The various steps of the sequential extraction are designed to dissolve the fraction of metal in the sample associated with a particular matrix component, for example, carbonates or organic matter. The seven fractions analyzed for this project are the exchangeable fraction, the organic fraction, the carbonate fraction, the non-crystalline materials faction, the metal hydroxide fraction, the acid/sulfide fraction and the residual fraction. In addition, a total metals concentration is determined.

The data were reviewed in accordance with the principles presented in *USEPA National Functional Guidelines for Laboratory Data Review, Inorganics* (EPA, 2004), the laboratory standard operating procedures (SOPs) and per the requirements of the specified methods.

Data for the following Testamerica lot number and samples (this list comprises all SEP fractions resulting from the samples submitted to the laboratory) were reviewed.

Field Sample ID/SEP Step #	Laboratory Sample ID	Lot Number
OU1-SS-SB316-0-1/Step 1	J8DH0	H7J050295
OU1-SS-SB316-0-1/Step 2	J8DH8	
OU1-SS-SB316-0-1/Step 3	J8DJA	
OU1-SS-SB316-0-1/Step 4	J8DJE	

Field Sample ID/SEP Step #	Laboratory Sample ID	Lot Number
OU1-SS-SB316-0-1/Step 5	J8DJG	H7J050295
OU1-SS-SB316-0-1/Step 6	J8DJJ	
OU1-SS-SB316-0-1/Step 7	J8DJL	
OU1-SS-SB316-0-1/Total	J8DJN	
OU1-SS-SB318-2-4/Step 1	J8DJQ	
OU1-SS-SB318-2-4/Step 2	J8DJW	
OU1-SS-SB318-2-4/Step 3	J8DJ0	
OU1-SS-SB318-2-4/Step 4	J8DJ1	
OU1-SS-SB318-2-4/Step 5	J8DJ2	
OU1-SS-SB318-2-4/Step 6	J8DJ4	
OU1-SS-SB318-2-4/Step 7	J8DJ5	
OU1-SS-SB318-2-4/Total	J8DJ7	
OU1-SS-SB313-2-4/Step 1	J8DJ9	
OU1-SS-SB313-2-4/Step 2	J8DKA	
OU1-SS-SB313-2-4/Step 3	J8DKE	
OU1-SS-SB313-2-4/Step 4	J8DKG	
OU1-SS-SB313-2-4/Step 5	J8DKH	
OU1-SS-SB313-2-4/Step 6	J8DKL	
OU1-SS-SB313-2-4/Step 7	J8DKP	
OU1-SS-SB313-2-4/Total	J8DKT	
OU1-SS-SB311-0-1/Step 1	J8DKW	
OU1-SS-SB311-0-1/Step 2	J8DK3	
OU1-SS-SB311-0-1/Step 3	J8DK7	
OU1-SS-SB311-0-1/Step 4	J8DK8	
OU1-SS-SB311-0-1/Step 5	J8DK9	
OU1-SS-SB311-0-1/Step 6	J8DLA	
OU1-SS-SB311-0-1/Step 7	J8DLD	
OU1-SS-SB311-0-1/Total	J8DLE	

Executive Summary

All samples were analyzed as requested. All holding times were met. All sample results are acceptable for use as qualified with the exception of those results which are qualified as rejected (R).

The laboratory narrative indicated that the samples were received outside of the temperature specifications of $4\pm2^{o}C$ at $16\,^{o}C$. No sample qualifications were made based on the sample receipt temperature.

The laboratory narrative also indicated that the container label for sample OU1-SS-SB311-0-1 did not match the ID listed on the chain of custody (COC); the label listed the ID as OU1-SS-SS311-0-1. The ID on the COC was used for the sample.

The laboratory report listed the ID for OU1-SS-SB318-2-4 as OU1-SS-SB317-2-4 in the original report. The laboratory was notified and indicated that the ID should have been OU1-SS-SB318-2-4. A revised report with the corrected ID was issued.

1.0 Metals (EPA Methods 6010B/7470A)

The soil samples were analyzed for the requested metals (EPA 6010B/7470A) following a seven step SEP extraction and a total metals digestion. Tier III validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPS and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ⊗ Blanks
- ⊗ Laboratory Control Samples
- ✓ Matrix Spike/Matrix Spike Duplicate Samples
- ⊗ Laboratory Duplicate Samples
- ⊗ Serial Dilutions
- ⊗ Total Metals Comparison

1.1 Data Completeness

All analyses were performed as requested on the chain-of-custody records.

1.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

1.3 Calibrations

1.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for inductively coupled plasma (ICP) analysis and cold vapor atomic absorption (CVAA) initial calibrations.

1.3.2 Continuing Calibration Verification (CCV)

The percent recoveries in all associated CCVs were within the QC acceptance limits.

1.3.3 Contract Required Detection Limit (CRDL) Standard

The CRDL standards were within the control limits.

1.3.4 Interference Check Standards A and AB (ICSA/ICSAB)

ICSA/ICSAB met all acceptance criteria.

1.4 Blanks

1.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria with the following exceptions. Nickel for Step 1, Selenium for Step 5 and Zinc for Steps 2 and 6

were detected in the preparation blanks at concentrations less than the reporting limits, but greater than the method detection limits (MDL). Therefore, since Nickel, Selenium and Zinc were detected in the following samples at concentrations less than ten times the blank concentration, the Nickel, Selenium and Zinc concentrations are J+ qualified as estimated with a high bias.

Sample	Metal	Step	Laboratory Concentration (mg/kg)*	Validation concentration (mg/kg)
OU1-SS-SB311-0-1	Zinc	2	6.8 BJ	6.8 J+
OU1-SS-SB313-2-4	Nickel	1	0.77BJ	0.77 J+
OU1-SS-SB313-2-4	Selenium	5	0.50 BJ	0.50 J+
OU1-SS-SB313-2-4	Zinc	2	6.4 BJ	6.4 J+
OU1-SS-SB316-0-1	Nickel	1	0.73 BJ	0.73 J+
OU1-SS-SB316-0-1	Selenium	5	0.58 J	0.58 J+
OU1-SS-SB316-0-1	Zinc	2	41.0 J	41.0 J+
OU1-SS-SB318-2-4	Nickel	1	0.78 BJ	0.78 J+
OU1-SS-SB318-2-4	Zinc	2	8.7 BJ	8.7 J+

* The laboratory J qualifier indicates method blank contamination; the laboratory B qualifier indicates an estimated concentration, less than the reporting limit but above the MDL. The validation J qualifier indicates estimated value.

1.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICBs and CCBs met the acceptance criteria with a few exceptions; several ICBs and CCBs had metal detections at concentrations less than the reporting limit, but greater than the MDLs. However, since the metals concentrations in the associated samples were greater than the reporting limits, no sample qualifications were required.

1.5 Laboratory Control Samples (LCS/LCS Duplicate, LCSD)

All percent recoveries in the LCS/LCSDs were within the laboratory acceptance limits (75-125% recovery), with the following exceptions.

LCS Metal	Step	LCS Recovery (%)	LCSD Recovery (%)
Arsenic	3	74	83
Cadmium	4	35	33
Lead	2	38	39
Mercury	1	11	11
Mercury	3	8.7	11
Mercury	6	127	124
Selenium	5	4.7	3.9

Arsenic in the LCS for step 3 and Mercury in step 6 were just outside the acceptance limits and the LCSD recoveries were acceptable; therefore, based on professional judgment, no qualifications were made to the sample results for these two metals. However, due to the low (<50%) LCS/LCSD recoveries of Cadmium in Step 4, Lead in step 2 and Mercury in steps 1 and 3, the associated sample results are R qualified as rejected.

Sample	Metal	Step	Laboratory Concentration (mg/kg)	Validation concentration (mg/kg)
OU1-SS-SB311-0-1	Cadmium	4	0.30 U	0.30 R
	Lead	2	5.4 U	5.4 R
	Mercury	1	0.012 U	0.012 R
	Mercury	3	0.012 U	0.012 R
	Selenium	5	0.61 U	0.61 R
OU1-SS-SB313-2-4	Cadmium	4	0.28 U	0.28 R
	Lead	2	5.1 U	5.1 R
	Mercury	1	0.011 U	0.011 R
	Mercury	3	0.011 U	0.011 R
	Selenium	5	0.50 BJ	0.50 R
OU1-SS-SB316-0-1	Cadmium	4	1.8	1.8 R
	Lead	2	5.2 U	5.2 R
	Mercury	1	0.011 U	0.011 R
	Mercury	3	0.016	0.016 R
	Selenium	5	0.58 J	0.58 R
OU1-SS-SB318-2-4	Cadmium	4	0.38	0.38 R
	Lead	2	5.4 U	5.4 R
	Mercury	1	0.012 U	0.012 R
	Mercury	3	0.012 U	0.012 R
	Selenium	5	0.60 U	0.60 R

* The laboratory J qualifier indicates method blank contamination; the laboratory B qualifier indicates an estimated concentration, less than the reporting limit but above the MDL.

1.6 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD pairs were not performed. Precision and accuracy were assessed from the LCS/LCSD pairs; precision was also assessed from the laboratory duplicate sample.

1.7 Laboratory Duplicate Samples

Sample OU1-SS-SB316-0-1 was analyzed as the laboratory duplicate. The relative percent differences (RPD) were within the laboratory acceptance limits (0-30%), with the following exceptions.

Metal	Step	RPD (%)
Cadmium	6	81
	7	80
Chromium	2	38
	3	200
	4	44
	5	38
	6	70
Copper	3	39
	4	32
	7	61
Lead	3	66
Mercury	3	37
	6	52

Nickel	6	47
	7	48
Selenium	4	200
	6	200
	7	91
Zinc	6	49
	7	94
	Total	42

Therefore, the concentrations of Cadmium for steps 6 and 7, Chromium for steps 2, 3, 4, 5 and 6, Copper for steps 3, 4 and 7, Lead for step 3, Mercury for steps 3 and 6, Nickel for steps 6 and 7, Selenium for steps 4, 6 and 7, Zinc for steps 6 and 7 and total Zinc in sample OU1-SS-SB316-0-1 are J qualified as estimated for concentrations detected and UJ qualified as estimated less than the reporting limit for undetected concentrations.

Sample	**Metal**	**Step**	**Laboratory Concentration* (mg/kg)**	**Validation concentration (mg/kg)**
OU1-SS-SB316-0-1	Cadmium	6	4.3	4.3 J
		7	2.0	2.0 J
	Chromium	2	12.1	12.1 J
		3	2.3	2.3 J
		4	1.9	1.9 J
		5	6.8	6.8 J
		6	35.0	35.0 J
	Copper	3	18.8	18.8 J
		4	55.8	55.8 J
		7	23.1	23.1 J
	Lead	3	31.4	31.4 J
	Mercury	3	0.016	0.016 J
		6	0.011 U	0.011 UJ
	Nickel	6	20.8	20.8 J
		7	7.4	7.4 J
	Selenium	4	0.57 U	0.57 UJ
		6	0.57 U	0.57 UJ
		7	0.57 U	0.57 UJ
	Zinc	6	2450 J	2450 J
		7	942	942 J
		Total	13800	13800 J

* The laboratory J qualifier indicates method blank contamination. The validation J qualifier indicates estimated value.

1.8 Serial Dilutions

The percent differences for the serial dilution for the total metals analysis of sample OU1-SS-SB316-0-1 were outside the laboratory acceptance criteria for Arsenic, Cadmium, Chromium, Copper, Nickel, Lead and Zinc; therefore the total Arsenic, Cadmium, Chromium, Copper, Nickel, Lead and Zinc concentrations for sample OU1-SS-SB316-0-1 are J qualified as estimated.

The percent difference for the serial dilution for Zinc step 2 using sample OU1-SS-SB316-0-1 was outside the laboratory acceptance criteria. Therefore, the Zinc concentration for sample OU1-SS-SB316-0-1 is J qualified as estimated.

Sample	Metal	Step	Laboratory Concentration* (mg/kg)	Validation concentration (mg/kg)
OU1-SS-SB316-0-1	Arsenic	Total	26.3	26.3 J
	Cadmium	Total	42.8	42.8 J
	Chromium	Total	48.4	48.4 J
	Copper	Total	197	197 J
	Nickel	Total	44.9	44.9 J
	Lead	Total	958	958 J
	Zinc	Total	13800	13800 J
	Zinc	2	41.0 J	41.0 J

* The laboratory J qualifier indicates method blank contamination. The validation J qualifier indicates estimated value.

1.9 Total Metals Comparison

A comparison of the total metals concentrations and the sums of the SEP fraction results was made. The relative percent difference between the two values was compared to a criterion of 40% RPD. Most of the results compared well; the metals with RPDs >40% are in bold in the table below. No qualifications were made based on this comparison. Identified issues with sequential extraction include extraction efficiency, reagent specificity and selectivity and element redistribution; these issues may explain some of the differences between the sum of the SEP concentrations and the total concentrations.

Sample	Metal	Total Concentration* (mg/kg)	Sum of SEP Concentrations (mg/kg)	Relative Percent Difference (%)
OU1-SS-SB316-0-1	Arsenic	26.3	39.3	40
	Cadmium	42.8	41.7	3
	Chromium	**48.4**	**89.2**	**59**
	Copper	197	214	8
	Lead	**958**	**1650**	**53**
	Mercury	0.97	1.3	29
	Nickel	44.9	54.8	20
	Selenium	1.0	0.84	17
	Zinc	13800	18900	31
OU1-SS-SB318-2-4	Arsenic	19.0	12.9	38
	Cadmium	9.4	11.6	21
	Chromium	61.1	67.2	10
	Copper	54.3	47.8	13
	Lead	130	156	18
	Mercury	0.14	0.15	7
	Nickel	40	50.5	23
	Selenium	**0.84 UG**	**0.32**	**200**
	Zinc	2480	2730	10

OU1-SS-SB313-2-4	**Arsenic**	**5.5**	**2.5**	**75**
	Cadmium	**0.33**	**0.086**	**120**
	Chromium	52.1	41.7	22
	Copper	7.9	5.9	29
	Lead	**10.4**	**4.0**	**89**
	Mercury	0.11 U	0.11 U	0
	Nickel	**40.5**	**23.5**	**53**
	Selenium	**1.7 UG**	**0.77**	**200**
	Zinc	**75.1**	**39.9**	**61**
OU1-SS-SB311-0-1	Arsenic	17.6	21.5	20
	Cadmium	0.65	0.50	26
	Chromium	52.3	55.4	6
	Copper	17.9	17.0	5
	Lead	25.9	31.5	20
	Mercury	0.10 B	0.087	14
	Nickel	22.7	28.6	23
	Selenium	0.65	0.87	29
	Zinc	168	156	7

* The laboratory UG qualifier indicates the laboratory reported an elevated reporting limit due to matrix interferences.

ATTACHMENT A
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by GeoSyntec's Data Review Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher that the concentration of the analyte in the sample due to positive bias attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Geosyntec consultants

1531 Dick Lonas Road, Building A
Knoxville, TN 37909
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Memorandum

TO: Jill Johnson

DATE: December 26, 2007

FROM: Geosyntec Consultants QA/QC Group

SITE: Carus Chemicals, FR1347

SUBJECT: Summary of Tier IV Validation of analytical results for Metals Analyses, H7J110169

Introduction

This report summarizes the findings of the full validation of three soil samples collected on behalf of the Carus Chemical Company project. These samples were collected on October 9-10, 2007. The samples were analyzed by TestAmerica Laboratories, Inc. (formerly STL), Knoxville, Tennessee. The samples were analyzed for Metals by EPA Methods 6010B and 7470A following Sequential Extraction Procedure (SEP). The SEP consists of a series of seven sequential extractions which are used to determine the solid-phase association in which the metals of interest exist in the soil matrix. The various steps of the sequential extraction are designed to dissolve the fraction of metal in the sample associated with a particular matrix component, for example, carbonates or organic matter. The seven fractions analyzed for this project are the exchangeable fraction, the organic fraction, the carbonate fraction, the non-crystalline materials faction, the metal hydroxide fraction, the acid/sulfide fraction and the residual fraction. In addition, a total metals concentration is determined.

The data were reviewed in accordance with the principles presented in *USEPA National Functional Guidelines for Laboratory Data Review, Inorganics* (EPA, 2004), the laboratory standard operating procedures (SOPs) and per the requirements of the specified methods.

Data for the following TestAmerica lot number and samples (this list comprises all SEP fractions resulting from the samples submitted to the laboratory) were reviewed.

Field Sample ID/SEP Step #	Laboratory Sample ID	Lot Number
OU1-SS-SB302-10.5-11.5/Step 1	J8PAK	H7J110169
OU1-SS-SB302-10.5-11.5/Step 2	J8PAW	
OU1-SS-SB302-10.5-11.5/Step 3	J8PA2	
OU1-SS-SB302-10.5-11.5/Step 4	J8PA4	

Field Sample ID/SEP Step #	Laboratory Sample ID	Lot Number
OU1-SS-SB302-10.5-11.5/Step 5	J8PA6	H7J110169
OU1-SS-SB302-10.5-11.5/Step 6	J8PA9	
OU1-SS-SB302-10.5-11.5/Step 7	J8PCC	
OU1-SS-SB302-10.5-11.5/Total	J8PCD	
OU1-SS-SB301-0-1/Step 1	J8PCG	
OU1-SS-SB301-0-1/Step 2	J8PCH	
OU1-SS-SB301-0-1/Step 3	J8PCJ	
OU1-SS-SB301-0-1/Step 4	J8PCK	
OU1-SS-SB301-0-1/Step 5	J8PCM	
OU1-SS-SB301-0-1/Step 6	J8PCN	
OU1-SS-SB301-0-1/Step 7	J8PCP	
OU1-SS-SB301-0-1/Total	J8PCQ	
OU1-SS-SB304-58-59/Step 1	J8PD6	
OU1-SS-SB304-58-59/Step 2	J8PD7	
OU1-SS-SB304-58-59/Step 3	J8PEE	
OU1-SS-SB304-58-59/Step 4	J8PEF	
OU1-SS-SB304-58-59/Step 5	J8PEG	
OU1-SS-SB304-58-59/Step 6	J8PEJ	
OU1-SS-SB304-58-59/Step 7	J8PEM	
OU1-SS-SB304-58-59/Total	J8PEN	

Executive Summary

All samples were analyzed as requested. All holding times were met. All sample results are usable as qualified with the exception of those qualified as rejected (R).

Incorrect error correction was observed on the chain of custody (COC) instead of the proper procedure of a single strike through, correction, and initials and date of person making the correction.

1.0 Metals (EPA Methods 6010B/7470A)

The soil samples were analyzed for the requested metals (EPA 6010B/7470A) following a seven step SEP extraction and a total metals digestion. Tier III validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPS and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations

⊗ Blanks
⊗ Laboratory Control Samples
✓ Matrix Spike/Matrix Spike Duplicate Samples
⊗ Laboratory Duplicate Samples
⊗ Serial Dilutions
⊗ Total Metals Comparison

1.1 Data Completeness

All analyses were performed as requested on the chain-of-custody records.

1.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

1.3 Calibrations

1.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for inductively coupled plasma (ICP) analysis and cold vapor atomic absorption (CVAA) initial calibrations.

1.3.2 Continuing Calibration Verification (CCV)

The percent recoveries in all associated CCVs were within the QC acceptance limits.

1.3.3 Contract Required Detection Limit (CRDL) Standard

The CRDL standards were within the control limits.

1.3.4 Interference Check Standards A and AB (ICSA/ICSAB)

ICSA/ICSAB met all acceptance criteria.

1.4 Blanks

1.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria with the following exceptions. Nickel for Step 1, Selenium for Step 5 and Zinc for Steps 2, 6, 7 and total Zinc were detected in the preparation blanks at concentrations less than the reporting limits, but greater than the method detection limits (MDL). Therefore, since Nickel, Selenium and Zinc were detected in the following samples at concentrations less than ten times the blank concentration, the Nickel, Selenium and Zinc concentrations are J+ qualified as estimated with a high bias.

Sample	Metal	Step	Laboratory Concentration (mg/kg)*	Validation concentration (mg/kg)
OU1-SS-SB301-0-1	Nickel	1	1.7 BJ	1.7 J+
	Selenium	5	0.68 J	0.68 J+
OU1-SS-SB302-10.5-11.5	Nickel	1	2.0 BJ	2.0 J+
	Selenium	5	0.39 BJ	0.39 J+
	Zinc	2	7.8 BJ	7.8 J+
OU1-SS-SB304-58-59	Nickel	1	1.2 BJ	1.2 J+
	Selenium	5	0.49 BJ	0.49 J+
	Zinc	2	27.9 J	27.9 J+

* The laboratory J qualifier indicates method blank contamination; the laboratory B qualifier indicates an estimated concentration, less than the reporting limit but above the MDL. The validation J qualifier indicates estimated value.

1.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICBs and CCBs met the acceptance criteria with a few exceptions; in several cases, the ICBs and CCBs had metal detections at concentrations less than the reporting limit, but greater than the MDLs. However, since the metals concentrations in the associated samples were greater than the reporting limits, no sample qualifications were required.

1.5 Laboratory Control Samples (LCS/LCS Duplicate, [LCSD])

All percent recoveries in the LCS/LCSDs were within the laboratory acceptance limits (75-125% recovery), with the following exceptions.

LCS Metal	Step	LCS Recovery (%)	LCSD Recovery (%)
Arsenic	3	77	73
Cadmium	2	128	131
Cadmium	4	30	30
Chromium	3	75	73
Lead	2	53	56
Mercury	1	16	17
Mercury	2	118	127
Mercury	3	9	15
Selenium	5	5	4.1
Zinc	2	130	137

Since the LCSD recoveries for Arsenic in step 3, Chromium in step 3 and Mercury in step 2 were just outside the acceptance limits and the LCS recoveries were acceptable, based on professional judgment, no qualifications were made to the sample results for these metals. Due to low (<75%, but >50%) LCS/LCSD recoveries of Lead in step 2, the concentrations of Lead in step 2 in the associated samples are J-qualified as estimated with a low bias or UJ qualified as estimated less than the reporting limit. Additionally, due to the low (<50%) LCS/LCSD recoveries of Cadmium in step 4, Mercury in steps 1 and 3 and Selenium in step 5, the associated sample results are R qualified as rejected. Due to the high LCS/LCSD (>125%) recoveries of Cadmium in step 2 and Zinc in step 2, the concentrations of Cadmium and Zinc in step 2 for the associated samples are J+ qualified as estimated with a high

bias.

Sample	Metal	Step	Laboratory Concentration (mg/kg)	Validation concentration (mg/kg)
OU1-SS-SB301-0-1	Cadmium	2	34.0	34.0 J+
	Cadmium	4	3.2	3.2 R
	Lead	2	38.6	38.6 J-
	Mercury	1	0.013 U	0.013 R
	Mercury	3	0.013 U	0.013 R
	Selenium	5	0.68 J	0.68 R
	Zinc	2	513 J	513 J+
OU1-SS-SB302-10.5-11.5	Cadmium	2	5.4	5.4 J+
	Cadmium	4	1.1	1.1 R
	Lead	2	5.7 U	5.7 UJ
	Mercury	1	0.013 U	0.013 R
	Mercury	3	0.013 U	0.013 R
	Selenium	5	0.39 BJ	0.36 R
	Zinc	2	7.8 BJ	7.8 J+
OU1-SS-SB304-58-59	Cadmium	2	5.4	5.4 J+
	Cadmium	4	2.6	2.6 R
	Lead	2	5.2 U	5.2 UJ
	Mercury	1	0.011 U	0.011 R
	Mercury	3	0.011 U	0.011 R
	Selenium	5	0.49 BJ	0.49 R
	Zinc	2	27.9 J	27.9 J+

* The laboratory J qualifier indicates method blank contamination; the laboratory B qualifier indicates an estimated concentration, less than the reporting limit but above the MDL. The validation J qualifier indicates estimated value.

1.6 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD pairs were not performed. Precision and accuracy were assessed from the LCS/LCSD pairs; precision was also assessed from the laboratory duplicate sample.

1.7 Laboratory Duplicate Samples

Sample OU1-SS-SB302-10.5-11.5 was analyzed as the laboratory duplicate. The relative percent differences (RPD) were within the laboratory acceptance limits (0-30%), with the following exceptions.

Metal	Step	RPD (%)
Arsenic	2	200
Cadmium	4	62
	7	47
Chromium	4	200
Lead	4	71
Zinc	7	39

Therefore, the concentrations of Arsenic in step 2, Cadmium in steps 4 and 7, Chromium in step 4, Lead in step 4 and Zinc in step 7 in sample OU1-SS-SB302-10.5-11.5 are J qualified as estimated.

Sample	Metal	Step	Laboratory Concentration* (mg/kg)	Validation concentration (mg/kg)
OU1-SS-SB302-10.5-111.5	Arsenic	2	2.1 B	2.1 J
	Cadmium	4	1.1	1.1 J
		7	0.23 B	0.23 J
	Chromium	4	0.18 B	0.18 J
	Lead	4	2.0	2.0 J
	Zinc	7	129 J	129 J

* The laboratory J qualifier indicates method blank contamination; the laboratory B qualifier indicates an estimated concentration, less than the reporting limit but above the MDL. The validation J qualifier indicates estimated value.

1.8 Serial Dilutions

The percent differences for the serial dilution for the total metals analysis of sample OU1-SS-SB302-10.5-11.5 were outside the laboratory acceptance criteria for Cadmium, Chromium, Copper, Nickel, Lead and Zinc; therefore the total Cadmium, Chromium, Copper, Nickel, Lead and Zinc concentrations for sample OU1-SS-SB302-10.5-111.5 are J qualified as estimated.

The percent difference for the serial dilution for Lead in steps 4 and 5, Nickel in step 5 and Zinc in step 5, using sample OU1-SS-SB302-10.5-11.5, were outside the laboratory acceptance criteria. Therefore, the concentrations for Lead in steps 4 and 5, Nickel in step 5 and Zinc in step 5 for sample OU1-SS-SB302-10.5-11.5 are J qualified as estimated.

Sample	Metal	Step	Laboratory Concentration* (mg/kg)	Validation concentration (mg/kg)
OU1-SS-SB302-10.5-11.5	Cadmium	Total	47.0	47.0 J
	Chromium	Total	52.1	52.1 J
	Copper	Total	50.8	50.8 J
	Nickel	Total	56.7	56.7 J
	Lead	Total	56.7	56.7 J
	Zinc	Total	3780 J	3780 J
	Lead	4	2.0	2.0 J
	Lead	5	39.8	39.8 J
	Nickel	5	22.3	22.3 J
	Zinc	5	534	534 J

* The laboratory J qualifier indicates method blank contamination. The validation J qualifier indicates estimated value.

1.9 Total Metals Comparison

A comparison of the total metals concentrations and the sums of the SEP fraction results was made. The relative percent difference between the two values was compared to a criterion of 40% RPD. Most of the results compared well; the metals with RPDs >40% are in bold in the table below. No qualifications were made based on this comparison. Identified issues with sequential extraction include extraction efficiency, reagent specificity and selectivity and element redistribution; these issues

may explain some of the differences between the sum of the SEP concentrations and the total concentrations.

Sample	Metal	Total Concentration* (mg/kg)	Sum of SEP Concentrations (mg/kg)	Relative Percent Difference (%)
OU1-SS-SB301-0-1	Arsenic	117	109	7
	Cadmium	75.7	92.2	20
	Chromium	**54.3**	**30.5**	**56**
	Copper	511	438	15
	Lead	3140	3160	1
	Mercury	14.1	10.6	28
	Nickel	45.9	44.8	2
	Selenium	1.8	2.3	24
	Zinc	53300 J	63300	17
OU1-SS-SB302-10.5-11.5	Arsenic	32.7	25.0	27
	Cadmium	47.0	44.9	5
	Chromium	52.1	44.4	16
	Copper	50.8	42.2	18
	Lead	56.7	57.7	2
	Mercury	0.13 U	0.13 U	0
	Nickel	73.3	57.1	25
	Selenium	**0.63 U**	**1.0**	**200**
	Zinc	3780 J	3820	1
OU1-SS-SB304-58-59	Arsenic	9.9	14.6	38
	Cadmium	90.9	90.8	0
	Chromium	38.1	45.8	18
	Copper	428	369	15
	Lead	284	373	27
	Mercury	0.11 U	0.11 U	0
	Nickel	49.4	43.8	12
	Selenium	**0.77 UG**	**0.49**	**200**
	Zinc	21000	15100	33

* The laboratory J qualifier indicates method blank contamination; the laboratory UG qualifier indicates the laboratory reported an elevated reporting limit due to matrix interferences.

ATTACHMENT A
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by GeoSyntec's Data Review Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher that the concentration of the analyte in the sample due to positive bias attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Geosyntec consultants

2240 Sutherland Avenue, Suite 107
Knoxville, TN 37919
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Memorandum

TO: Richard Berggreen

DATE: April 7, 2010

FROM: Geosyntec Consultants QA/QC Group

SITE: Mattheissen and Hegeler Zinc Company Site, OU1

SUBJECT: Summary of Tier II Validation of analytical results for CAS Report R1001329

Introduction
This report summarizes the findings of the Tier II validation of three slag samples collected on behalf of the Mattheissen and Hegeler Zinc Company Site, OU1 project. These samples were collected on August 12-13, 2009. The samples were analyzed by Columbia Analytical Services, Inc. (CAS), Rochester, New York for total metals by EPA methods 6020 and 6010B, mercury by EPA method 7471A and total solids by EPA modified method 160.3.

The data were reviewed in accordance with the principles presented in *USEPA National Functional Guidelines for Laboratory Data Review, Inorganics* (EPA, 2004), and per the requirements of the QAPP, the laboratory standard operating procedures and the specified methods.

Data for the following samples were reviewed.

Lab ID	Client ID
R1001329-001	OU1-SS-LRS-414S-0908
R1001329-002	OU1-SS-SLP-416S-0908
R1001329-005	OU1-SS-SLP-417S-0908

Matrix –slag

Executive Summary
The analyses were performed as requested on the chain of custody (COC). The matrix on the COC was marked as “other”; the report narrative indicated that soil samples were received. In addition, the report narrative indicated that the samples were analyzed outside the method specific holding times at the client’s request.

The report narrative also stated that the CRDL (low level) standard percent recovery for zinc was outside the control limits; review of the full data package indicated that the recovery was high, 162% recovery. Since the recovery was less than 180% and the associated sample results were greater than two times the reporting limit, no sample qualifications are required.

1.0 Metals Analyses of Soil Samples (EPA Methods 6020/6010B/7471A)

The slag samples were analyzed for the requested metals and mercury (EPA 6020/6010B/7471A) following metals and mercury digestion. Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPS and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Data Completeness
✓ Internal Standards
⊗ Holding Times and Preservation
⊗ Blanks
✓ Laboratory Control Samples
⊗ Matrix Spike/Matrix Spike Duplicate Samples
⊗ Laboratory Duplicate Samples
✓ Serial Dilutions

1.1 Data Completeness

The analyses were performed as requested on the COC. The analytical completeness for the project, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for analysis, is 97%. As noted below in the Holding Time and Preservation section, the samples were analyzed outside the method-specified holding times. The concentrations of selenium and thallium in sample OU1-SS-LRS-414S-0908 are R qualified as rejected.

1.2 Internal Standards

The internal standard recoveries are not part of the Level II data package; however, the report narrative indicated that the internal standard recoveries for Ge were high and outside the laboratory acceptance criteria in sample OU1-SS-SLP-417S-0908. Based on professional judgment, no qualifications are required for sample OU1-SS-SLP-417S-0908 since the internal standard recovery in another dilution (ten-fold dilution) of the sample was acceptable.

1.3 Holding Times and Preservation

The analyses were performed outside the method-specified holding times for methods 7471A, 6010B and 6020. The samples were collected on 8/12-13/09 and analyzed more than 6 months outside the holding time for mercury and more than 1

month outside the holding times for the other metals. Therefore, the detected concentrations of metals in the samples are J- qualified as estimated with a low bias and the undetected concentrations of metals in the samples are R qualified as rejected.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SS-LRS-414S-0908	Aluminum	17200	17200 J-
	Arsenic	7.3	7.3 J-
	Barium	53.4	53.4 J-
	Beryllium	3.1	3.1 J-
	Cadmium	1.8	1.8 J-
	Calcium	25300	25300 J-
	Chromium	3.0	3.0 J-
	Cobalt	5.9	5.9 J-
	Copper	309	309 J-
	Iron	57200	57200 J-
	Lead	35.9	35.9 J-
	Magnesium	1150	1150 J-
	Manganese	1360	1360 J-
	Mercury	0.251	0.251J-
	Nickel	21.7	21.7 J-
	Potassium	681 J	681 J-
	Selenium	0.542 U	0.542 R
	Silver	14.0	14.0 J-
	Antimony	25.6 J	25.6 J-
	Sodium	564 J	564 J-
	Thallium	0.012 U	0.012 R
	Vanadium	11.1	11.1 J-
	Zinc	8180	8180 J-
OU1-SS-SLP-416S-0908	Aluminum	5790	5790 J-
	Arsenic	11.3	11.3 J-
	Barium	103	103 J-
	Beryllium	0.477 J	0.477 J-
	Cadmium	17.8	17.8 J-
	Calcium	4660	4660 J-
	Chromium	15.2	15.2 J-
	Cobalt	6.4	6.4 J-
	Copper	110	110 J-
	Iron	106000	106000 J-

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
	Lead	208	208 J-
	Magnesium	639 J	639 J-
	Manganese	389	389 J-
	Mercury	0.537	0.537 J-
	Nickel	17.5	17.5 J-
	Potassium	1050 J	1050 J-
	Selenium	2.2	2.2 J-
	Silver	5.3 J	5.3 J-
	Antimony	2.1 J	2.1 J-
	Sodium	354 J	354 J-
	Thallium	0.172 J	0.172 J-
	Vanadium	24.2	24.2 J-
	Zinc	5930	5930 J-
OU1-SS-SLP-417S-0908	Aluminum	5310	5310 J-
	Arsenic	209	209 J-
	Barium	305	305 J-
	Beryllium	0.377 J	0.377 J-
	Cadmium	5.6	5.6 J-
	Calcium	5610	5610 J-
	Chromium	7.3	7.3 J-
	Cobalt	29.8	29.8 J-
	Copper	4190	4190 J-
	Iron	85900	85900 J-
	Lead	1050	1050 J-
	Magnesium	1920	1920 J-
	Manganese	1830	1830 J-
	Mercury	0.034 J	0.034 J-
	Nickel	958	958 J-
	Potassium	731 J	731 J-
	Selenium	3.4 J	3.4 J-
	Silver	51.9	51.9 J-
	Antimony	138	138 J-
	Sodium	735 J	735 J-
	Thallium	0.013 J	0.013 J-
	Vanadium	6.2	6.2 J-
	Zinc	30100	30100 J-

1.4 Blanks

1.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria, with the following exceptions. Copper, iron, magnesium and antimony were detected in the method blank at estimated concentrations less than the reporting limit and greater than the IDL. However, since the concentrations of copper, iron, magnesium and antimony in the associated samples are greater than the reporting limits, no sample qualifications are required. Cobalt was detected in the method blank at a concentrations greater than the reporting limit. Validation guidance indicates that the concentrations of cobalt in the associated samples that are less than ten times the method blank concentration are J+ qualified as estimated with a high bias. However, since the cobalt concentrations in the associated samples were qualified due to analyses outside the holding time, no additional qualifications are applied.

1.4.1 Field Blanks

Equipment blanks and field blanks were collected on 8/12-13/09 with the samples and reported in laboratory report R0904599. The field blanks and equipment blanks met the acceptance criteria, with the following exceptions.

Barium and calcium were detected in equipment blank OU1-GW-MW401A-090812 and calcium was detected in equipment blank OU1-GW-MW401B-090812, at estimated concentrations less than the reporting limit and greater than the IDL. The concentrations of barium and calcium in the associated sample are greater than the reporting limit; therefore, no sample qualifications are required.

Copper and thallium were detected in equipment blank OU1-GW-MW401A-090812 at estimated concentrations. The copper concentration in the associated sample is greater than ten times the equipment blank concentration (not estimated concentrations); therefore, no copper qualifications are required. The thallium concentration in the associated sample is not detected; therefore, no thallium qualifications are required.

Calcium and manganese were detected in field blank OU1-GW-MW405-090813 at estimated concentrations less than the reporting limit and greater than the IDL. No sample qualifications were required since the calcium and manganese concentrations in the associated samples are greater than the reporting limits.

Copper was detected in equipment blank OU1-GW-MW401B-090813 at an estimated concentration. No sample qualifications were required since the copper concentrations in the associated samples are greater than ten times the equipment blank concentration.

Barium, calcium and cobalt were detected in equipment blank OU1-GW-MW401A-090813 at estimated concentrations less than the reporting limits and

greater than the IDL. No sample qualifications were required since the barium, calcium and cobalt concentrations in the associated samples are greater than the reporting limits.

Copper and nickel were detected in equipment blank OU1-GW-MW401A-090813 at estimated concentrations. No sample qualifications were required since the copper and nickel concentrations in the associated samples are greater than ten times the equipment blank concentrations.

Iron, manganese and zinc were detected in equipment blank OU1-GW-MW401A-090813 at concentrations greater than the reporting limits. No sample qualifications were required since the iron, manganese and zinc concentrations in the associated samples are greater than ten times the equipment blank concentrations.

1.5 Laboratory Control Samples (LCS)

The percent recoveries in the LCSs were within the acceptance limits.

1.6 Matrix Spike (MS)

Sample OU1-SS-SLP-417S-0908 was analyzed as the matrix spike for the method 6020 analyses; the compound recoveries were within the laboratory acceptance criteria, with the following exceptions. The spike recovery acceptance criteria do not apply for arsenic, barium, cobalt, copper, lead and nickel since the concentrations of arsenic, barium, cobalt, copper, lead and nickel in the unspiked sample exceeded the spike concentration by a factor of four or greater. In addition, the recoveries of cadmium, chromium and selenium were low and outside the laboratory acceptance criteria; the post digestion spikes were within the laboratory acceptance criteria. Validation guidance indicates that the concentrations of cadmium, chromium and selenium in the associated samples are J qualified as estimated. However, since the metal concentrations in sample OU1-SS-SLP-417S-0908 were qualified due to analyses outside the holding time, no additional qualifications are applied.

It was noted that no matrix spike information was reported for the mercury and method 6010B analyses since the sample used for the MS was a batch QC sample.

1.7 Laboratory Duplicate Samples

Sample OU1-SS-SLP-417S-0908 was analyzed as the laboratory duplicate for the method 6020 analyses. The RPD results were acceptable, with the following exceptions. The RPD duplicate results for sample OU1-SS-SLP-417S-0908 for arsenic, barium, cadmium, chromium, cobalt, copper, lead and vanadium were high and outside the laboratory acceptance criteria. Validation guidance indicates that the concentrations of arsenic, barium, cadmium, chromium, cobalt, copper, lead and vanadium in the associated samples are J qualified as estimated. However, since the metal concentrations in sample OU1-SS-SLP-417S-0908 were qualified due to analyses outside the holding time, no additional qualifications are applied.

It was noted that no duplicate information was reported for the mercury and method 6010B analyses since the sample used for the laboratory duplicate was a batch QC sample.

1.8 Serial Dilutions

The percent differences for the compounds for the serial dilution of sample OU1-SS-SLP-417S-0908 were within of the laboratory acceptance criteria.

ATTACHMENT A
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Review Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher that the concentration of the analyte in the sample due to bias attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower that the concentration of the analyte in the sample due to bias attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Geosyntec consultants

1531 Dick Lonas Road, Building A
Knoxville, TN 37909
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Memorandum

TO: Nandra Weeks

DATE: February 28, 2008

FROM: Geosyntec Consultants QA/QC Group

SITE: Mattheissen and Hegeler Zinc Company Site, OU1

SUBJECT: Summary of Tier III Validation of analytical results for CAS Report R2741246

Introduction
This report summarizes the findings of the full validation of 7 groundwater samples, one trip blank, one field blank and one equipment blank collected on behalf of the Mattheissen and Hegeler Zinc Company Site, OU1 project. These samples were collected on January 14, 15, and 17, 2008. The samples were analyzed by Columbia Analytical Services, Inc. (CAS), Rochester, New York. The samples were analyzed for Volatile Organic Compounds by EPA Method 8260B, Semivolatile Organic Compounds by EPA Method 8270C, Total and Dissolved metals by EPA Methods 6020 and 6010B, Total and Dissolved Mercury by EPA Method 7470A, Total Organic Carbon (TOC) by EPA Method 415.1, Cyanide by EPA Method 9012A, Sulfate by EPA Method 300.0 and ortho-Phosphate by EPA Method 365.1.

The data were reviewed in accordance with the principles presented in *USEPA National Functional Guidelines for Laboratory Data Review, Organics* (EPA, 2005), *USEPA National Functional Guidelines for Laboratory Data Review, Inorganics* (EPA, 2004), and per the requirements of the QAPP, the laboratory standard operating procedures and the specified methods.

Data for the following samples were reviewed.

Lab ID	Client ID
1060748	OU1-GW-G-101-0712
1060749	OU1-GW-G-02-0712
1060754	OU1-GW-MW-A-0712
1060756	OU1-GW-MW404-0712
1060760	OU1-GW-P-7-0712
1060765	OU1-GW-P-9-0712
1060781	OU1-GW-MW402-0712

1060782	OU1-GW-G-04-0712
1060783	OU1-GW-MW405-0712
1060784	OU1-GW-MW401-0712
1060785	OU1-GW-MW404-0712
1060786	SOLUBLE OU1-GW-G-101-0712
1060787	SOLUBLE OU1-GW-MW-A-0712
1060788	SOLUBLE OU1-GW-MW404-071
1060789	SOLUBLE OU1-GW-G-04-0712

Matrix – groundwater, 3 aqueous trip blank, 1 aqueous field blank and 1 aqueous equipment blank

Executive Summary
All analyses were performed as requested on the chain of custody (COC), except as noted below.

Sample OU1-GW-G-101-0712 was not analyzed for volatiles by EPA Method 8260B, although requested on the COC. In addition, this sample was analyzed for TOC, although the COC did not request that analysis. Based on email communication between the laboratory and client, the sample was collected in the bottle preserved with sulfuric acid, which is appropriate to the TOC analysis; therefore, the volatiles analysis could not be performed since some organic compounds break down with sulfuric acid preservation.

The methods listed on the COC for TOC analysis and ortho-phosphate analysis were EPA Method 9060 and EPA Method 300.0/9056, respectively. The methods used by the laboratory for analysis were EPA Method 415.1 for TOC and EPA Method 365.1 for ortho-phosphate.

The collection dates for the samples on the COC did not list the year; for example, the collection date was listed as 12/5.

Incorrect error correction was observed on the COC instead of the proper procedure of a single strike through, correction, and initials and date of person making the correction.

All holding times were met, with the exception of the ortho-phosphate analyses of samples OU1-GW-G-02-0712 and OU1-GW-G-04-0712. Both samples were received after the 48 hour holding time had expired. The samples were analyzed within 96 hours of sample collection, per instructions from the client.

1.0 Volatile Organic Compounds (EPA Method 8260B)
Full validation including recalculation was performed with the laboratory data for the analysis of volatile organic compounds (EPA Method 8260B). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ✓ Internal Standards
- ✓ Performance Check Sample
- ⊗ Blanks
- ✓ System Monitoring Compounds (Surrogates)
- ✓ Matrix Spike/Matrix Spike Duplicate Sample
- ✓ Laboratory Control Samples
- ✓ Compound Identification and Quantitation

1.1 Data Completeness

All analyses were performed as requested on the COC.

1.2 Holding Times and Preservation

All samples were analyzed within the 14 day technical holding time from date of collection for volatiles.

1.3 Calibrations

1.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the percent relative standard deviation (%RSD) of the relative response factors (RRFs). For all target analytes, the RRFs met the method criteria; the RSDs met the method criteria for all compounds or the coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibrations.

1.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the RRFs met the method criteria; the percent differences (%D) between the RRFs in the initial and continuing calibration standards for all target analytes were within the method acceptance criteria.

1.4 Internal Standards

All internal standard retention times are within ±30 seconds of the associated continuing calibration internal standard retention time. All internal standard area counts were within the acceptance criteria (>50% and <150%) of the associated continuing calibration internal standard area counts.

1.5 Performance Check Samples

An instrument performance check sample (tune standard) was analyzed at the beginning of each 12-hour period during sample analysis. The samples were analyzed within the 12-hour period. All ion abundance criteria were met for bromofluorobenzene (BFB).

1.6 Blanks

Methylene chloride was detected in the method blank, at an estimated concentration greater than the method detection limit (MDL) but less than the reporting limit (RL).

Therefore, the estimated concentrations of methylene chloride in the samples greater than the MDL but less than the RL are U qualified as not detected at the RL.

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-GW-MW-A-0712	Methylene chloride	0.24 JB	1.0 U
OU1-GW-MW404-0712	Methylene chloride	0.26 JB	1.0 U
OU1-GW-MW402-0712	Methylene chloride	0.28 JB	1.0 U
OU1-GW-MW405-0712	Methylene chloride	0.27 JB	1.0 U
OU1-GW-MW401-0712	Methylene chloride	0.22 JB	1.0 U

Sample OU1-GW-MW402-0712 was submitted as the trip blank. Acetone and methylene chloride were detected in the trip blank at estimated concentrations greater than the MDL, but less than the RL. Acetone was not detected in the associated samples and as noted above, methylene chloride was detected in the laboratory method blank resulting in qualification of the associated samples including the trip blank. No additional sample qualifications were made to the methylene chloride concentrations in the samples based on the trip blank results.

Sample OU1-GW-MW405-0712 was submitted as the field blank. Acetone, 2-butanone and methylene chloride were detected in the field blank at estimated concentrations greater than the MDL, but less than the RL. Acetone and 2-butanone were not detected in the associated samples, and again as noted above, methylene chloride was detected in the laboratory method blank resulting in the qualification of the associated samples including the field blank. No additional sample qualifications were made to the methylene chloride concentrations in the associated samples based on the field blank results.

Sample OU1-GW-MW401-0712 was submitted as the equipment blank. Acetone, 2-butanone and methylene chloride were detected in the equipment blank at estimated concentrations greater than the MDL, but less than the RL. Acetone and 2-butanone were not detected in the associated samples, and as noted above, methylene chloride was detected in the laboratory method blank and associated samples including the equipment blank. No additional sample qualifications were made to the methylene chloride concentrations in the associated samples based on the equipment blank results.

1.7 System Monitoring Compounds (Surrogates)
All surrogate recoveries were within the laboratory acceptance limits.

1.8 Laboratory Control Samples (LCS)
All LCS recoveries were within the laboratory control limits.

1.9 Matrix Spike/Matrix Spike Duplicate Sample (MS/MSD)
Sample OU1-GW-MW-A-0712 was analyzed as the MS/MSD. All recoveries and RPDs were within the laboratory control limits.

1.10 Compound Identification and Quantitation

All compound identifications and quantitations were appropriate.

2.0 Semivolatile Organic Compounds (EPA Method 8270C)

Full validation including recalculation was performed on the laboratory data for the analysis of semivolatile organic compounds (EPA Method 8270C). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Data Completeness
✓ Holding Times and Preservation
⊗ Calibrations
✓ Internal Standards
⊗ Performance Check Sample
⊗ Blanks
✓ System Monitoring Compounds (Surrogates)
⊗ Laboratory Control Samples
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Compound Identification and Quantitation

2.1 Data Completeness

All analyses were performed as requested on the COC.

2.2 Holding Times and Preservation

The samples for semivolatile analysis were extracted within the 7 day technical holding time from date of collection and analyzed within the 40 day technical holding time from date of extraction.

2.3 Calibrations

2.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the %RSD of the RRFs. For all target analytes, the RRFs met the method criteria; the RSDs met the method or validation criteria for all compounds or the coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibrations. It was noted that linear curve fits using only 5 points were used for 2,4-dinitrophenol and pentachlorophenol; Method 8000 requires the use of a minimum of 6 points for linear curve fits. However, based on professional judgment, no sample qualifications were made.

2.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the RRFs met the method criteria; the percent differences (%D) between the RRFs in the initial and continuing calibration

standards for all target analytes were within the method or validation acceptance criteria.

2.4 Internal Standards

All internal standard retention times are within ±30 seconds of the associated continuing calibration internal standard retention time. All internal standard area counts were within the acceptance criteria (>50% and <150%) of the associated continuing calibration internal standard area counts.

2.5 Performance Check Samples

An instrument performance check sample was analyzed at the beginning of each 12-hour period during sample analysis. The samples were analyzed within the 12-hour period. All ion abundance criteria were met for decafluorotriphenyl-phosphine (DFTPP). It was noted that on all 5B Forms, the percent relative abundances for mass 441 compared to mass 443 were wrong. However, the raw data confirmed that mass 441 passed the method criteria; therefore, no sample qualifications were required. The laboratory was notified of the error.

2.6 Blanks

There were no detections of the project compounds of concern in the laboratory method blank.

Sample OU1-GW-MW401-0712 was submitted as the equipment blank. The following compounds were detected in the equipment blank: Bis(2-ethylhexylphthalate, fluoranthene and phenanthrene. However, since none of these compounds were detected in the associated samples, no sample qualifications were required.

2.7 System Monitoring Compounds (Surrogates)

All surrogate recoveries were within the laboratory acceptance limits.

2.8 Laboratory Control Samples (LCS)

All LCS recoveries were within the laboratory control limits, with the exception of benzaldehyde, which had high recoveries, outside of the laboratory control limits, in the LCS and LCSD. However, since benzaldehyde was not detected in any of the samples, no sample qualifications were required. Additionally, 3-Nitroaniline recovery in the LCS was low and outside of the laboratory control limits. Therefore, the undetected concentrations of 3-nitroaniline in the samples are UJ qualified as estimated less than the RL.

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-GW-101-0712	3-Nitroaniline	50 U	50 UJ
OU1-GW-MW-A-0712	3-Nitroaniline	47 U	47 UJ
OU1-GW-MW404-0712	3-Nitroaniline	47 U	47 UJ
OU1-GW-MW401-0712	3-Nitroaniline	47 U	47 UJ

2.9 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Sample OU1-GW-MW-A-0712 was analyzed as the MS/MSD. All recoveries and RPDs were within the laboratory control limits, with the following exceptions. Benzaldehyde recoveries in the MS/MSD were high and outside of the laboratory control limits. However, since benzaldehyde was not detected in sample OU1-GW-MW-A-0712, no sample qualifications were required. The following compounds had low recoveries outside of the laboratory control limits in the MS and/or MSD: 3,3'dichlorobenzidine, 3-nitroaniline, and 4-nitroaniline. Therefore, the undetected concentrations of 3,3'-dichlorobenzidine, 3-nitroaniline, and 4-nitroaniline in sample OU1-GW-MW-A-0712 are UJ qualified as estimated less than the RL.

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-GW-MW-A-0712	3-Nitroaniline	47 U	47 UJ
	4-Nitroaniline	47 U	47 UJ
	3,3'- Dichlorobenzidine	9.4 U	9.4 UJ

2.10 Compound Identification and Quantitation

All compound identifications and quantitations were appropriate.

3.0 Metals (EPA Methods 6020/6010B/7470A)

The water samples were analyzed for the requested total and dissolved metals and Mercury (EPA 6020/6010B/7470A/7471A) following metals digestion and mercury digestion. Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPS and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Data Completeness
✓ Holding Times and Preservation
✓ Calibrations
✓ Blanks
✓ Laboratory Control Samples
⊗ Matrix Spike/Matrix Spike Duplicate Samples
⊗ Laboratory Duplicate Samples
⊗ Serial Dilutions
✓ Compound Identification and Quantitation

3.1 Data Completeness

All analyses were performed as requested on the COC.

3.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

3.3 Calibrations

3.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for inductively coupled plasma/mass spectrometry (ICP/MS) analysis, inductively coupled plasma (ICP) analysis and cold vapor atomic absorption (CVAA) initial calibrations.

3.3.2 Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV)

The percent recoveries in all associated ICVs and CCVs were within the QC acceptance limits.

3.3.3 CRDL (Detection Limit) Standard

The CRDL standards were within the control limits.

3.3.4 ICSA/ICSAB (Interference Check) Standards

The ICSA/ICSAB standards met all acceptance criteria.

3.4 Blanks

3.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria, with the following exceptions; antimony, arsenic, chromium, copper, manganese and vanadium were detected in the preparation blank at estimated concentrations less than the RL, but greater than the instrument detection limits (IDL). However, since arsenic, copper, manganese and vanadium were either not detected or detected in the associated samples at concentrations greater than the RL, no sample qualifications were required. Several samples had antimony and/or chromium concentrations at estimated concentrations less than the RL, but greater than the IDL; for these samples, the concentrations of antimony and/or chromium are U qualified as not detected at the RL.

Sample	Metal	Laboratory Concentration (ug/L)	Validation concentration (ug/L)
OU1-GW-G-101-0712	Chromium	1.5 B	3.0 U
	Dissolved Chromium	1.2 B	3.0 U
OU1-GW-P-9-0712	Antimony	0.484 B	1.0 U
	Chromium	1.3 B	3.0 U
OU1-GW-G-04-0712	Chromium	1.9 B	3.0 U
OU1-GW-MW405-0712	Chromium	1.3 B	3.0 U
OU1-GW-MW401-0712	Antimony	0.406 B	1.0 U
	Chromium	2.6 B	3.0 U

3.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICBs and CCBs met the acceptance criteria, with the following exceptions. Antimony, arsenic, magnesium, manganese, sodium and selenium were detected in the ICB and/or CCB at concentrations less than the RL, but greater than the IDL. However, since arsenic, magnesium and manganese were either

not detected or detected in the associated samples at concentrations greater than the RL, no sample qualifications were required.

The samples were analyzed at a five fold dilution for arsenic and selenium. Due to the concentrations of arsenic and selenium in several samples as compared to the associated ICB or CCBs concentrations of arsenic and selenium, the arsenic and selenium concentrations detected in the samples at concentrations less than the RL, but greater than the IDL are U qualified as undetected at the RL or reported at an elevated RL, based on professional judgment.

Samples OU1-GW-MW405-0712 and OU1-GW-MW401-0712 had estimated sodium concentrations less than the RL but greater than the IDL. The associated CCBs also had estimated sodium concentrations less than the RL but greater than the IDL; therefore, the sodium concentrations in samples OU1-GW-MW405-0712 and OU1-GW-MW401-0712 are U qualified as undetected at the RL.

Sample	**Metal**	**Laboratory Concentration (ug/L)**	**Validation concentration (ug/L)**
OU1-GW-MW404-0712	Selenium	1.6 B	5.0 U
	Dissolved Arsenic	1.6 B	5.0 U
	Dissolved Selenium	7.6	7.6 U
OU1-GW-P-7-0712	Arsenic	1.3 B	5.0 U
	Selenium	2.6 B	5.0 U
OU1-GW-P-9-0712	Arsenic	3.4 B	5.0 U
	Selenium	2.7 B	5.0 U
OU1-GW-G-04-0712	Arsenic	2.1 B	5.0 U
	Dissolved Arsenic	1.7 B	5.0 U
	Dissolved Selenium	5.3	5.3 U
OU1-GW-MW405-0712	Arsenic	0.574 B	5.0 U
	Selenium	4.0 B	5.0 U
	Sodium	75.9 B	5000 U
OU1-GW-MW401-0712	Arsenic	1.3 B	5.0 U
	Selenium	4.8 B	5.0 U
	Sodium	288 B	5000 U
OU1-GW-G-101-07	Dissolved Arsenic	1.9 B	5.0 U
	Dissolved Selenium	6.2	6.2 U
OU1-GW-MW-A-0712	Dissolved Arsenic	1.3 B	5.0 U
	Dissolved Selenium	6.2	6.2 U

3.5 Laboratory Control Samples (LCS)

All percent recoveries in the LCS were within the acceptance limits.

3.6 Matrix Spike (MS)

Sample OU1-GW-MW-A-0712 was analyzed as a total metals MS. The compound recoveries were within the laboratory control limits, with the following exceptions. Calcium, magnesium, manganese, nickel, potassium, and zinc recoveries were high and outside of the laboratory control limits; however, since the sample concentrations were greater than four times the spike concentrations, no sample qualifications were required.

Sample OU1-GW-G-04-0712 was analyzed as a total metals MS. The recoveries were within the laboratory control limits, with the following exceptions. Calcium recovery was high and magnesium recovery was low, both outside of the laboratory control limits; however, since the sample concentrations were greater than four times the spike concentrations, no sample qualifications were required.

Sample OU1-GW-MW-A-0712 was analyzed as the dissolved metals MS. The recoveries were within the laboratory control limits, with the following exceptions. Calcium, magnesium, nickel and sodium recoveries were low and outside of the laboratory control limits; however, since the sample concentrations were greater than four times the spike concentrations, no sample qualifications were required.

3.7 Laboratory Duplicate Samples

Sample OU1-GW-MW-A-0712 was analyzed as the laboratory duplicate for both total and dissolved metals. The RPD results were acceptable, with the following exceptions. Selenium and silver had high RPD results for the total metals analysis, outside of the laboratory control limits; however, since the total selenium and silver concentrations in sample OU1-GW-MW-A-0712 are less than five times the RL, no sample qualifications are required.

Sample OU1-GW-G-04-0712 was analyzed as a total metals laboratory duplicate. The RPD results were acceptable, with the exception of silver; however, since the silver concentration in sample OU1-GW-G-04-0712 is less than five times the RL, no sample qualifications are required.

3.8 Serial Dilutions

The percent differences for the compounds for the serial dilution for the total metals analysis of sample OU1-GW-MW-A-0712 were outside of the laboratory acceptance criteria for selenium and silver; however, these metals concentrations in the serial dilution are less than 50 times the IDL. Therefore, no sample qualifications are required.

The percent differences for the compounds for the serial dilution for the total metals analysis of sample OU1-GW-G-04-0712 were outside of the laboratory acceptance criteria for aluminum, antimony, arsenic, chromium, copper, lead, selenium and silver; however, these metals concentrations in the serial dilution are less than 50 times the IDL. Therefore, no sample qualifications are required.

The percent differences for the compounds for the serial dilution for the dissolved metals analysis of sample OU1-GW-MW-A-0712 were outside of the laboratory acceptance criteria for antimony, arsenic, selenium and silver; however, these metals concentrations in the serial dilution are less than 50 times the IDL. Therefore, no sample qualifications are required.

3.9 Compound Identification and Quantitation

The project acceptance limits for the ICP-MS internal standards are 30-170% recovery. All internal standard recoveries were within the project acceptance limits.

Four samples were analyzed for both total and dissolved metals. All four samples had some total metals concentrations less than the dissolved metals concentrations. In each of these three samples, the difference between the total and dissolved metals concentrations were less then 10% for most metals; however, for samples with percent difference greater than 10%, the total and dissolved metals concentrations are J qualified as estimated. The following table summarizes the percent differences between the total and dissolved iron concentrations and the appropriate qualifications for these four samples.

Sample	Metal	Total Concentration (ug/L)	Dissolved Concentration (ug/L)	Percent Difference (%)	Total Validation Result (ug/L)	Dissolved Validation Result (ug/L)
OUI-GW-G-101-0712	Barium	32.9	33.1	1	NA	NA
	Calcium	250000	253000	1	NA	NA
	Magnesium	132000	135000	2	NA	NA
	Nickel	18.7	21.3	13	18.7 J	21.3 J
	Potassium	13900	14000	1	NA	NA
	Sodium	272000	275000	1	NA	NA
OUI-GW-MW-A-0712	Cadmium	81.5	82.4	1	NA	NA
	Cobalt	4.5 B	4.7 B	4	NA	NA
	Copper	6.3	6.5	3	NA	NA
	Magnesium	80100	81200	1	NA	NA
	Manganese	4470	4540	2	NA	NA
	Nickel	80.6	97.4	19	80.6 J	97.4 J
	Potassium	111000	113000	2	NA	NA
OUI-GW-MW-404--0712	Cadmium	81.8	82.9	1	NA	NA
	Calcium	720000	703000	2	NA	NA
OUI-GW-G-04-0712	Cobalt	3.1 B	3.2 B	3	NA	NA
	Nickel	13.8	14.9	8	NA	NA

NA-not applicable

The concentrations of some compounds in the samples were B qualified by the laboratory, indicating an estimated sample concentration less than the RL, but greater than the IDL. These concentrations are J qualified as estimated.

Sample	Metal	Laboratory Concentration (ug/L)	Validation concentration (ug/L)
OU1-GW-G-101-0712	Cobalt	2.0 B	2.0 J
	Lead	0.736 B	0.736 J
	Manganese	6.8 B	6.8 J
	Thallium	0.451 B	0.451 J
	Zinc	19.9 B	19.9 J
	Dissolved Cobalt	2.1 B	2.1 J
	Dissolved Manganese	1.1 B	1.1 J
	Dissolved Zinc	10.7 B	10.7 J
OU1-GW-G-02-0712	Arsenic	1.1 B	1.1 J
	Cadmium	2.1 B	2.1 J
	Lead	2.4 B	2.4 J
	Silver	6.7 B	6.7 J
OU1-GW-MW-A-0712	Cobalt	4.5 B	4.5 J
	Selenium	1.2 B	1.2 J
	Silver	8.6 B	8.6 J
	Dissolved Cobalt	4.7 B	4.7 J
	Dissolved Silver	7.8 B	7.8 J
OU1-GW-MW404-0712	Cobalt	4.7 B	4.7 J
	Silver	7.8 B	7.8 J
	Dissolved Cobalt	4.6 B	4.6 J
	Dissolved Silver	6.0 B	6.0 J
OU1-GW-P-7-0712	Aluminum	86.3 B	86.3 J
	Cadmium	2.7 B	2.7 J
	Chromium	3.4 B	3.4 J
	Copper	4.6 B	4.6 J
	Lead	0.645 B	0.645 J
OU1-GW-P-9-0712	Cadmium	1.8 B	1.8 J
	Copper	2.7 B	2.7 J
	Silver	9.3 B	9.3 J
OU1-GW-G-04-0712	Aluminum	57.6 B	57.6 J
	Cobalt	3.1 B	3.1 J
	Copper	1.3 B	1.3 J
	Lead	1.5 B	1.5 J
	Selenium	0.988 B	0.988 J
	Silver	4.4 B	4.4 J
	Dissolved Cobalt	3.2 B	3.2 J
	Dissolved Copper	0.528 B	0.528 J
	Dissolved Lead	0.724 B	0.724 J
	Dissolved Silver	3.9 B	3.9 J

OU1-GW-MW405-0712	Calcium	33.0 B	33.0 J
	Copper	2.8 B	2.8 J
	Zinc	4.1 B	4.1 J
OU1-GW-MW401-0712	Barium	3.5 B	3.5 J
	Calcium	332 B	332 J
	Copper	3.7 B	3.7 J
	Lead	1.1 B	1.1 J
	Magnesium	43.3 B	43.3 J
	Nickel	1.1 B	1.1 J
	Potassium	158 B	158 J

4.0 Cyanide (EPA Method 9012), Total Organic Carbon (EPA Method 415.1), Sulfate (EPA Method 300.0) and ortho-Phosphate (EPA Method 365.1)

The water samples were analyzed for cyanide (EPA Method 9012), total organic carbon (TOC EPA Method 415.1), sulfate (EPA Method 300.0) and ortho-phosphate (EPA Method 365.1). Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPs and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Data Completeness
⊗ Holding Times and Preservation
✓ Calibrations
✓ Blanks
✓ Laboratory Control Sample
⊗ Matrix Spike Sample
⊗ Laboratory Duplicate Sample

4.1 Data Completeness

All analyses were performed as requested on the COC, with the following exceptions. The methods listed on the COC for TOC analysis and ortho-phosphate analysis were EPA 9060 and EPA 300.0/9056, respectively. The methods used by the laboratory for analysis were EPA 415.1 for TOC and EPA 365.1 for ortho-phosphate.

4.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times, with the following exceptions. Method 365.1 states that samples for ortho-phosphate must be preserved with sulfuric acid and analyzed within 28 days of collection. The samples were not preserved with sulfuric acid and were analyzed with 48 hours of collection (the ortho-phosphate holding time for unpreserved samples listed for EPA Method 300.0), with the exception of samples OU1-GW-G-02-0712 and OU1-GW-G-04-0712, which were analyzed within 3 days of collection. Therefore, the ortho-

phosphate concentrations in samples OU1-GW-G-02-0712 and OU1-GW-G-04-0712 are UJ qualified as not detected less than the RL and J qualified as estimated.

Sample	Compound	Laboratory Concentration (mg/L)	Validation concentration (mg/L)
OU1-GW-G-02-0712	Ortho-phosphate	0.0100 U	0.0100 UJ
OU1-GW-G-04-0712	Ortho-phosphate	0.0126	0.0126 J

4.3 Calibrations

4.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for all analyses.

4.3.2 Continuing Calibration Verification (CCV)

The percent recoveries in all associated CCVs were within the QC acceptance limits for all analyses.

4.4 Blanks

4.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria; no compounds were detected in the method blanks.

4.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICB and CCBs met the acceptance criteria; no compounds were detected in either the ICB or CCBs.

4.5 Laboratory Control Sample (LCS)

The percent recoveries in the LCSs were within the acceptance limits for all analyses.

4.6 Matrix Spike (MS)

Sample OU1-GW-G-04-0712 was analyzed as the MS for ortho-phosphate, TOC and sulfate analyses. The percent recoveries were within the acceptance limits.

Sample OU1-GW-MW-A-0712 was analyzed as the MS for the cyanide analysis. The percent recovery was within the acceptance limits.

4.7 Laboratory Duplicate Samples

Sample OU1-GW-G-04-0712 was analyzed as the laboratory duplicate for ortho-phosphate, TOC and sulfate analyses. The RPDs were within the acceptance limits.

Sample OU1-GW-MW-A-0712 was analyzed as the laboratory duplicate for the cyanide analysis. Cyanide was not detected in either the sample or the duplicate.

ATTACHMENT A
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by GeoSyntec's Data Review Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher that the concentration of the analyte in the sample due to bias attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower that the concentration of the analyte in the sample due to bias attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Geosyntec consultants

1531 Dick Lonas Road, Building A
Knoxville, TN 37909
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Memorandum

TO: Nandra Weeks

DATE: March 11, 2008

FROM: Geosyntec Consultants QA/QC Group

SITE: Mattheissen and Hegeler Zinc Company Site, OU1

SUBJECT: Summary of Tier III Validation of analytical results for CAS Report R2741179

Introduction
This report summarizes the findings of the full validation of 4 groundwater samples and one trip blank collected on behalf of the Mattheissen and Hegeler Zinc Company Site, OU1 project. These samples were collected on December 3-4, 2007. The samples were analyzed by Columbia Analytical Services, Inc. (CAS), Rochester, New York. The samples were analyzed for Volatile Organic Compounds by EPA Method 8260B, Semivolatile Organic Compounds by EPA Method 8270C, Total and Dissolved metals by EPA Methods 6020 and 6010B, Total and Dissolved Mercury by EPA Method 7470A, Total Organic Carbon (TOC) by EPA Method 415.1, Cyanide by EPA Method 9012A, Sulfate by EPA Method 300.0 and ortho-Phosphate by EPA Method 365.1.

The data were reviewed in accordance with the principles presented in *USEPA National Functional Guidelines for Laboratory Data Review, Organics* (EPA, 2005), *USEPA National Functional Guidelines for Laboratory Data Review, Inorganics* (EPA, 2004), and per the requirements of the QAPP, the laboratory standard operating procedures and the specified methods.

Data for the following samples were reviewed.

Lab ID	Client ID
1059800	OUI-GW-G-103-0712
1059802	OUI-GW-G-106-0712
1059807	OUI-GW-MW-303H-0712
1059808	OUI-GW-MW-305H-0712
1059809	OUI-GW-MW-402-0712
1059810	SOLUBLE OU1-GW-G-106-0712
1059811	SOLUBLE OU1-GW-MW-303H-0

1059812	SOLUBLE OU1-GW-MW-305H-0

Matrix – groundwater and 1 aqueous trip blank

Executive Summary

All analyses were performed as requested on the chain of custody (COC), except as noted below.

The methods listed on the COC for TOC analysis and ortho-phosphate analysis were EPA Method 9060 and EPA Method 300.0/9056, respectively. The methods used by the laboratory for analysis were EPA Method 415.1 for TOC and EPA Method 365.1 for ortho-phosphate.

The collection dates for the samples were not listed on the COC. The laboratory used collection dates of December 3-4, 2007.

Incorrect error correction was observed on the COC instead of the proper procedure of a single strike through, correction, and initials and date of person making the correction.

All holding times were met.

1.0 Volatile Organic Compounds (EPA Method 8260B)

Full validation including recalculation was performed with the laboratory data for the analysis of volatile organic compounds (EPA Method 8260B). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ⊗ Calibrations
- ✓ Internal Standards
- ✓ Performance Check Sample
- ✓ Blanks
- ✓ System Monitoring Compounds (Surrogates)
- ✓ Matrix Spike/Matrix Spike Duplicate Sample
- ✓ Laboratory Control Samples
- ✓ Compound Identification and Quantitation

1.1 Data Completeness

All analyses were performed as requested on the COC.

1.2 Holding Times and Preservation

All samples were analyzed within the 14 day technical holding time from date of collection for volatiles.

1.3 Calibrations

1.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the percent relative standard deviation (%RSD) of the relative response factors (RRFs). For all target analytes, the RRFs met the method criteria; the RSDs met the method criteria for all compounds or the coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibrations.

1.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the RRFs met the method criteria; the percent differences (%D) between the RRFs in the initial and continuing calibration standards for all target analytes were within the method or validation acceptance criteria, with the following exception. Methylcyclohexane in the CCV was outside of the acceptance limits. Therefore, the undetected concentrations of methylcyclohexane in the associated samples are UJ qualified as estimated below the reporting limit (RL).

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OUI-GW-G-103-0712	Methylcyclohexane	1.0 U	1.0 UJ
OUI-GW-G-106-0712	Methylcyclohexane	1.0 U	1.0 UJ
OUI-GW-MW-402-0712	Methylcyclohexane	1.0 U	1.0 UJ

1.4 Internal Standards

All internal standard retention times are within ±30 seconds of the associated continuing calibration internal standard retention time. All internal standard area counts were within the acceptance criteria (>50% and <150%) of the associated continuing calibration internal standard area counts.

1.5 Performance Check Samples

An instrument performance check sample (tune standard) was analyzed at the beginning of each 12-hour period during sample analysis. The samples were analyzed within the 12-hour period. All ion abundance criteria were met for bromofluorobenzene (BFB).

1.6 Blanks

There were no detections of the project compounds of concern in laboratory method blanks.

Sample OU1-GW-MW-402-0712 was submitted as the trip blank. Acetone was detected in the trip blank at an estimated concentration greater than the method detection limit (MDL), but less than the RL. However, since acetone was not detected in the associated samples, no sample qualifications were made.

1.7 System Monitoring Compounds (Surrogates)
All surrogate recoveries were within the laboratory acceptance limits.

1.8 Laboratory Control Samples (LCS)
All LCS recoveries were within the laboratory control limits.

1.9 Matrix Spike/Matrix Spike Duplicate Sample (MS/MSD)
A MS/MSD pair was not analyzed.

1.10 Compound Identification and Quantitation
All compound identifications and quantitations were appropriate.

2.0 Semivolatile Organic Compounds (EPA Method 8270C)

Full validation including recalculation was performed on the laboratory data for the analysis of semivolatile organic compounds (EPA Method 8270C). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Data Completeness
✓ Holding Times and Preservation
⊗ Calibrations
✓ Internal Standards
⊗ Performance Check Sample
✓ Blanks
✓ System Monitoring Compounds (Surrogates)
✓ Laboratory Control Samples
✓ Matrix Spike/Matrix Spike Duplicate
⊗ Compound Identification and Quantitation

2.1 Data Completeness
All analyses were performed as requested on the COC.

2.2 Holding Times and Preservation
The samples for semivolatile analysis were extracted within the 7 day technical holding time from date of collection and analyzed within the 40 day technical holding time from date of extraction.

2.3 Calibrations

2.3.1 Initial Calibrations (ICAL)
Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the %RSD of the RRFs. For all target analytes, the RRFs met the method criteria; the RSDs met the method or

validation criteria for all compounds or the coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibrations. It was noted that linear curve fits using only 5 points were used for 2,4-dinitrophenol and pentachlorophenol; Method 8000 requires the use of a minimum of 6 points for linear curve fits. However, based on professional judgment, no sample qualifications were made.

2.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the RRFs met the method criteria; the percent differences (%D) between the RRFs in the initial and continuing calibration standards for all target analytes were within the method or validation acceptance criteria.

2.4 Internal Standards

All internal standard retention times are within ±30 seconds of the associated continuing calibration internal standard retention time. All internal standard area counts were within the acceptance criteria (>50% and <150%) of the associated continuing calibration internal standard area counts.

2.5 Performance Check Samples

An instrument performance check sample was analyzed at the beginning of each 12-hour period during sample analysis. The samples were analyzed within the 12-hour period. All ion abundance criteria were met for decafluorotriphenyl-phosphine (DFTPP). It was noted that on all 5B Forms, the percent relative abundances for mass 441 compared to mass 443 were wrong. However, the raw data confirmed that mass 441 passed the method criteria; therefore, no sample qualifications were required. The laboratory was notified of the error.

2.6 Blanks

There were no detections of the project compounds of concern in the laboratory method blank.

2.7 System Monitoring Compounds (Surrogates)

All surrogate recoveries were within the laboratory acceptance limits.

2.8 Laboratory Control Samples (LCS)

All LCS recoveries were within the laboratory control limits, with the exception of benzaldehyde, which had high recoveries, outside of the laboratory control limits, in the LCS and LCSD. However, since benzaldehyde was not detected in any of the samples, no sample qualifications were required.

2.9 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

A MS/MSD pair was not analyzed.

2.10 Compound Identification and Quantitation

All compound identifications and quantitations were appropriate.

3.0 Metals (EPA Methods 6020/6010B/7470A)

The water samples were analyzed for the requested total and dissolved metals and Mercury (EPA 6020/6010B/7470A) following metals digestion and mercury digestion. Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPs and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Data Completeness
✓ Holding Times and Preservation
✓ Calibrations
✓ Blanks
✓ Laboratory Control Samples
⊗ Matrix Spike/Matrix Spike Duplicate Samples
⊗ Laboratory Duplicate Samples
⊗ Serial Dilutions
✓ Compound Identification and Quantitation

3.1 Data Completeness

All analyses were performed as requested on the COC. It was noted that the sample results were not reported down to the instrument detection limit (IDL), i.e., the sample and QC sample results between the IDL and the RL were not reported. Corrected forms with sample results reported to the IDL were requested from the laboratory and were sent by email.

In addition, the serial dilution form included in the data package was incomplete. A revised serial dilution form was requested from the laboratory and was sent by email. The initial and serial dilution results for barium, cobalt and nickel listed on the revised form did not agree with the raw data. Another revised serial dilution form was requested from the laboratory and was sent by email.

3.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

3.3 Calibrations

3.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for inductively coupled plasma/mass spectrometry (ICP/MS) analysis, inductively coupled plasma (ICP) analysis and cold vapor atomic absorption (CVAA) initial calibrations.

3.3.2 Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV)

The percent recoveries in all associated ICVs and CCVs were within the QC acceptance limits.

3.3.3 CRDL (Detection Limit) Standard

The CRDL standards were within the control limits.

3.3.4 ICSA/ICSAB (Interference Check) Standards

The ICSA/ICSAB standards met all acceptance criteria.

3.4 Blanks

3.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria with the following exceptions; antimony, chromium, copper and zinc were detected in the water preparation blank at estimated concentrations less than the RL, but greater than the IDL. Antimony was not detected in any sample; therefore, no antimony sample concentrations are qualified. However, the estimated concentrations of chromium, copper, and zinc detected in the associated samples at estimated concentrations less than the RL, but greater than the IDL are U qualified as not detected at the RL.

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OUI-GW-G-103-0712	Chromium	1.4 B	15 U
	Copper	3.6 B	5.0 U
OUI-GW-G-106-0712	Chromium	1.3 B	15 U
	Copper	5.0 B	5.0 U
	Dissolved Chromium	1.6 B	15 U
OUI-GW-MW-303H-0712	Chromium	1.5 B	15 U
	Copper	2.5 B	5.0 U
	Zinc	11.2 B	20 U
	Dissolved Chromium	2.2 B	15 U
	Dissolved Copper	2.7 B	5.0 U
	Dissolved Zinc	11.4 B	20 U
OUI-GW-MW-305H-0712	Chromium	1.4 B	15 U
	Copper	1.9 B	5.0 U
	Dissolved Chromium	3.2 B	15 U
	Dissolved Copper	2.7 B	5.0 U

3.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICBs and CCBs met the acceptance criteria with a few exceptions; several ICBs and CCBs had metal detections at estimated concentrations less than the

RL, but greater than the IDLs. However, based on professional judgment and since the metals concentrations for all metals in the associated samples were either greater than the RL or not detected, no additional sample qualifications were made.

3.5 Laboratory Control Samples (LCS)

All percent recoveries in the LCS were within the acceptance limits.

3.6 Matrix Spike (MS)

Sample OU1-GW-G-103-0712 was analyzed as the MS; only mercury was spiked into the MS. The recovery of mercury was within the laboratory control limits.

The metals analyzed by EPA Method 6010B and 6020 were assessed using a batch QC sample. No information was provided on the batch QC sample results.

3.7 Laboratory Duplicate Samples

Sample OU1-GW-G-103-0712 was analyzed as the laboratory duplicate; only mercury was assessed. The RPD result was acceptable.

The metals analyzed by EPA Method 6010B and 6020 were assessed using a batch QC sample. No information was provided on the batch QC sample results.

3.8 Serial Dilutions

The percent differences for the compounds for the serial dilution for the dissolved metals analysis of sample OU1-GW-MW-305-H-00712 were outside of the laboratory acceptance criteria for aluminum, cobalt and nickel; however, these metals concentrations in the serial dilution are less than 50 times the IDL. Therefore, no sample qualifications are required.

3.9 Compound Identification and Quantitation

The project acceptance limits for the ICP-MS internal standards are 30-170% recovery. All internal standard recoveries were within the project acceptance limits.

Three samples were analyzed for both total and dissolved metals. All three samples had some total metals concentrations less than the dissolved metals concentrations. In each of these three samples, the difference between the total and dissolved metals concentrations were less then 10% for most metals; however, for samples with percent difference greater than 10%, the total and dissolved metals concentrations are UJ qualified as estimated less than the RL or J qualified as estimated. The following table summarizes the percent differences between the total and dissolved iron concentrations and the appropriate qualifications for these three samples.

Sample	Metal	Total Concentra-tion (ug/L)	Dissolved Concentra-tion (ug/L)	Percent Differenc e (%)	Total Validation Result (ug/L)	Dissolved Validation Result (ug/L)
OUI-GW-G-	Calcium	663000	715000	8	NA	NA
	Chromium	1.3 B	1.6 B	NC	NA	NA

106-0712	Copper	5.0 B	5.6	NC	NA	NA
	Iron	889	947	6	NA	NA
	Lead	1.1B	1.2 B	NC	NA	NA
	Magnesium	72000	75400	5	NA	NA
	Manganese	1890	1960	4	NA	NA
	Nickel	62.3	63.0	1	NA	NA
	Potassium	86700	89300	3	NA	NA
	Selenium	2.3 B	1.1 B	NC	NA	NA
	Sodium	362000	372000	3	NA	NA
	Zinc	14300	15300	7	NA	NA
OUI-GW-MW-303H-0712	Aluminum	17.1 U	95.9 B	NC	NA	NA
	Barium	53.5	54.3	1	NA	NA
	Calcium	422000	435000	3	NA	NA
	Chromium	1.5 B	2.2 B	NC	NA	NA
	Cobalt	3.1 B	3.2 B	NC	NA	NA
	Copper	2.5 B	2.7 B	NC	NA	NA
	Iron	1370	1730	23	1370 J	1730 J
	Lead	0.600 U	0.620 B	NC	NA	NA
	Manganese	4000	4020	1	NA	NA
	Potassium	48200	48800	1	NA	NA
	Sodium	209000	218000	4	NA	NA
	Zinc	11.2 B	11.4 B	NC	NA	NA
GW-MW-305H-0712	Aluminum	17.1 U	268	> 200	100 UJ	268 J
	Arsenic	2.5 B	2.6 B	NC	NA	NA
	Barium	30.2	40.6	29	30.2 J	40.6 J
	Calcium	496000	512000	3	NA	NA
	Chromium	1.4 B	3.2 B	NC	NA	NA
	Cobalt	4.9 B	5.5	> 200	5.0 UJ	5.5 J
	Copper	1.9 B	2.7 B	NC	NA	NA
	Iron	2340	3500	40	2340 J	3500 J
	Lead	0.600 U	1.8 B	NC	NA	NA
	Magnesium	149000	155000	4	NA	NA
	Manganese	5220	5450	4	NA	NA
	Nickel	16.2	16.7	3	NA	NA
	Zinc	61.5	97.1	45	61.5 J	97.1 J

NC-not calculable
NA-not applicable

The concentrations of some compounds in the samples were B qualified by the laboratory, indicating an estimated sample concentration less than the RL, but greater than the IDL. These concentrations are J qualified as estimated.

Sample ID	**Compound**	**Laboratory Result (ug/L)**	**Validation Result (ug/L)**
OUI-GW-G-103-0712	Cadmium	0.619 B	0.619 J
	Cobalt	1.8 B	1.8 J
	Selenium	2.7 B	2.7 J
	Vanadium	1.3 B	1.3 J
OUI-GW-G-106-0712	Arsenic	0.649 B	0.649 J

	Lead	1.1 B	1.1 J
	Selenium	2.3 B	2.3 J
	Dissolved Lead	1.2 B	1.2 J
	Dissolved Selenium	1.1 B	1.1 J
OUI-GW-MW-303H-0712	Arsenic	0.841 B	0.841 J
	Cobalt	3.1 B	3.1 J
	Selenium	1.9 B	1.9 J
	Dissolved Aluminum	95.9 B	95.9 J
	Dissolved Arsenic	0.529 B	0.529 J
	Dissolved Cobalt	3.2 B	3.2 J
	Dissolved Lead	0.620 B	0.620 J
	Dissolved Selenium	1.5 B	1.5 J
GW-MW-305H-0712	Arsenic	2.5 B	2.5 J
	Cobalt	4.9 B	4.9 J
	Selenium	1.9 B	1.9 J
	Dissolved Arsenic	2.6 B	2.6 J
	Dissolved Lead	1.8 B	1.8 J
	Dissolved Selenium	0.997 B	0.997 J

4.0 Cyanide (EPA Method 9012), Total Organic Carbon (EPA Method 415.1), Sulfate (EPA Method 300.0) and ortho-Phosphate (EPA Method 365.1)

The water samples were analyzed for cyanide (EPA Method 9012), total organic carbon (TOC EPA Method 415.1), sulfate (EPA Method 300.0) and ortho-phosphate (EPA Method 365.1). Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPs and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Data Completeness
✓ Holding Times and Preservation
✓ Calibrations

✓ Blanks
✓ Laboratory Control Sample
⊗ Matrix Spike Sample
⊗ Laboratory Duplicate Sample

4.1 Data Completeness

All analyses were performed as requested on the COC records, with the following exceptions. The methods listed on the COC for TOC analysis and ortho-phosphate analysis were EPA 9060 and EPA 300.0/9056, respectively. The methods used by the laboratory for analysis were EPA 415.1 for TOC and EPA 365.1 for ortho-phosphate.

4.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times. Method 365.1 states that samples for ortho-phosphate must be preserved with sulfuric acid and analyzed within 28 days of collection. The samples were not preserved with sulfuric acid and were analyzed within 2 days of collection; based on professional judgment, no sample qualifications were made.

4.3 Calibrations

4.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for all analyses.

4.3.2 Continuing Calibration Verification (CCV)

The percent recoveries in all associated CCVs were within the QC acceptance limits for all analyses.

4.4 Blanks

4.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria; no compounds were detected in the method blanks.

4.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICB and CCBs met the acceptance criteria; no compounds were detected in either the ICB or CCBs.

4.5 Laboratory Control Sample (LCS)

The percent recoveries in the LCSs were within the acceptance limits for all analyses.

4.6 Matrix Spike (MS)

A MS was not analyzed. Results of batch QC analyses were not reported.

.

4.7 Laboratory Duplicate Samples

Laboratory duplicates were not analyzed. Results of batch QC analyses were not reported.

ATTACHMENT A
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by GeoSyntec's Data Review Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher that the concentration of the analyte in the sample due to bias attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower that the concentration of the analyte in the sample due to bias attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Geosyntec consultants

1531 Dick Lonas Road, Building A
Knoxville, TN 37909
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Memorandum

TO: Nandra Weeks

DATE: March 10, 2008

FROM: Geosyntec Consultants QA/QC Group

SITE: Mattheissen and Hegeler Zinc Company Site, OU1

SUBJECT: Summary of Tier III Validation of analytical results for CAS Report R2740697

Introduction
This report summarizes the findings of the full validation of one surface water sample, collected on behalf of the Mattheissen and Hegeler Zinc Company Site, OU1 project. The sample was collected on October 30, 2007. The sample was analyzed by Columbia Analytical Services, Inc. (CAS), Rochester, New York. The sample was analyzed for Organochlorine Pesticides by EPA Method 8081A, Total Metals by EPA Methods 6020 and 6010B and Mercury by EPA Method 7470A.

The data were reviewed in accordance with the principles presented in *USEPA National Functional Guidelines for Laboratory Data Review, Organics* (EPA, 2005), *USEPA National Functional Guidelines for Laboratory Data Review, Inorganics* (EPA, 2004), and per the requirements of the QAPP, the laboratory standard operating procedures and the specified methods.

Data for the following sample was reviewed.

Field Sample ID	CAS Job Number
OU1-SW-LVR207-071030	1052143

Matrix – surface water

Executive Summary

All analyses were performed as requested on the chain of custody (COC).

All holding times were met.

1.0 Organochlorine Pesticides (EPA Method 8081A)

Full validation including recalculation was performed on the laboratory data for the analysis of Organochlorine Pesticides (EPA Method 8081A). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ⊗ Holding Times and Preservation
- ✓ Calibrations
- ✓ Blanks
- ✓ System Monitoring Compounds (Surrogates)
- ✓ Laboratory Control Samples
- ✓ Matrix Spike/Matrix Spike Duplicate
- ✓ Compound Identification and Quantitation

1.1 Data Completeness

All analyses were performed as requested on the COC.

1.2 Holding Times and Preservation

The sample for organochlorine pesticide analysis was extracted one day outside of the 7 day technical holding time from date of collection; the sample extract was analyzed within the 40 day technical holding time from date of extraction. Based on professional judgment, no sample qualifications were made.

1.3 Calibrations

1.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the %RSD of the average response factors (RFs). For all target analytes, the RSDs met the method criteria for all compounds.

1.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the percent differences (%D) between the average RFs in the initial and continuing calibration standards for all target analytes were within the method acceptance criteria.

1.4 Blanks

There were no detections of the project compounds of concern in the laboratory method blank.

1.5 System Monitoring Compounds (Surrogates)

All surrogate recoveries were within the laboratory acceptance limits.

1.6 Laboratory Control Samples (LCS)

All LCS/LCS duplicate (LCSD) recoveries and RPDs were within the laboratory control limits.

1.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

A MS/MSD pair was not analyzed.

1.8 Compound Identification and Quantitation

All compound identifications and quantitations were appropriate.

2.0 Metals (EPA Methods 6020/6010B/7470A)

The water sample was analyzed for the requested metals and Mercury (EPA 6020/6010B/7470A) following total metals digestion and Mercury digestion. Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPS and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Data Completeness
✓ Holding Times and Preservation
✓ Calibrations
⊗ Blanks
✓ Laboratory Control Samples
⊗ Matrix Spike/Matrix Spike Duplicate Samples
⊗ Laboratory Duplicate Samples
⊗ Serial Dilutions
⊗ Compound Identification and Quantitation

2.1 Data Completeness

All analyses were performed as requested on the COC.

2.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

2.3 Calibrations

2.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for inductively coupled plasma/mass spectrometry (ICP/MS) analysis, inductively coupled plasma (ICP) analysis and cold vapor atomic absorption (CVAA) initial calibrations.

2.3.2 Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV)

The percent recoveries in all associated ICVs and CCVs were within the QC acceptance limits, with the following exception. The recovery of mercury in the closing CCV was high and outside of the acceptance limits. However, based on professional judgment and the qualification of the sample's mercury result due to the continuing calibration blank (CCB, below), no additional sample qualification was made.

2.3.3 CRDL (Detection Limit) Standard

The CRDL standards were within the control limits.

2.3.4 ICSA/ICSAB (Interference Check) Standards

The ICSA/ICSAB standards met all acceptance criteria.

2.4 Blanks

2.4.1 Preparation (Method) Blank

The preparation blank met the acceptance criteria with the following exceptions; chromium, copper, and lead were detected in the preparation blank at estimated concentrations less than the reporting limit (RL), but greater than the instrument detection limits (IDL). Since the chromium and lead concentrations in the sample were higher than the RL, no sample qualifications were required; however, the concentration of copper detected in the associated sample at an estimated concentration less than the RL but greater than the IDL is U qualified as not detected at the RL.

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-SW-LVR207-071030	Copper	2.6 B	5.0 U

2.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICBs and CCBs met the acceptance criteria with the following exceptions; several ICBs and CCBs had metal detections at estimated concentrations less than the RL, but greater than the IDL. However, based on professional judgment and since the concentrations for all metals except mercury in the associated sample were either greater than the RL or not detected, no additional sample qualifications were made. Based on the mercury concentrations reported in the CCBs and the estimated concentration in the sample less than

the RL but greater than the IDL, the concentration of mercury in the associated sample is U qualified as not detected at the RL.

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-SW-LVR207-071030	Mercury	0.18 B	0.20 U

2.5 Laboratory Control Samples (LCS)

All percent recoveries in the LCS were within the acceptance limits.

2.6 Matrix Spike (MS)

Sample OU1-SW-LVR207-071030 was analyzed as the MS; all compound recoveries were within the laboratory control limits.

The metals analyzed by EPA Method 6010B were spiked into a batch QC sample. No information was provided on the batch QC sample results.

2.7 Laboratory Duplicate Samples

Sample OU1-SW-LVR207-071030 was analyzed as the laboratory duplicate. All RPD results were acceptable, with the exception of arsenic, selenium and vanadium. However, since arsenic, selenium and vanadium were detected at concentrations less than the RL, but greater than the IDL, no sample qualifications were required.

The metals analyzed by EPA Method 6010B were assessed using a batch QC sample. No information was provided on the batch QC sample results.

2.8 Serial Dilutions

The percent differences for the compounds for the serial dilution for the total metals water analysis of sample OU1-SW-LV205-071030 were outside of the laboratory acceptance criteria for arsenic, chromium, cobalt, nickel, potassium, selenium, vanadium and zinc; however, all these metals except potassium had concentrations in the serial dilution less than 50 times the IDL and no sample qualifications are required. Therefore, the concentration of potassium in sample OU1-SW-LV205-071030 is J qualified as estimated since it is greater than 50 times the IDL.

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-SW-LVR207-071030	Potassium	5100	5100 J

3.9 Compound Identification and Quantitation

The project acceptance limits for the ICP-MS internal standards are 30-170% recovery. All internal standard recoveries were within the project acceptance limits.

The concentrations of some compounds in the sample were B qualified by the laboratory, indicating an estimated sample concentration less than the reporting limit,

but greater than the instrument detection limit. These concentrations are J qualified as estimated.

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-SW-LV205-071030	Arsenic	0.429 B	0.429 J
	Copper	2.6 B	2.6 J
	Selenium	0.679 B	0.679 J
	Zinc	8.4 B	8.4 J

ATTACHMENT A
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by GeoSyntec's Data Review Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher that the concentration of the analyte in the sample due to bias attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower that the concentration of the analyte in the sample due to bias attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Geosyntec consultants

1531 Dick Lonas Road, Building A
Knoxville, TN 37909
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Memorandum

TO: Nandra Weeks

DATE: March 6, 2008

FROM: Geosyntec Consultants QA/QC Group

SITE: Mattheissen and Hegeler Zinc Company Site, OU1

SUBJECT: Summary of Tier III Validation of analytical results for CAS Report R2740633

Introduction
This report summarizes the findings of the full validation of 5 soil samples collected on behalf of the Mattheissen and Hegeler Zinc Company Site, OU1 project. These samples were collected on October 29-30, 2007. The samples were analyzed by Columbia Analytical Services, Inc. (CAS), Rochester, New York. The samples were analyzed for a client specified list of Acid Volatile Sulfide/Simultaneously Extracted Metals (AVS/SEM) by EPA *Draft Analytical Method for Determination of Acid Volatile Sulfide in Sediment,* December 1991, EPA Method 6010B and EPA Method 376.1.

The data were reviewed in accordance with the principles presented in *USEPA National Functional Guidelines for Laboratory Data Review, Inorganics* (EPA, 2004), and per the requirements of the QAPP, the laboratory standard operating procedures and the specified methods.

Data for the following samples were reviewed.

Field Sample ID	CAS Job Number
OU1-SS-LVR203-071030	1050477
OU1-SS-LVR207-071030	1050478
OU1-SS-LVR201-071029	1050479
OU1-SS-LVR406-071029	1050480
OU1-SS-LVR205-071030	10504816

Matrix – soil

Executive Summary
All analyses were performed as requested on the chain of custody (COC).

All holding times were met.

1.0 Metals (EPA Methods 6010B)
The soil samples were analyzed for the specified list of metals (cadmium, copper, lead, nickel and zinc) following simultaneous extraction (EPA *Draft Analytical Method for Determination of Acid Volatile Sulfide in Sediment*, December 1991 and EPA Method 6010B). Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPS and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ✓ Blanks
- ✓ Laboratory Control Samples
- ✓ Matrix Spike/Matrix Spike Duplicate Samples
- ✓ Laboratory Duplicate Samples
- ✓ Serial Dilutions
- ✓ Compound Identification and Quantitation

1.1 Data Completeness
All analyses were performed as requested on the COC. There are two samples on the COC with the same ID, OU1-SS-LVR206-0071030. One was collected 10/30/07, 1535 and given lab ID 1050447. The one collected 10/30/07, 1500 was given the lab ID 10540478. This second one was identified in the lab report as OUI-SS-LVR207-071030, based on email communication between CAS and the client.

1.2 Holding Times and Preservation
All analyses were performed within the method-specified holding times.

1.3 Calibrations
1.3.1 Initial Calibrations (IC)
All initial calibration requirements were met for inductively coupled plasma/mass spectrometry (ICP/MS) analysis, inductively coupled plasma (ICP) analysis and cold vapor atomic absorption (CVAA) initial calibrations.

1.3.2 Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV)

The percent recoveries in all associated ICVs and CCVs were within the QC acceptance limits.

1.3.3 CRDL (Detection Limit) Standard

The CRDL standards were within the control limits.

1.3.4 ICSA/ICSAB (Interference Check) Standards

The ICSA/ICSAB standards met all acceptance criteria.

1.4 Blanks

1.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria.

1.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICBs and CCBs met the acceptance criteria.

1.5 Laboratory Control Samples (LCS)

All percent recoveries in the LCS were within the acceptance limits.

1.6 Matrix Spike (MS)

Sample OU1-SSW-LVR05-071030 was analyzed as the MS; all compound recoveries were within the laboratory control limits, with the exception of cadmium, lead and zinc. However, since the sample concentrations for these compounds were greater than four times the spike concentrations, no sample qualifications were required.

1.7 Laboratory Duplicate Samples

Sample OU1-SSW-LVR05-071030 was analyzed as the laboratory duplicate. All relative percent difference (RPD) results were acceptable.

1.8 Serial Dilutions

The percent differences for the compounds for the serial dilution of sample OU1-SSW-LVR05-071030 were outside of the laboratory acceptance criteria for copper and nickel; however, these metals concentrations in the serial dilution are less than 50 times the IDL. Therefore, no sample qualifications are required.

1.9 Compound Identification and Quantitation

The project acceptance limits for the ICP-MS internal standards are 30-170% recovery. All internal standard recoveries were within the project acceptance limits.

2.0 Acid Volatile Sulfide (AVS)-EPA *Draft Analytical Method for Determination of Acid Volatile Sulfide in Sediment,* December 1991 and EPA Method 376.1

The soil samples were analyzed for AVS. Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPs and the quality of the data reported. The following summarizes the results of this review. In addition, the percent solids data was reviewed and found to be acceptable.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ✓ Blanks
- ✓ Laboratory Control Sample
- ✓ Matrix Spike Sample
- ✓ Laboratory Duplicate Sample

2.1 Data Completeness

All analyses were performed as requested on the COC.

2.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

2.3 Calibrations

2.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for sulfide analysis.

2.3.2 Continuing Calibration Verification (CCV)

The percent recoveries in the associated CCVs were within the QC acceptance limits.

2.4 Blanks

2.4.1 Preparation (Method) Blank

The preparation blank met the acceptance criteria; sulfide was not detected in the method blank.

2.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICB and CCBs met the acceptance criteria; no sulfide was detected in either the ICB or CCBs.

2.5 Laboratory Control Sample (LCS)

The sulfide percent recovery in the LCS was within the acceptance limits.

2.6 Matrix Spike (MS)

Sample OU1-SSW-LVR05-071030 was analyzed as the MS; the sulfide recovery was within the laboratory control limits.

2.7 Laboratory Duplicate Samples

Sample OU1-SSW-LVR05-071030 was analyzed as the laboratory duplicate. The RPD result was acceptable.

ATTACHMENT A
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by GeoSyntec's Data Review Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher that the concentration of the analyte in the sample due to bias attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower that the concentration of the analyte in the sample due to bias attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Geosyntec consultants

1531 Dick Lonas Road, Building A
Knoxville, TN 37909
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Memorandum

TO: Nandra Weeks

DATE: March 10, 2008

FROM: Geosyntec Consultants QA/QC Group

SITE: Mattheissen and Hegeler Zinc Company Site, OU1

SUBJECT: Summary of Tier III Validation of analytical results for CAS Report R2740626

Introduction
This report summarizes the findings of the full validation of twenty five soil samples, five trip blanks and 5 equipment blank samples collected on behalf of the Mattheissen and Hegeler Zinc Company Site, OU1 project. These samples were collected on October 24, 29, 30, 31 and November 1, 2007. The samples were analyzed by Columbia Analytical Services, Inc. (CAS), Rochester, New York. The samples were analyzed for Volatile Organic Compounds by EPA Method 8260B, Semivolatile Organic Compounds by EPA Method 8270C, Organochlorine Pesticides by EPA Method 8081A, Polychlorinated Biphenyls (PCBs) by EPA Method 8082, Total Metals by EPA Methods 6020 and 6010B, Total Mercury by EPA Methods 7470A and 7471A, Cyanide by EPA Method 9012A and Percent Solids by Modified EPA Method 160.3.

The data were reviewed in accordance with the principles presented in *USEPA National Functional Guidelines for Laboratory Data Review, Organics* (EPA, 2005), *USEPA National Functional Guidelines for Laboratory Data Review, Inorganics* (EPA, 2004), and per the requirements of the QAPP, the laboratory standard operating procedures and the specified methods.

Data for the following samples were reviewed.

Lab ID	Client ID
1050401	OUI-SW-LVR205-071030
1050411	OUI-SW-LVR201-071029
1050415	OUI-SW-LVR406-071029
1050420	OUI-SW-MW402
1050422	OUI-SW-MW402
1050423	OUI-SW-MW402B
1050426	OUI-SW-LVR203-071030

1050428	OUI-SW-MW402C
1050433	OUI-SS-LVR203-071030
1050447	OUI-SS-LVR206-071030
1050448	OUI-SS-LVR207-071030
1050449	OUI-SS-LVR208-071030
1050450	OUI-SS-LVR204-071030
1050451	OUI-SS-LVR202-071030
1050455	OUI-SS-LVR201-071029
1050457	OUI-SS-LVR406-071029
1050775	OUI-SS-LVR205-071030
1050776	OUI-SS-LVR214-071031
1050777	OUI-SS-LVR209-071031
1050778	OUI-SS-LVR214-071031
1050779	OUI-SS-LVR213-071031
1050780	OUI-SS-LVR205-071030
1050781	OUI-SS-LVR209-071031
1050782	OUI-SS-LVR211-071031
1050783	OUI-SS-LVR212-071031
1050784	OUI-SS-LVR210-071031
1050785	OUI-SW-LVR209-071031
1050786	OUI-SW-MW402
1050787	OUI-SW-LVR211-071031
1050788	OUI-SW-LVR209-071031
1051235	OUI-SS-LVR213-071031
1051236	OU1-SE-UL215-071101
1051237	OU1-SW-LVR213-071031
1051238	OU1-SW-LVR214-071031
1051239	OU1-SW-MW402
1051240	OU1-SW-MW402
1051241	OU1-SW-MW401A
1051242	OU1-SW-MW401
1051243	OU1-SW-MW401B
1051244	OU1-SW-MW401C
1051245	OU1-SW-MW401D

Matrix – soil, 5 aqueous trip blanks and 5 aqueous equipment blanks

Executive Summary

All analyses were performed as requested on the chain of custody (COC). Incorrect error correction was observed on the COC instead of the proper procedure of a single strike through, correction, and initials and date of person making the correction.

There are some discrepancies throughout the lab report on the client IDs that the lab used compared to the COC forms. The following client ID in the laboratory report for laboratory ID

4080411 does not match the client ID on the COC. The laboratory used OU1-SW-LV201-071029; the COC lists the ID as OU1-SW-LVR201-071029. The following client ID in the laboratory report for laboratory ID 4080401 does not match the client ID on the COC. The laboratory used OU1-SW-LV205-071030; the COC lists the ID as OU1-SW-LVR205-071030. The following client ID in the laboratory report for laboratory ID 4080415 does not match the client ID on the COC. The laboratory used OU1-SW-LV406-071029; the COC lists the ID as OU1-SW-LVR406-071029. These client IDs were changed by the laboratory and new forms were emailed.

There are two samples on the COC with the same ID, OU1-SS-LVR206-0071030. One was collected 10/30/07, 1535 and given lab ID 1050447. The one collected 10/30/07, 1500 was given the lab ID 10540448. This second one was identified in the lab report as OUI-SS-LVR207-071030, based on email communication between CAS and the client.

All holding times were met.

1.0 Volatile Organic Compounds (EPA Method 8260B)

Full validation including recalculation was performed with the laboratory data for the analysis of volatile organic compounds (EPA Method 8260B). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Data Completeness
✓ Holding Times and Preservation
✓ Calibrations
✓ Internal Standards
✓ Performance Check Sample
⊗ Blanks
✓ System Monitoring Compounds (Surrogates)
⊗ Matrix Spike/Matrix Spike Duplicate Sample
✓ Laboratory Control Samples
⊗ Compound Identification and Quantitation

1.1 Data Completeness

All analyses were performed as requested on the COC.

Soil samples OUI-SS-LVR213-071031 (both original and dilution), OUI-SS-LVR209-071031 were not reported on a dry weight basis in the laboratory report. Revised report forms with the sample results on a dry weight basis were requested and received from the lab by email. In addition, incomplete extraction records were in the laboratory report. Complete extraction records were requested and received from the laboratory by email.

1.2 Holding Times and Preservation

All samples were analyzed within the 14 day technical holding time from date of collection for volatiles.

1.3 Calibrations

1.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the percent relative standard deviation (%RSD) of the relative response factors (RRFs). For all target analytes, the RRFs met the method criteria; the RSDs met the method criteria for all compounds or the coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibrations.

1.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the RRFs met the method criteria; the percent differences (%D) between the RRFs in the initial and continuing calibration standards for all target analytes were within the method or validation acceptance criteria.

1.4 Internal Standards

All internal standard retention times are within ±30 seconds of the associated continuing calibration internal standard retention time. All internal standard area counts were within the acceptance criteria (>50% and <150%) of the associated continuing calibration internal standard area counts.

1.5 Performance Check Samples

An instrument performance check sample (tune standard) was analyzed at the beginning of each 12-hour period during sample analysis. The samples were analyzed within the 12-hour period. All ion abundance criteria were met for bromofluorobenzene (BFB).

1.6 Blanks

Methylene chloride was detected in the method blank associated with the soil samples, at an estimated concentration greater than the method detection limit (MDL) but less than the reporting limit (RL). However, since methylene chloride was not detected in the associated samples, no sample qualifications were required.

2-Butanone was detected in the method blank associated with the dilution of sample OUI-SS-LVR213-071031, at a estimated concentration greater than the MDL but less than the RL. Therefore, the 2-butanone estimated concentration in sample OUI-SS-LVR213-071031 is U qualified as undetected at the RL.

Sample ID	Compound	Laboratory Result (ug/kg)	Validation Result (ug/kg)
OUI-SS-LVR213-071031	2-Butanone	240 JB	1500 U

Trip blanks were associated with the samples listed on the same COC. For example, the following samples are associated with trip blank OU1-SW-MW402, collection date 10/24/07, since these samples are listed on the same COC as this trip blank: OUI-SW-LV201-071029, OUI-SS-LVR201-071029 and OUI-SS-LVR406-071029.

Acetone was detected in the following trip blanks at estimated concentrations less than the RL, but greater than the MDL: OU1-SW-MW402, collected 10/30/07 (lab ID 1050420), OU1-SW-MW402, collected 10/24/07 (lab ID 1050422), OU1-SW-MW402, collected 10/31/07 (lab ID 1050786) and OU1-SW-MW402, collected 11/01/07 (lab ID 1051240). Therefore, based on the estimated concentration of acetone in the associated sample greater than the MDL but less than the RL, the concentration of acetone in the sample is U qualified as undetected at the RL. All other associated samples did not have acetone detected.

Sample ID	Compound	Laboratory Result (ug/kg)	Validation Result (ug/kg)
OU1-SE-UL215-071101	Acetone	3.2 J	20 U

1.7 System Monitoring Compounds (Surrogates)
All surrogate recoveries were within the laboratory acceptance limits.

1.8 Laboratory Control Samples (LCS)
All LCS recoveries were within the laboratory control limits.

1.9 Matrix Spike/Matrix Spike Duplicate Sample (MS/MSD)
Sample OU1-SW-LVR205-071030 was analyzed as the water MS/MSD. All compound recoveries and RPDs were within the laboratory control limits.

Sample OU1-SS-LVR205-071030 was analyzed as the soil MS/MSD. All compound recoveries and RPDs were within the laboratory control limits, with the following exceptions. Acetone and 2-butanone recoveries were high and outside of the laboratory control limits. Therefore, the concentrations of acetone and 2-butanone in sample OU1-SS-LVR205-071030 are J qualified as estimated.

The following compounds had low recoveries, slightly outside of the laboratory control limits: 1,2-dibromo-3-chloropropane, cis-1,2-dichloropropene, trans-1,2-dichloropropene and o-xylene. However, based on professional judgment, no sample qualifications were made since the recoveries were just outside of the control limits.

The following compounds had low recoveries, outside of the laboratory control limits: bromoform, chlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene, 2-hexanone, styrene and 1,2,4-trichlorobenzene. Therefore, the concentrations of bromoform, chlorobenzene, 1,3-dichlorobenzene, 1,4-

dichlorobenzene, 1,2-dichlorobenzene, 2-hexanone, styrene and 1,2,4-trichlorobenzene in sample OU1-SS-LVR205-071030 are UJ qualified as estimated below the RL.

Sample ID	Compound	Laboratory Result (ug/kg)	Validation Result (ug/kg)
OU1-SS-LVR205-071030	Acetone	130	130 J
	Bromoform	7.6 U	7.6 UJ
	2-Butanone	27	27 J
	Chlorobenzene	7.6 U	7.6 UJ
	1,3-Dichlorobenzene	7.6 U	7.6 UJ
	1,4-Dichlorobenzene	7.6 U	7.6 UJ
	1,2-Dichlorobenzene,	7.6 U	7.6 UJ
	2-hexanone	15 U	15 UJ
	Styrene	7.6 U	7.6 UJ
	1,2,4-Trichlorobenzene	7.6 U	7.6 UJ

1.10 Compound Identification and Quantitation

All compound identifications and quantitations were appropriate, with the following exceptions.

Sample OUI-SS-LVR213-071031 was analyzed both original (undiluted) and a second time at a dilution due to the concentration of acetone in the original sample, which was outside of the linear range of the calibration. The sample results for carbon disulfide, 1,2-dichlorobenzene and methyl acetate from the dilution of sample OUI-SS-LVR213-071031 did not agree with the original analysis of the sample. Therefore, based on professional judgment, the concentrations of carbon disulfide, 1,2-dichlorobenzene and methyl acetate in both the original and dilution analyses of sample OUI-SS-LVR213-071031 are UJ qualified as undetected less than the RL and J qualified as estimated.

Sample ID	Compound	Original Laboratory Result (ug/kg)	Validation Result (ug/kg)	Dilution Laboratory Result (ug/kg)	Validation Result (ug/kg)
OUI-SS-LVR213-071031	Carbon disulfide	6.8 J	6.8 J	51 J	51 J
	1,2-Dichlorobenzene	7.6 U	7.6 UJ	52 J	52 J
	Methyl acetate	1.4 J	1.4 J	410 J	410 J

2.0 Semivolatile Organic Compounds (EPA Method 8270C)

Full validation including recalculation was performed on the laboratory data for the analysis of semivolatile organic compounds (EPA Method 8270C). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ⊗ Calibrations
- ✓ Internal Standards
- ⊗ Performance Check Sample
- ✓ Blanks
- ✓ System Monitoring Compounds (Surrogates)
- ✓ Laboratory Control Samples
- ⊗ Matrix Spike/Matrix Spike Duplicate
- ⊗ Compound Identification and Quantitation

2.1 Data Completeness

All analyses were performed as requested on the COC.

2.2 Holding Times and Preservation

The samples for semivolatile analysis were extracted within the 7 day (water) or 14 day (soil) technical holding time from date of collection and analyzed within the 40 day technical holding time from date of extraction.

2.3 Calibrations

2.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the %RSD of the RRFs. For all target analytes, the RRFs met the method criteria; the RSDs met the method or validation criteria for all compounds or the coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibrations.

2.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the RRFs met the method criteria; the percent differences (%D) between the RRFs in the initial and continuing calibration standards for all target analytes were within the method or validation acceptance criteria, with the following exception. 2,4-Dinitrophenol in the CCV associated with samples OUI-SS-LVR214-071031, OUI-SS-LVR209-071031, OUI-SS-LVR213-071031 and OU1-SE-UL215-071101 was outside of the acceptance criteria. Therefore, the undetected concentrations of 2,4-

Dinitrophenol in samples OUI-SS-LVR214-071031, OUI-SS-LVR209-071031, OUI-SS-LVR213-071031 and OU1-SE-UL215-071101 are UJ qualified as estimated below the RL.

Sample ID	Compound	Laboratory Result (ug/kg)	Validation Result (ug/kg)
OUI-SS-LVR214-071031	2,4-Dinitrophenol	2000 U	2000 UJ
OUI-SS-LVR209-071031	2,4-Dinitrophenol	2100 U	2100 UJ
OUI-SS-LVR213-071031	2,4-Dinitrophenol	5800 U	5800 UJ
OU1-SE-UL215-071101	2,4-Dinitrophenol	15000 U	15000 UJ

2.4 Internal Standards

All internal standard retention times are within ±30 seconds of the associated continuing calibration internal standard retention time. All internal standard area counts were within the acceptance criteria (>50% and <150%) of the associated continuing calibration internal standard area counts.

2.5 Performance Check Samples

An instrument performance check sample was analyzed at the beginning of each 12-hour period during sample analysis. The samples were analyzed within the 12-hour period. All ion abundance criteria were met for decafluorotriphenyl-phosphine (DFTPP). It was noted that on all 5B Forms, the percent relative abundances for mass 441 compared to mass 443 were wrong. However, the raw data confirmed that mass 441 passed the method criteria; therefore, no sample qualifications were required. The laboratory was notified of the error.

2.6 Blanks

There were no detections of the project compounds of concern in the laboratory method blanks.

Sample OU1-SW-MW401 is the equipment blank. No compounds were detected in the equipment blank.

2.7 System Monitoring Compounds (Surrogates)

All surrogate recoveries were within the laboratory acceptance limits.

2.8 Laboratory Control Samples (LCS)

All LCS recoveries were within the laboratory control limits, with the exception of benzaldehyde, which had high recoveries, outside of the laboratory control limits, in the soil and water LCS and LCSD. However, since benzaldehyde was not detected in any of the samples, no sample qualifications were required.

2.9 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Sample OU1-SW-LVR205-071030 was analyzed as the water MS/MSD. All compound recoveries and RPDs were within the laboratory control limits.

Sample OU1-SS-LVR205-071030 was analyzed as the soil MS/MSD. All compound recoveries were within the laboratory control limits, with the exception of high benzaldehyde recoveries in the MS/MSD and high fluoranthene recovery in the MSD. Since benzaldehyde was not detected in sample OU1-SW-LV205-071030, no sample qualifications were required. However, since fluoranthene was detected in sample OU1-SW-LV205-071030, the concentration is J qualified as estimated.

Sample ID	Compound	Laboratory Result (ug/kg)	Validation Result (ug/kg)
OU1-SW-LV205-071030	Fluoranthene	340 J	340 J

2.10 Compound Identification and Quantitation

All compound identifications and quantitations were appropriate.

3.0 Organochlorine Pesticides (EPA Method 8081A)

Full validation including recalculation was performed on the laboratory data for the analysis of Organochlorine Pesticides (EPA Method 8081A). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ✓ Blanks
- ⊗ System Monitoring Compounds (Surrogates)
- ✓ Laboratory Control Samples
- ✓ Matrix Spike/Matrix Spike Duplicate
- ⊗ Compound Identification and Quantitation

3.1 Data Completeness

All analyses were performed as requested on the COC.

3.2 Holding Times and Preservation

The samples for organochlorine pesticide analysis were extracted within the 7 day (water) or 14 day (soil) technical holding time from date of collection and analyzed within the 40 day technical holding time from date of extraction.

3.3 Calibrations

3.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the %RSD of the average response factors (RFs). For all target analytes, the RSDs met the method criteria for all compounds.

3.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the percent differences (%D) between the average RFs in the initial and continuing calibration standards for all target analytes were within the method acceptance criteria.

3.4 Blanks

There were no detections of the project compounds of concern in the laboratory method blank.

Sample OU1-SW-MW401 was the equipment blank. No compounds were detected in the equipment blank.

3.5 System Monitoring Compounds (Surrogates)

All surrogate recoveries were within the laboratory acceptance limits, with the exception of one high surrogate recovery (decachlorobiphenyl, DCB) in sample OU1-SE-UL215-071101. However, since the other surrogate recovery (tetrachloro-m-xylene, TCMX) was acceptable, no sample qualifications were required.

3.6 Laboratory Control Samples (LCS)

All LCS/LCS duplicate (LCSD) recoveries and RPDs were within the laboratory control limits.

3.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Sample OU1-SW-LVR205-071030 was analyzed as the water MS/MSD. All compound recoveries and RPDs were within the laboratory control limits.

Sample OU1-SS-LVR205-071030 was analyzed as the soil MS/MSD. All compound recoveries and RPDs were within the laboratory control limits.

3.8 Compound Identification and Quantitation

All compound identifications and quantitations were appropriate, with the following exceptions.

The dieldrin concentration in sample OU1-SE-UL215-071101 was reported by the laboratory as not detected at the RL. However, based on the raw data and recalculation during the validation process, the sample detection limit is 51 ug/kg, due to baseline noise. The concentration of dieldrin on a second column resulted in a sample detection limit of 23 ug/kg. The RPD between the two results is 89%, which suggests that a chromatographic problem may exist, due to matrix interference. The

higher of the two concentrations is reported as the detection limit in the sample, based on the laboratory's reporting procedure and professional judgment.

The concentration of endrin aldehyde in sample OU1-SE-UL215-071101 was reported by the laboratory as not detected at the RL. However, based on the raw data and recalculation during the validation process, the sample detection limit is 101 ug/kg, due to baseline noise. The concentration of endrin aldehyde on a second column resulted in a sample detection limit of 58 ug/kg. The RPD between the two results is 54%, which suggests that a chromatographic problem may exist, due to matrix interference. The higher of the two concentrations is reported as the detection limit in the sample, based on the laboratory's reporting procedure and professional judgment.

The concentration of endrin ketone in sample OU1-SE-UL215-071101 was reported by the laboratory as not detected at the RL. However, based on the raw data and recalculation during the validation process, the sample detection limit is 140 mg/kg. The concentration of endrin ketone on a second column resulted in a sample detection limit of 51 ug/kg. The RPD between the two results is 54%, which suggests that a chromatographic problem may exist, due to matrix interference. The higher of the two concentrations is reported as the detection limit in the sample, based on the laboratory's reporting procedure and professional judgment.

The concentration of heptachlor epoxide in sample OU1-SE-UL215-071101 was reported by the laboratory as not detected at the RL. However, based on the raw data and recalculation during the validation process, the sample detection limit is 10 mg/kg. The concentration of heptachlor epoxide on a second column resulted in a sample detection limit of 4.0 ug/kg. The RPD between the two results is 89%, which suggests that a chromatographic problem may exist, due to matrix interference. The higher of the two concentrations is reported as the detection limit in the sample, based on the laboratory's reporting procedure and professional judgment.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SE-UL215-071101	Dieldrin	4.8 U	51 U
	Endrin aldehyde	4.8 U	101 U
	Endrin ketone	4.8 U	140 U
	Heptachlor epoxide	2.5 U	10 U

It was noted that J qualified concentrations (sample concentrations between the MDL and RL) were not reported by the laboratory.

4.0 PCBs (EPA Method 8082)

Full validation including recalculation was performed on the laboratory data for the analysis of PCBs (EPA Method 8082). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ⊗ Calibrations
- ✓ Blanks
- ✓ System Monitoring Compounds (Surrogates)
- ✓ Laboratory Control Samples
- ✓ Matrix Spike/Matrix Spike Duplicate
- ✓ Compound Identification and Quantitation

4.1 Data Completeness

All analyses were performed as requested on the COC.

4.2 Holding Times and Preservation

The samples for PCB analysis were extracted within the 7 day (water) or 14 day (soil) technical holding time from date of collection and analyzed with the 40 day technical holding time from date of extraction.

4.3 Calibrations

4.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the %RSD of the average response factors (RFs). For all target analytes, the RSDs met the method criteria for all compounds.

4.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the percent differences (%D) between the average RFs in the initial and continuing calibration standards for all target analytes were within the method acceptance criteria, with the following exceptions. Two closing CCVs had compounds with percent differences outside of the method acceptance limits. There were no PCBs detected in the associated samples, with the exception of PCB 1260 in sample OU1-SE-UL215-071101. Only one of the peaks used to quantify PCB1260 in the CCV associated with sample OU1-SE-UL215-071101 was outside the acceptance limits. Therefore, based on professional judgment and since the instrument response increased, no sample qualifications were made.

4.4 Blanks

There were no detections of the project compounds of concern in the laboratory method blank.

Sample OU1-SW-MW401 was the equipment blank. No compounds were detected in the equipment blank.

4.5 System Monitoring Compounds (Surrogates)
All surrogate recoveries were within the laboratory acceptance limits.

4.6 Laboratory Control Samples (LCS)
All LCS/LCS duplicate (LCSD) recoveries and RPDs were within the laboratory control limits.

4.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)
Sample OU1-SW-LVR205-071030 was analyzed as the water MS/MSD. All compound recoveries and RPDs were within the laboratory control limits.

Sample OU1-SS-LVR205-071030 was analyzed as the soil MS/MSD. All compound recoveries and RPDs were within the laboratory control limits.

4.8 Compound Identification and Quantitation
All compound identifications and quantitations were appropriate.

5.0 Metals (EPA Methods 6020/6010B/7470A/74741A)

The soil and water samples were analyzed for the requested metals and Mercury (EPA 6020/6010B/7470A/7471A) following total metals digestion and Mercury digestion. Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPS and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Data Completeness
✓ Holding Times and Preservation
✓ Calibrations
⊗ Blanks
✓ Laboratory Control Samples
⊗ Matrix Spike/Matrix Spike Duplicate Samples
⊗ Laboratory Duplicate Samples
⊗ Serial Dilutions
⊗ Compound Identification and Quantitation

5.1 Data Completeness
All analyses were performed as requested on the COC.

5.2 Holding Times and Preservation
All analyses were performed within the method-specified holding times.

5.3 Calibrations

5.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for inductively coupled plasma/mass spectrometry (ICP/MS) analysis, inductively coupled plasma (ICP) analysis and cold vapor atomic absorption (CVAA) initial calibrations.

5.3.2 Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV)

The percent recoveries in all associated ICVs and CCVs were within the QC acceptance limits.

5.3.3 CRDL (Detection Limit) Standard

The CRDL standards were within the control limits.

5.3.4 ICSA/ICSAB (Interference Check) Standards

The ICSA/ICSAB standards met all acceptance criteria.

5.4 Blanks

5.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria with the following exceptions; chromium, copper and lead were detected in the water preparation blank at estimated concentrations less than the RL, but greater than the instrument detection limits (IDL). Therefore, the concentrations of chromium, copper and lead detected in the associated sample at concentrations less than the RL, but greater than the IDL are U qualified as not detected at the RL.

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-SW-LV205-071030	Chromium	0.589 B	3.0 U
	Lead	0.279 B	1.0 U
OU1-SW-LV201-071029	Chromium	1.1 B	3.0 U
	Copper	2.5 B	5.0 U
	Lead	0.352 B	1.0 U
OU1-SW-LV406-071029	Chromium	1.2 B	3.0 U
	Copper	2.5 B	5.0 U
	Lead	0.358 B	1.0 U
OU1-SW-LVR203-071030	Chromium	1.4 B	3.0 U
	Copper	2.8 B	5.0 U
	Lead	0.392 B	1.0 U
OU1-SW-LVR211-071031	Copper	3.8 B	5.0 U
OU1-SW-LVR209-071031	Chromium	3.0 B	3.0 U
	Copper	2.2 B	5.0 U
	Lead	0.768 B	1.0 U
OU1-SW-LVR213-071031	Chromium	1.5 B	3.0 U
	Copper	1.6 B	5.0 U

	Lead	0.252 B	1.0 U
OU1-SW-LVR214-071031	Chromium	2.4 B	3.0 U
	Copper	1.6 B	5.0 U
	Lead	0.353 B	1.0 U
OU1-SW-MW401A	Chromium	1.4 B	3.0 U
	Lead	0.816 B	1.0 U
OU1-SW-MW401B	Chromium	1.6 B	3.0 U
	Lead	0.808 B	1.0 U
OU1-SW-MW401C	Chromium	1.3 B	3.0 U
	Lead	0.854 B	1.0 U
OU1-SW-MW401D	Chromium	1.0 B	3.0 U
	Lead	0.799 B	1.0 U

Aluminum, calcium, chromium, iron, lead, manganese and sodium were detected in the soil preparation blank at estimated concentrations less than the RL, but greater than the IDL. Based on the sample concentrations greater than the RL and professional judgment, no sample qualifications were made to the aluminum, calcium, chromium, iron, lead and manganese sample results. However, based on the soil blank concentration of sodium, the sodium concentrations detected in the associated samples are U qualified as not detected at the RL; the concentration of sodium in sample OU1-SS-LVR406-071029 is U qualified as not detected at an elevated detection limit.

Sample ID	**Compound**	**Laboratory Result (mg/kg)**	**Validation Result (mg/kg)**
OU1-SS-LVR203-071030	Sodium	106 B	500 U
OU1-SS-LVR206-071030	Sodium	86.9 B	500 U
OU1-SS-LVR207-071030	Sodium	123 B	500 U
OU1-SS-LVR208-071030	Sodium	174 B	500 U
OU1-SS-LVR204-071030	Sodium	312 B	500 U
OU1-SS-LVR202-071030	Sodium	121 B	500 U
OU1-SS-LVR201-071029	Sodium	209 B	500 U
OU1-SS-LVR406-071029	Sodium	614 B	614 U
OU1-SS-LVR205-071030	Sodium	221 B	500 U
OU1-SS-LVR214-071031	Sodium	155 B	500 U
OU1-SS-LVR209-071031	Sodium	156 B	500 U
OU1-SS-LVR211-071031	Sodium	195 B	500 U
OU1-SS-LVR212-071031	Sodium	120 B	500 U
OU1-SS-LVR210-071031	Sodium	129 B	500 U
OU1-SS-LVR213-071031	Sodium	146 B	500 U
OU1-SE-UL215-071101	Sodium	242 B	500 U

5.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICBs and CCBs met the acceptance criteria with a few exceptions; several ICBs and CCBs had metal detections at estimated concentrations less than the RL, but greater than the IDLs. However, based on professional judgment and

since the metals concentrations for all metals in the waters and soils in the associated samples were either greater than the RL or not detected, no additional sample qualifications were made.

5.4.3 Field QC Samples

Samples OU1-SW-MW-401A, OU1-SW-MW-401B, OU1-SW-MW-401C and OU1-SW-MW-401D are the equipment blanks. The following compounds were detected in the equipment blanks at estimated concentrations less than the RL, but greater than the IDL.

OU1-SW-MW-401A – barium, calcium, chromium, lead, mercury, nickel, potassium, sodium and zinc.

OU1-SW-MW-401B – barium, calcium, chromium, lead, mercury, nickel and zinc.

OU1-SW-MW-401C – barium, calcium, chromium, copper, lead, manganese, mercury, nickel, potassium, sodium, vanadium and zinc.

OU1-SW-MW-401D – barium, calcium, chromium, lead, mercury, nickel, potassium, vanadium and zinc.

Copper was detected in the all the equipment blanks at concentrations greater than the RL.

Based on the concentrations of all of the above metals in the water samples, the following sample qualifications are made. If the sample concentration is estimated less than the RL, the sample is U qualified as undetected at the RL. If the sample concentration is above the RL, the sample is U qualified as undetected at an elevated RL.

Sample ID	**Compound**	**Laboratory Result (ug/L)**	**Validation Result (ug/L)**
OU1-SW-LV205-071030	Copper	1.5 B	5.0 U
	Vanadium	1.1	1.1 U
	Zinc	22.9	22.9 U
OU1-SW-LVR209-071031	Vanadium	1.7	1.7 U
	Zinc	9.8 B	20.0 U
OU1-SW-LVR213-071031	Zinc	4.7 B	20.0 U
OU1-SW-LVR214-071031	Mercury	0.015 B	0.200 U
	Vanadium	0.475 B	1.0 U
	Zinc	4.9 B	20.0 U

Based on professional judgment, no sample qualifications were made to the soil samples, since the concentrations of the metals in the soil samples were at least two times higher than the equipment blank concentrations.

5.5 Laboratory Control Samples (LCS)

All percent recoveries in the soil and water LCS were within the acceptance limits.

5.6 Matrix Spike (MS)

Sample OU1-SW-LVR-205-071030 was analyzed as the water MS; all compound recoveries were within the laboratory control limits.

Sample OU1-SS-LVR205-071030 was analyzed as the soil MS. The following compounds were outside of the laboratory control limits: Aluminum, barium, cadmium, calcium, copper, iron, lead, manganese, vanadium and zinc. However, since the concentration of these metals in the unspiked sample exceeded the spike concentration by a factor of four or greater, the spike recovery control limits do not apply and qualification of the data is not required. The recoveries for antimony and selenium were low and outside of the laboratory control limits; the recovery for cobalt was high and outside of the laboratory control limits. Therefore, the concentration in sample OU1-SS-LVR205-071030 of antimony is UJ qualified as estimated less than the RL, the concentration of selenium is J- qualified as estimated with a low bias, and the concentration of cobalt in sample OU1-SS-LVR205-071030 are J+ qualified as estimated with a high bias.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SS-LVR205-071030	Antimony	0.981 U	0.981 UJ
	Cobalt	3.5	3.5 J+
	Selenium	0.524 B	0.524 J-

5.7 Laboratory Duplicate Samples

Sample OU1-SW-LVR205-071030 was analyzed as the water laboratory duplicate. All RPD results were acceptable, with the exception of arsenic, chromium, thallium and vanadium. However, since arsenic, chromium, thallium and vanadium were detected at a estimated concentration less than the RL but greater than the IDL in the duplicate, no sample qualifications were required.

Sample OU1-SS-LVR205-071030 was analyzed as the soil laboratory duplicate. Cadmium was outside of the laboratory acceptance limits for RPD. Therefore, the concentration of cadmium in sample OU1-SS-LVR205-071030 is J qualified as estimated.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SS-LVR205-071030	Cadmium	1.1 B	1.1 J

5.8 Serial Dilutions

The percent differences for the compounds for the serial dilution for the total metals water analysis of sample OU1-SW-LVR205-071030 were outside of the laboratory acceptance criteria for chromium, potassium, selenium, thallium and vanadium;

however, these metals concentrations in the serial dilution are less than 50 times the IDL. Therefore, no sample qualifications are required.

The percent differences for the compounds for the serial dilution for the total metals soil analysis of sample OU1-SS-LVR205-071030 were outside of the laboratory acceptance criteria for beryllium, chromium, selenium and silver; however, the beryllium, chromium, selenium and silver concentrations in the serial dilution are less than 50 times the IDL. Therefore, no sample qualifications are required.

5.9 Compound Identification and Quantitation

The project acceptance limits for the ICP-MS internal standards are 30-170% recovery. All internal standard recoveries were within the project acceptance limits.

The concentrations of some compounds in the samples were B qualified by the laboratory, indicating an estimated sample concentration less than the RL, but greater than the IDL. These concentrations are J qualified as estimated.

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-SW-LV205-071030	Cobalt	0.421 B	0.421 J
	Selenium	0.659 B	0.659 J
	Thallium	0.064 B	0.064 J
OU1-SW-LV201-071029	Arsenic	0.341 B	0.341 J
	Selenium	0.843 B	0.843 J
OU1-SW-LV406-071029	Arsenic	0.313 B	0.313 J
	Selenium	0.915 B	0.915 J
OU1-SW-LVR203-071030	Arsenic	0.423 B	0.423 J
	Selenium	0.991 B	0.991 J
OU1-SW-LVR211-071031	Beryllium	0.119 B	0.119 J
	Cadmium	0.477 B	0.477 J
	Thallium	0.043 B	0.043 J
OU1-SW-LVR209-071031	Arsenic	0.879 B	0.879 J
	Cobalt	0.878 B	0.878 J
	Zinc	9.8 B	9.8 J
OU1-SW-LVR213-071031	Arsenic	0.475 B	0.475 J
	Cobalt	0.493 B	0.493 J
	Selenium	0.782 B	0.782 J
	Zinc	4.7 B	4.7 J

OU1-SW-LVR214-071031	Arsenic	0.528 B	0.528 J
	Cobalt	0.643 B	0.643 J
	Vanadium	0.475 B	0.475 J
	Zinc	4.9 B	4.9 J
OU1-SW-MW401A	Barium	0.514 B	0.514 J
	Calcium	126 B	126 J
	Mercury	0.015 B	0.015 J
	Nickel	0.137 B	0.137 J
	Potassium	144 B	144 J
	Sodium	54.0 B	54.0 J
	Zinc	18.2 B	18.2 J
OU1-SW-MW401B	Barium	0.394 B	0.394 J
	Calcium	92.6 B	92.6 J
	Mercury	0.017 B	0.017 J
	Nickel	0.352 B	0.352 J
	Zinc	16.0 B	16.0 J
OU1-SW-MW401C	Barium	0.641 B	0.641 J
	Calcium	156 B	156 J
	Manganese	2.7 B	2.7 J
	Mercury	0.028 B	0.028 J
	Nickel	0.187 B	0.187 J
	Potassium	178 B	178 J
	Sodium	159 B	159 J
	Vanadium	0.525 B	0.525 J
OU1-SW-MW401D	Barium	0.404 B	0.404 J
	Calcium	101 B	101 J
	Mercury	0.016 B	0.016 J
	Nickel	0.186 B	0.186 J
	Potassium	107 B	107 J
	Vanadium	1.1 B	1.1 J
	Zinc	13.8 B	13.8 J

Sample	**Metal**	**Laboratory Concentration (mg/kg)**	**Validation Concentration (mg/kg)**
OU1-SS-LVR203-071030	Antimony	2.0 B	2.0 J
	Beryllium	0.139 B	0.139 J
	Mercury	0.022 B	0.022 J
	Silver	0.755 B	0.755 J
OU1-SS-LVR206-071030	Beryllium	0.231 B	0.231 J
	Cadmium	1.1 B	1.1 J
	Mercury	0.011 B	0.011 J
	Selenium	0.524 B	0.524 J

	Silver	0.387 B	0.387 J
	Thallium	0.057 B	0.057 J

OU1-SS-LVR207-071030	Beryllium	0.285 B	0.285 J
	Copper	5.9 B	5.9 J
	Mercury	0.012 B	0.012 J
	Selenium	0.515 B	0.515 J
	Silver	0.247 B	0.247 J
OU1-SS-LVR208-071030	Beryllium	0.355 B	0.355 J
	Cadmium	0.757 B	0.757 J
	Copper	6.5 B	6.5 J
	Mercury	0.007 B	0.007 J
	Selenium	0.541 B	0.541 J
	Silver	0.880 B	0.880 J
OU1-SS-LVR204-071030	Beryllium	0.423 B	0.423 J
	Mercury	0.041 B	0.041 J
	Selenium	0.977 B	0.977 J
OU1-SS-LVR202-071030	Beryllium	0.152 B	0.152 J
	Mercury	0.014 B	0.014 J
	Selenium	0.379 B	0.379 J
	Silver	0.614 B	0.614 J
OU1-SS-LVR201-071029	Beryllium	0.449 B	0.449 J
	Mercury	0.006 B	0.006 J
	Selenium	0.911 B	0.911 J
	Thallium	0.080 B	0.080 J
OU1-SS-LVR406-071029	Beryllium	0.511 B	0.511 J
	Mercury	0.010 B	0.010 J
	Thallium	0.230 B	0.230 J
OU1-SS-LVR205-071030	Beryllium	0.848 B	0.848 J
	Selenium	1.2 B	1.2 J
	Silver	0.760 B	0.760 J
	Thallium	0.343 B	0.343 J
OU1-SS-LVR214-071031	Beryllium	0.340 B	0.340 J
	Mercury	0.006 B	0.006 J
	Selenium	0.668 B	0.668 J
	Silver	0.571 B	0.571 J
	Thallium	0.118 B	0.118 J
OU1-SS-LVR209-071031	Beryllium	0.356 B	0.356 J
	Selenium	0.490 B	0.490 J
	Silver	0.345 B	0.345 J
	Thallium	0.085 B	0.085 J
OU1-SS-LVR211-071031	Beryllium	0.616 B	0.616 J
	Mercury	0.033 B	0.033 J
	Selenium	0.658 B	0.658 J
	Silver	0.409 B	0.409 J
	Thallium	0.161 B	0.161 J

OU1-SS-LVR212-071031	Beryllium	0.256 B	0.256 J
	Cadmium	0.986 B	0.986 J
	Mercury	0.009 B	0.009 J
	Selenium	0.506 B	0.506 J
	Silver	0.383 B	0.383 J
	Thallium	0.061 B	0.061 J
OU1-SS-LVR210-071031	Beryllium	0.221 B	0.221 J
	Chromium	4.9 B	4.9 J
	Mercury	0.008 B	0.008 J
	Selenium	0.712 B	0.712 J
	Silver	0.224 B	0.224 J
OU1-SS-LVR213-071031	Beryllium	0.393 B	0.393 J
	Cadmium	1.1 B	1.1 J
	Mercury	0.027 B	0.027 J
	Silver	0.239 B	0.239 J
	Thallium	0.134 B	0.134 J
OU1-SE-UL215-071101	Antimony	4.8 B	4.8 J
	Beryllium	0.993 B	0.993 J
	Thallium	0.615 B	0.615 J

6.0 Cyanide (EPA Method 9012) and Percent Solids (Modified Method 160.3)
The soil and water samples were analyzed for cyanide (EPA Method 9012) and percent solids (EPA Modified Method 160.3). Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPs and the quality of the data reported. The following summarizes the results of this review. In addition, the percent solids data was reviewed and found to be acceptable.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ✓ Blanks
- ✓ Laboratory Control Sample
- ✓ Matrix Spike Sample
- ✓ Laboratory Duplicate Sample

7.1 Data Completeness
All analyses were performed as requested on the COC.

7.2 Holding Times and Preservation
All analyses were performed within the method-specified holding times.

7.3 Calibrations

7.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for Cyanide analysis.

7.3.2 Continuing Calibration Verification (CCV)

The percent recoveries in all associated CCVs were within the QC acceptance limits for Cyanide.

7.4 Blanks

7.4.1 Preparation (Method) Blank

The preparation blank met the acceptance criteria; Cyanide was not detected in the method blank.

7.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICB and CCBs met the acceptance criteria; no Cyanide was detected in either the ICB or CCBs.

7.5 Laboratory Control Sample (LCS)

The cyanide percent recoveries in the LCSs (water and soil) were within the acceptance limits.

7.6 Matrix Spike (MS)

Sample OU1-SW-LVR205-071030 was analyzed as the water MS; the cyanide recovery was within the laboratory control limits.

Sample OU1-SS-LVR205-071030 was analyzed as the soil MS; the cyanide recovery was within the laboratory control limits.

7.7 Laboratory Duplicate Samples

Sample OU1-SW-LV205-071030 was analyzed as the water laboratory duplicate; cyanide was not detected in either the original or lab duplicate.

Sample OU1-SS-LVR205-071030 was analyzed as the soil laboratory duplicate; cyanide was not detected in either the original or lab duplicate.

ATTACHMENT A
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by GeoSyntec's Data Review Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher that the concentration of the analyte in the sample due to bias attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower that the concentration of the analyte in the sample due to bias attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Geosyntec consultants

1531 Dick Lonas Road, Building A
Knoxville, TN 37909
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Memorandum

TO: Nandra Weeks

DATE: March 10, 2008

FROM: Geosyntec Consultants QA/QC Group

SITE: Mattheissen and Hegeler Zinc Company Site, OU1

SUBJECT: Summary of Tier III Validation of analytical results for CAS Report R2740512

Introduction

This report summarizes the findings of the full validation of three soil samples, four equipment blanks and one trip blank collected on behalf of the Mattheissen and Hegeler Zinc Company Site, OU1 project. These samples were collected on October 24-25, 2007. The samples were analyzed by Columbia Analytical Services, Inc. (CAS), Rochester, New York. The samples were analyzed for Volatile Organic Compounds by EPA Method 8260B, Semivolatile Organic Compounds by EPA Method 8270C, Organochlorine Pesticides by EPA Method 8081A, Polychlorinated Biphenyls (PCBs) by EPA Method 8082, Total Metals by EPA Methods 6020 and 6010B, Mercury by EPA Methods 7470A and 7471A, Metals by EPA Methods 6020, 6010 and 7470A following EPA Method 1312 Synthetic Precipitation Leaching Procedure (SPLP), Cyanide by EPA Method 9012, pH by EPA Method 9045 and Percent Solids by Modified EPA Method 160.3.

The data were reviewed in accordance with the principles presented in *USEPA National Functional Guidelines for Laboratory Data Review, Organics* (EPA, 2005), *USEPA National Functional Guidelines for Laboratory Data Review, Inorganics* (EPA, 2004), and per the requirements of the QAPP, the laboratory standard operating procedures and the specified methods.

Data for the following samples were reviewed.

CAS Job No.	Client ID
1049297	OU1-SS-SB307-0-1 MS/MSD
1049298	OU1-SS-SB307-7-8
1049299	OU1-SS-SB307-7-8
1049300	OU1-SS-SB406-0-1
1049301	OU1-SW-MW402

1049302	OU1-SW-MW401-B
1049303	OU1-SW-MW401-A
1049304	OU1-SW-MW401-C
1049305	OU1-SW-MW401-B
1049306	OU1-SW-MW401-C
1049307	OU1-SW-MW401-B
1049308	OU1-SW-MW401-A
1049309	OU1-SW-MW401-C
1049310	OU1-SW-MW401-D
1049363	OU1-SS-SB307-0-1

Matrix – soil, 1 aqueous trip blank and 4 aqueous equipment blanks

Executive Summary

All analyses were performed as requested on the chain of custody (COC). The dates of sample collection were recorded on the COC using only the month and day; the year was not included in the date. It was assumed, based on the date of sample receipt at the laboratory, that the year was 2007.

All holding times were met.

1.0 Volatile Organic Compounds (EPA Method 8260B)

Full validation including recalculation was performed with the laboratory data for the analysis of volatile organic compounds (EPA Method 8260B). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ⊗ Internal Standards
- ✓ Performance Check Sample
- ⊗ Blanks
- ✓ System Monitoring Compounds (Surrogates)
- ⊗ Matrix Spike/Matrix Spike Duplicate Sample
- ⊗ Laboratory Control Samples
- ✓ Compound Identification and Quantitation

1.1 Data Completeness

All analyses were performed as requested on the COC.

1.2 Holding Times and Preservation

All samples were analyzed within the 14 day technical holding time from date of collection for volatiles.

1.3 Calibrations

1.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the percent relative standard deviation (%RSD) of the relative response factors (RRFs). For all target analytes, the RRFs met the method criteria; the RSDs met the method criteria for all compounds or the coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibrations.

1.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the RRFs met the method criteria; the percent differences (%D) between the RRFs in the initial and continuing calibration standards for all target analytes were within the method or validation acceptance criteria.

1.4 Internal Standards

All internal standard retention times are within ±30 seconds of the associated continuing calibration internal standard retention time. All internal standard area counts were within the acceptance criteria (>50% and <150%) of the associated continuing calibration internal standard area counts, with the following exceptions. Internal standard recoveries for dichlorobenzene-d5 in sample OU1-SS-SB307-7-8 and dichlorobenzene-d5 and Chlorobenzene-d5 in the reanalysis of sample OU1-SS-SB307-7-8 were low and outside of the method acceptance limits. Therefore, the undetected concentrations of the associated compounds are R qualified as rejected and the concentrations detected are J qualified as estimated.

Sample ID	Compound	Laboratory Result (ug/kg)	Validation Result (ug/kg)
OU1-SS-SB307-7-8	1,2-Dibromo-3-chloropropane	6.8 U	6.8 R
	1,3-Dichlorobenzene	6.8 U	6.8 R
	1,4-Dichlorobenzene	6.8 U	6.8 R
	1,2-Dichlorobenzene	6.8 U	6.8 R
	1,1,2,2-Tetrachloro-ethane	6.8 U	6.8 R
	1,2,4-Trichlorobenzene	6.8 U	6.8 R
OU1-SS-SB307-7-8 (reanalysis)	Bromoform	7.7 U	7.7 R
	Chlorobenzene	7.7 U	7.7 R
	1,2-Dibromo-3-chloropropane	7.7 U	7.7 R
	Dibromochloro-methane	7.7 U	7.7 R
	1,2-Dibromoethane	7.7 U	7.7 R
	1,3-Dichlorobenzene	7.7 U	7.7 R
	1,4-Dichlorobenzene	7.7 U	7.7 R
	1,2-Dichlorobenzene	7.7 U	7.7 R
	Trans-1,3-dichloropropene	7.7 U	7.7 R
	Ethylbenzene	4.9 J	4.9 J
	2-Hexanone	15 U	15 R
	Isopropylbenzene	1.9 J	1.9 J
	4-Methyl-2-pentanone	15 U	15 R
	Styrene	7.7 U	7.7 R
	1,1,2,2-Tetrachloroethane	7.7 U	7.7 R
	Tetrachloroethene	7.7 U	7.7 R
	Toluene	9.3	9.3 J
	1,2,4-Trichlorobenzene	7.7 U	7.7 R
	1,1,2-Trichloroethane	7.7 U	7.7 R
	o-Xylene	7.1 J	7.1 J
	m+p-Xylene	9.6	9.6 J

1.5 Performance Check Samples

An instrument performance check sample (tune standard) was analyzed at the beginning of each 12-hour period during sample analysis. The samples were analyzed within the 12-hour period. All ion abundance criteria were met for bromofluorobenzene (BFB).

1.6 Blanks

Acetone was detected in the method blank associated with the soil samples, at an estimated concentration greater than the method detection limit (MDL) but less than the reporting limit (RL). No sample qualifications were required for acetone because of the concentrations of acetone in the associated samples are greater than the RL.

Sample OU1-SW-MW-402 (collected 10/24/07) is the trip blank and samples OU1-SW-MW-401-A (collected 10/24/07), OU1-SW-MW-401-B (collected 10/25/07) and OU1-SW-MW-401-C (collected 10/25/07) are the equipment blanks. Acetone was detected in each of these blanks at estimated concentrations less than the RL, but greater than the MDL. No soil sample qualifications were required, based on the concentrations of acetone in the associated samples which are greater than the RL.

1.7 System Monitoring Compounds (Surrogates)

All surrogate recoveries were within the laboratory acceptance limits.

1.8 Laboratory Control Samples (LCS)

All LCS recoveries were within the laboratory control limits, with the exception of high dichlorodifluoromethane recovery outside of the laboratory control limits in the LCS associated with the soil analysis. Since dichlorodifluoromethane was not detected in the soil sample, no sample qualification was required.

1.9 Matrix Spike/Matrix Spike Duplicate Sample (MS/MSD)

A MS/MSD pair was not analyzed.

1.10 Compound Identification and Quantitation

All compound identifications and quantitations were appropriate.

2.0 Semivolatile Organic Compounds (EPA Method 8270C)

Full validation including recalculation was performed on the laboratory data for the analysis of semivolatile organic compounds (EPA Method 8270C). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Data Completeness
✓ Holding Times and Preservation
⊗ Calibrations
✓ Internal Standards
⊗ Performance Check Sample
✓ Blanks
✓ System Monitoring Compounds (Surrogates)
✓ Laboratory Control Samples

- ✓ Matrix Spike/Matrix Spike Duplicate
- ✓ Compound Identification and Quantitation

2.1 Data Completeness

All analyses were performed as requested on the COC.

2.2 Holding Times and Preservation

The samples for semivolatile analysis were extracted within the 7 day technical holding time (waters) and 14 day technical holding time (soil) from date of collection and analyzed with the 40 day technical holding time from date of extraction.

2.3 Calibrations

2.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the %RSD of the RRFs. For all target analytes, the RRFs met the method criteria; the RSDs met the method criteria for all compounds or the coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibrations.

2.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the RRFs met the method criteria; the percent differences (%D) between the RRFs in the initial and continuing calibration standards for all target analytes were within the method acceptance criteria, with the following exception. Benzaldehyde in the CCV associated with samples OU1-SW-MW401-B, OU1-SW-MW401-A and OU1-SW-MW401-C was outside of the method acceptance criteria with a low bias. Therefore, the undetected concentrations of benzaldehyde in samples OU1-SW-MW401-B, OU1-SW-MW401-A and OU1-SW-MW401-C are UJ qualified as estimated below the RL.

Sample ID	**Compound**	**Laboratory Result (ug/L)**	**Validation Result (ug/L)**
OU1-SW-MW401-B	Benzaldehyde	9.8 U	9.8 UJ
OU1-SW-MW401-A	Benzaldehyde	9.4 U	9.4 UJ
OU1-SW-MW401-C	Benzaldehyde	9.8 U	9.8 UJ

2.4 Internal Standards

All internal standard retention times are within ±30 seconds of the associated continuing calibration internal standard retention time. All internal standard area counts were within the acceptance criteria (>50% and <150%) of the associated continuing calibration internal standard area counts.

2.5 Performance Check Samples

An instrument performance check sample was analyzed at the beginning of each 12-hour period during sample analysis. The samples were analyzed within the

12-hour period. All ion abundance criteria were met for decafluorotriphenyl-phosphine (DFTPP). It was noted that on all 5B Forms, the percent relative abundances for mass 441 compared to mass 443 were wrong. However, the raw data confirmed that mass 441 passed the method criteria; therefore, no sample qualifications were required. The laboratory was notified of the error.

2.6 Blanks

There were no detections of the project compounds of concern in the laboratory method blanks.

Samples OU1-SW-MW401-B, OU1-SW-MW401-A, OU1-SW-MW401-C and OU1-SW-MW401-D were the equipment blanks. No compounds were detected in the equipment blanks.

2.7 System Monitoring Compounds (Surrogates)

All surrogate recoveries were within the laboratory acceptance limits.

2.8 Laboratory Control Samples (LCS)

All LCS recoveries were within the laboratory control limits.

2.9 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

A MS/MSD pair was not analyzed.

2.10 Compound Identification and Quantitation

All compound identifications and quantitations were appropriate.

3.0 Organochlorine Pesticides (EPA Method 8081A)

Full validation including recalculation was performed on the laboratory data for the analysis of Organochlorine Pesticides (EPA Method 8081A). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ✓ Blanks
- ✓ System Monitoring Compounds (Surrogates)
- ✓ Laboratory Control Samples
- ⊗ Matrix Spike/Matrix Spike Duplicate
- ⊗ Compound Identification and Quantitation

3.1 Data Completeness

All analyses were performed as requested on the COC.

3.2 Holding Times and Preservation

The samples for organochlorine pesticide analysis were extracted within the 7 day technical holding time (waters) and 14 day technical holding time (soil) from date of collection and analyzed within the 40 day technical holding time from date of extraction.

3.3 Calibrations

3.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the %RSD of the average response factors (RFs). For all target analytes, the RSDs met the method criteria for all compounds.

3.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the percent differences (%D) between the average RFs in the initial and continuing calibration standards for all target analytes were within the method acceptance criteria.

3.4 Blanks

There were no detections of the project compounds of concern in the laboratory method blank.

Samples OU1-SW-MW401-A and OU1-SW-MW401-B were the equipment blanks. No compounds were detected in the equipment blanks.

3.5 System Monitoring Compounds (Surrogates)

All surrogate recoveries were within the laboratory acceptance limits.

3.6 Laboratory Control Samples (LCS)

All LCS/LCS duplicate (LCSD) recoveries and RPDs were within the laboratory control limits.

3.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Sample OU1-SS-SB307-0-1 was analyzed as the MS/MSD. All compound recoveries were within the laboratory control limits, with the following exceptions. Aldrin recovery in the MSD was high and above the laboratory control limits. However, since aldrin was not detected in sample OU1-SS-SB307-0-1, no sample qualifications were required. The recoveries of endrin aldehyde were 1.1% and 178% on the two columns used for analysis; based on professional judgment these recoveries indicate matrix interferences. Therefore, the concentration of endrin aldehyde in sample OU1-SS-SB307-0-1 is UJ qualified as estimated less than the RL.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SS-SB307-0-1	Endrin aldehyde	3.7 U	3.7 UJ

3.8 Compound Identification and Quantitation

All compound identifications and quantitations were appropriate, with the following exceptions.

The beta endosulfan concentration in sample OU1-SS-SB307-0-1 was reported by the laboratory as not detected at 3.7 ug/kg. However, based on the raw data and email communication from the laboratory, the undetected concentration of beta endosulfan in sample OU1-SS-SB307-0-1 is 4.8 ug/kg, due to baseline noise. The concentration of beta endosulfan on a second column resulted in a sample detection limit of 3.9 ug/kg. The higher of the two concentrations is reported as the detection limit in the sample, based on the laboratory's reporting procedure and professional judgment. An elevated RL was calculated and reported as a result of the validation process and summarized below.

The endosulfan sulfate concentration in sample OU1-SS-SB307-0-1 was reported by the laboratory as not detected at 3.7 ug/kg. However, based on the raw data and email communication from the laboratory, the undetected concentration of endosulfan sulfate in sample OU1-SS-SB307-0-1 is 3.9 ug/kg, due to baseline noise. The concentration of endosulfan sulfate on a second column resulted in a sample detection limit of 1.57 ug/kg, which is less than the RL, but greater than the MDL. The RPD between the two results is 86%, which suggests that a chromatographic problem may exist, due to matrix interference. The higher of the two concentrations is reported as the detection limit in the sample, based on the laboratory's reporting procedure and professional judgment. An elevated RL was calculated and reported as a result of the validation process and summarized below.

The beta-BHC concentration in sample OU1-SS-SB307-0-1 was reported by the laboratory as not detected at 1.9 ug/kg. However, based on the raw data and professional judgment, the undetected concentration of beta-BHC in sample OU1-SS-SB307-0-1 is 8.8 mg/kg, due to baseline noise. The concentration of beta-BHC on a second column resulted in a sample detection limit of 0.34 ug/kg, which is less than the RL, but greater than the MDL. The RPD between the two results is 185%, which suggests that a chromatographic problem may exist, due to matrix interference. The higher of the two concentrations is reported as the detection limit in the sample, based on the laboratory's reporting procedure and professional judgment. An elevated RL was calculated and reported as a result of the validation process and summarized below.

The endrin concentration in sample OU1-SS-SB307-0-1 was reported by the laboratory as not detected at 3.7 ug/kg. However, based on the raw data and professional judgment, the undetected concentration of endrin in sample OU1-SS-SB307-0-1 is 5.0 mg/kg, due to baseline noise. The concentration of endrin on a second column resulted in a sample detection limit of 1.16 ug/kg, which is less than

the RL, but greater than the MDL. The RPD between the two results is 124%, which suggests that a chromatographic problem may exist, due to matrix interference. The higher of the two concentrations is reported as the detection limit in the sample, based on the laboratory's reporting procedure and professional judgment. An elevated RL was calculated and reported as a result of the validation process and summarized below.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SS-SB307-0-1	beta-Endosulfan	3.7 U	4.8 U
	Endosulfan sulfate	3.7 U	3.9 U
	beta-BHC	1.9 U	8.8 U
	Endrin	3.7 U	5.0 U

It was noted that J qualified concentrations (sample concentrations between the MDL and RL) were not reported by the laboratory.

4.0 PCBs (EPA Method 8082)

Full validation including recalculation was performed on the laboratory data for the analysis of PCBs (EPA Method 8082). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ✓ Blanks
- ✓ System Monitoring Compounds (Surrogates)
- ✓ Laboratory Control Samples
- ✓ Matrix Spike/Matrix Spike Duplicate
- ✓ Compound Identification and Quantitation

4.1 Data Completeness

All analyses were performed as requested on the COC.

4.2 Holding Times and Preservation

The samples for PCB analysis were extracted within the 7 day technical holding time (water) and 14 day technical holding time (soil) from date of collection and analyzed within the 40 day technical holding time from date of extraction.

4.3 Calibrations

4.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the %RSD of the average response factors (RFs). For all target analytes, the RSDs met the method criteria for all compounds.

4.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the percent differences (%D) between the average RFs in the initial and continuing calibration standards for all target analytes were within the method acceptance criteria.

4.4 Blanks

There were no detections of the project compounds of concern in the laboratory method blank.

Samples OU1-SW-MW401-A and OU1-SW-MW401-B were the equipment blanks. No compounds were detected in the equipment blanks.

4.5 System Monitoring Compounds (Surrogates)

All surrogate recoveries were within the laboratory acceptance limits.

4.6 Laboratory Control Samples (LCS)

All LCS/LCS duplicate (LCSD) recoveries and RPDs were within the laboratory control limits.

4.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Sample OU1-SS-SB307-0-1 was analyzed as the MS/MSD. All compound recoveries were within the laboratory control limits.

4.8 Compound Identification and Quantitation

All compound identifications and quantitations were appropriate.

5.0 Metals (EPA Methods 6020/6010B/7470A/74741A)

The soil and water samples were analyzed for the requested metals and Mercury (EPA 6020/6010B/7470A/7471A) following total metals digestion and Mercury digestion. Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPS and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Data Completeness
✓ Holding Times and Preservation

✓ Calibrations
⊗ Blanks
⊗ Laboratory Control Samples
⊗ Matrix Spike/Matrix Spike Duplicate Samples
⊗ Laboratory Duplicate Samples
⊗ Serial Dilutions
⊗ Compound Identification and Quantitation

5.1 Data Completeness

All analyses were performed as requested on the COC.

5.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

5.3 Calibrations

5.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for inductively coupled plasma/mass spectrometry (ICP/MS) analysis, inductively coupled plasma (ICP) analysis and cold vapor atomic absorption (CVAA) initial calibrations.

5.3.2 Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV)

The percent recoveries in all associated ICVs and CCVs were within the QC acceptance limits, with the following exception. Aluminum was slightly high (111%, limits 90-110%) and outside of the QC acceptance limits in the closing CCV for the soil analyses; however, based on professional judgment, no sample qualifications were made.

5.3.3 CRDL (Detection Limit) Standard

The CRDL standards were within the control limits, with the following exceptions. Iron recovery was high and slightly outside of the acceptance limits in the closing CRDL for the water analyses (134%, limits 70-130%). Zinc recovery was high and slightly outside of the acceptance limits in the closing CRDL for the soil analyses (131%, limits 70-130%). However, based on professional judgment and due to the sample concentrations greater than the RL, no sample qualifications were made.

5.3.4 ICSA/ICSAB (Interference Check) Standards

The ICSA/ICSAB standards met all acceptance criteria.

5.4 Blanks

5.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria with the following exceptions; chromium, copper, iron, lead, manganese, sodium, vanadium and zinc were detected in the water preparation blank at estimated concentrations less than the RL but greater than the instrument detection limits (IDL). The concentrations of copper and zinc in the associated water sample were greater

than the RL; therefore, no sample qualifications were required for copper and zinc. However, the estimated concentrations of chromium, iron, lead, manganese and sodium detected in the associated sample less than the RL but greater than the IDL are U qualified as not detected at the RL; the concentration of vanadium is U qualified as not detected at an elevated RL, based on professional judgment.

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-SW-MW401-A	Chromium	1.6 B	3.0 U
	Iron	34.2 B	100 U
	Lead	0.655 B	1.0 U
	Manganese	3.7 B	10 U
	Sodium	119 B	5000 U
	Vanadium	1.3	1.3 U

Calcium, lead manganese and sodium were detected in the soil preparation blank at estimated concentrations less than the RL, but greater than the IDL. However, no sample qualifications were made to the calcium, lead and manganese concentrations since the concentrations in the associated samples were greater than the RL. The concentrations of sodium in the associated samples were at least ten times the preparation blank sodium concentration; therefore, based on professional judgment, no sample qualifications were made to the sodium sample concentrations.

5.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICBs and CCBs met the acceptance criteria with a few exceptions; several ICBs and CCBs had metal detections at estimated concentrations less than the RL, but greater than the IDLs. However, since the metals concentrations for all metals except sodium (soil samples) in the associated samples were either greater than the RL or not detected, no additional sample qualifications were made. The concentrations of sodium in the associated soil samples were at least ten times the ICB and CCB blank sodium concentrations; therefore, based on professional judgment, no sample qualifications were made to the sodium sample concentrations based on the ICBs and CCBs.

5.4.3 Field QC Samples

Sample OU1-SW-MW-401A is the equipment blank. The following compounds were detected in OU1-SW-MW-401A at estimated concentrations less than the RL, but greater than the IDL. No soil sample qualifications were required, based on these estimated detections and the concentrations of the metals in the associated samples.

OU1-SW-MW-401A – barium, calcium, chromium, iron, lead, manganese, nickel and sodium.

The following compounds were detected in OU1-SW-MW-401A at concentrations greater than the RL:

OU1-SW-MW-401A – copper, vanadium and zinc

Based on professional judgment, no sample qualifications were made to the soil samples, based on these detections since the concentrations of the metals in the soil samples were much higher than the equipment blank concentrations.

5.5 Laboratory Control Samples (LCS)

All percent recoveries in the water LCS were within the acceptance limits.

All percent recoveries in the soil LCS were within the acceptance limits, with the following exceptions. Antimony, cobalt, lead and thallium had high recoveries, outside of the acceptance limits in the LCS. Therefore, the concentrations of antimony, cobalt, lead and thallium in the associated samples are J+ qualified as estimated with a high bias.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SS-SB307-0-1	Antimony	10.2	10.2 J+
	Cobalt	6.0	6.0 J+
	Lead	393	393 J+
	Thallium	0.592 B	0.592 J+
OU1-SS-SB307-7-8	Antimony	2.9 B	2.9 J+
	Cobalt	6.1	6.1 J+
	Lead	90.8	90.8 J+
	Thallium	0.430 B	0.430 J+
OU1-SS-SB307-8-9	Antimony	3.3 B	3.3 J+
	Cobalt	11.9	11.9 J+
	Lead	88.5	88.5 J+
	Thallium	0.694 B	0.694 J+
OU1-SS-SB406-0-1	Antimony	4.5 B	4.5 J+
	Cobalt	7.8	7.8 J+
	Lead	135	135 J+
	Thallium	0.664 B	0.664 J+

5.6 Matrix Spike (MS)

Sample OU1-SW-MW401-A was analyzed as the water MS. Only the metals analyzed by EPA Method 6010B were spiked; all compound recoveries were within the laboratory control limits.

The metals analyzed by EPA Method 6020 for waters were spiked into a batch QC sample. No information was provided on the batch QC sample results.

Sample OU1-SS-SB307-0-1 was analyzed as the soil MS. The following compounds were outside of the laboratory control limits: Aluminum, arsenic, barium, cadmium, calcium, chromium, iron, lead, magnesium, manganese, mercury, nickel, vanadium and zinc. However, since the concentration of these metals in the unspiked sample exceeded the spike concentration by a factor of four or greater, the spike recovery control limits do not apply and qualification of the data is not required. The recoveries for antimony and selenium were low and outside of the laboratory control limits; therefore, the concentrations of antimony and selenium in sample OU1-SS-SB307-0-1 are J- qualified as estimated with a low bias.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SS-SB307-0-1	Antimony	10.2	10.2 J-
	Selenium	0.638 B	0.638 J-

5.7 Laboratory Duplicate Samples

Sample OU1-SW-MW401-A was analyzed as the water laboratory duplicate. Only the metals analyzed by EPA Method 6010B were assessed in the laboratory duplicate. All RPD results were acceptable, with the exception of iron. However, since iron was detected at a estimated concentration less than the RL, but greater than the IDL, no sample qualifications were required.

The metals analyzed by EPA Method 6020 for waters were assessed using a batch QC sample. No information was provided on the batch QC sample results.

Sample OU1-SS-SB307-0-1 was analyzed as the soil laboratory duplicate. The following metals were outside of the laboratory acceptance limits for RPD: antimony, arsenic, barium, lead, mercury, sodium, vanadium and zinc. No sample qualifications are required for antimony and sodium since the concentrations in the duplicate are less than the RL. However, due to the duplicate RPDs outside of the acceptance limits, the concentrations of arsenic, barium, lead, mercury, vanadium and zinc are J qualified as estimated.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SS-SB307-0-1	Arsenic	16.9	16.9 J
	Barium	612	612 J
	Lead	393	393 J
	Mercury	1.1	1.1 J
	Vanadium	27.9	27.9 J
	Zinc	3110	3110 J

5.8 Serial Dilutions

The percent differences for the compounds for the serial dilution for the total metals water analysis of sample OU1-SW-MW401-A were outside of the laboratory acceptance criteria for calcium, chromium, iron, lead, magnesium, manganese,

potassium, sodium, vanadium and zinc; however, these metals concentrations in the serial dilution are less than 50 times the IDL. Therefore, no sample qualifications are required. The serial dilution was only performed for the metals analyzed by EPA Method 6010B. The serial dilution for the metals analyzed by EPA Method 6020 for waters was assessed using a batch QC sample. No information was provided on the batch QC sample results.

The percent differences for the compounds for the serial dilution for the total metals soil analysis of sample OU1-SS-SB307-0-1 were outside of the laboratory acceptance criteria for antimony, iron and selenium; however, the antimony and selenium concentrations in the serial dilution are less than 50 times the IDL. Therefore, no sample qualifications are required. Based on the concentrations of iron in the original sample and serial dilution, the concentration of iron in sample OU1-SS-SB307-0-1 is J qualified as estimated.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SS-SB3079-0-1	Iron	34300	34300 J

5.9 Compound Identification and Quantitation

The project acceptance limits for the ICP-MS internal standards are 30-170% recovery. All internal standard recoveries were within the project acceptance limits.

The concentrations of some compounds in the samples were B qualified by the laboratory, indicating an estimated sample concentration less than the RL, but greater than the IDL. These concentrations are J qualified as estimated.

Sample	Metal	Laboratory Concentration (ug/L)	Validation Concentration (ug/L)
OU1-SW-MW401A	Barium	0.719 B	0.719 J
	Calcium	260 B	260 J
	Nickel	0.179 B	0.179 J

Sample	Metal	Laboratory Concentration (mg/kg)	Validation Concentration (mg/kg)
OU1-SS-SB307-0-1	Beryllium	1.0 B	1.0 J
	Selenium	0.638 B	0.638 J
	Sodium	399 B	399 J
	Thallium	0.592 B	0.592 J
OU1-SS-SB307-7-8	Antimony	2.9 B	2.9 J
	Mercury	0.030 B	0.030 J
	Selenium	0.557 B	0.557 J
	Sodium	338 B	338 J
	Thallium	0.430 B	0.430 J

OU1-SS-SB307-8-9	Antimony	3.3 B	3.3 J
	Selenium	1.3 B	1.3 J
	Sodium	367 B	367 J
	Thallium	0.694 B	0.694 J
OU1-SS-SB406-0-1	Antimony	4.5 B	4.5 J
	Selenium	0.774 B	0.774 J
	Thallium	0.664 B	0.664 J

6.0 SPLP Metals (EPA Methods 1312/6020/6010B/7470A)

The soil samples were analyzed for the requested metals and Mercury (EPA 6020/6010B/7470A) following a Synthetic Precipitation Leaching Procedure (SPLP). Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPs and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ⊗ Blanks
- ✓ Laboratory Control Samples
- ⊗ Matrix Spike/Matrix Spike Duplicate Samples
- ✓ Laboratory Duplicate Samples
- ✓ Serial Dilutions
- ⊗ Compound Identification and Quantitation

6.1 Data Completeness

All analyses were performed as requested on the COC. The SPLP extraction log was requested from the laboratory and was sent by email.

6.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

6.3 Calibrations

6.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for inductively coupled plasma/mass spectrometry (ICP/MS) analysis, inductively coupled plasma (ICP) analysis and cold vapor atomic absorption (CVAA) initial calibrations.

6.3.2 Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV)

The percent recoveries in all associated ICVs and CCVs were within the QC acceptance limits.

6.3.3 CRDL Standard

The CRDL standards were within the control limits.

6.3.4 ICSA/ICSAB Standards

The ICSA/ICSAB met all acceptance criteria.

6.4 Blanks

6.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria with the following exceptions; arsenic, chromium, copper, lead, mercury and vanadium were detected in the preparation blank at estimated concentrations less than the RL but greater than the IDL. Therefore, based on the sample's chromium, copper, mercury and vanadium concentrations which are less than the RL but greater than the IDL, the sample concentrations are U qualified as not detected at the RL.

Sample	Metal	Laboratory Concentration (ug/L)	Validation Concentration (ug/L)
OU1-SS-SB307-0-1	Chromium	2.1 B	3.0 U
	Copper	4.5 B	5.0 U
	Mercury	0.120 B	0.200 U
	Vanadium	0.743 B	1.0 U

6.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICBs and CCBs met the acceptance criteria with a few exceptions; several ICBs and CCBs had metal detections at estimated concentrations less than the RL, but greater than the IDLs. However, based on professional judgment and since the metals concentrations in the associated samples were either greater than the RL or not detected, no additional sample qualifications were made.

6.5 Laboratory Control Samples (LCS)

All percent recoveries in the LCS were within the acceptance limits.

6.6 Matrix Spike (MS)

Sample OU1-SS-SB307-0-1 was analyzed as the MS. All compound recoveries were within the laboratory control limits. Only the metals analyzed by EPA Method 6020 were assessed in the MS. The metals analyzed by EPA Method 6010B were assessed using a batch QC sample. No information was provided on the batch QC sample results.

6.7 Laboratory Duplicate Samples

Sample OU1-SS-SB307-0-1 was analyzed as the laboratory duplicates. The relative percent differences (RPD) were within the acceptance limits, with the following exceptions. Thallium and vanadium were outside of the acceptance limits in the duplicate of sample OU1-SS-SB307-0-1; however, since the estimated concentrations of thallium and vanadium in the sample were less than the RL, no sample qualifications are required. Only the metals analyzed by EPA Method 6020 were assessed in the duplicate. The metals analyzed by EPA Method 6010B were assessed using a batch QC sample. No information was provided on the batch QC sample results.

6.8 Serial Dilutions

The percent differences for the compounds for the serial dilution for the SPLP analysis of sample OU1-SS-SB307-0-1 were outside of the laboratory acceptance criteria for arsenic, chromium, copper, potassium, selenium, thallium and vanadium; however, since the concentrations of these metals are less than 50 times the IDL, no sample qualifications are required.

6.9 Compound Identification and Quantitation

The project acceptance limits for the ICP-MS internal standards are 30-170% recovery. All internal standard recoveries were within the project acceptance limits.

The concentrations of some compounds in the sample were B qualified by the laboratory, indicating an estimated sample concentration less than the RL, but greater than the IDL. These concentrations are J qualified as estimated.

Sample	Metal	Laboratory Concentration (ug/L)	Validation Concentration (ug/L)
OU1-SS-SB307-0-1	Cadmium	0.681 B	0.681 J
	Cobalt	0.316 B	0.316 J
	Nickel	2.3 B	2.3 J
	Potassium	934 B	934 J
	Selenium	0.636 B	0.636 J
	Thallium	0.063 B	0.063 J

7.0 Cyanide (EPA Method 9012), pH (EPA Method 9045) and Percent Solids (Modified Method 160.3)

The soil and water samples were analyzed for cyanide (EPA Method 9012), pH, (EPA Method 9045) and percent solids (EPA Modified Method 160.3). Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPs and the quality of the data reported. The following summarizes the results of this review. In addition, the percent solids data was reviewed and found to be acceptable.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where

issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ✓ Blanks
- ✓ Laboratory Control Sample
- ✓ Matrix Spike Sample
- ✓ Laboratory Duplicate Sample

7.1 Data Completeness

All analyses were performed as requested on the COC.

7.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

7.3 Calibrations

7.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for Cyanide analysis.

7.3.2 Continuing Calibration Verification (CCV)

The percent recoveries in all associated CCVs were within the QC acceptance limits for Cyanide.

7.4 Blanks

7.4.1 Preparation (Method) Blank

The preparation blank met the acceptance criteria; Cyanide was not detected in the method blank.

7.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICB and CCBs met the acceptance criteria; no Cyanide was detected in either the ICB or CCBs.

7.5 Laboratory Control Sample (LCS)

The cyanide percent recoveries in the LCSs (water and soil) were within the acceptance limits (85-115% recovery).

7.6 Matrix Spike (MS)

An MS from this sample set was not analyzed. Results of batch QC analyses were not reported.

.

7.7 Laboratory Duplicate Samples

A duplicate from this sample set was not analyzed. Results of batch QC analyses were not reported.

ATTACHMENT A
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by GeoSyntec's Data Review Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher that the concentration of the analyte in the sample due to bias attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower that the concentration of the analyte in the sample due to bias attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Geosyntec consultants

1531 Dick Lonas Road, Building A
Knoxville, TN 37909
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Memorandum

TO: Nandra Weeks

DATE: March 6, 2008

FROM: Geosyntec Consultants QA/QC Group

SITE: Mattheissen and Hegeler Zinc Company Site, OU1

SUBJECT: Summary of Tier III Validation of analytical results for CAS Report R2740363

Introduction

This report summarizes the findings of the full validation of ten soil samples, two equipment blanks and three field blanks collected on behalf of the Mattheissen and Hegeler Zinc Company Site, OU1 project. These samples were collected on October 17-18, 2007. The samples were analyzed by Columbia Analytical Services, Inc. (CAS), Rochester, New York. The samples were analyzed for Volatile Organic Compounds by EPA Method 8260B, Semivolatile Organic Compounds by EPA Method 8270C, Organochlorine Pesticides by EPA Method 8081A, Polychlorinated Biphenyls (PCBs) by EPA Method 8082, Total Metals by EPA Methods 6020 and 6010B, Mercury by EPA Methods 7470A and 7471A, Metals by EPA Methods 6020, 6010 and 7470A following EPA Method 1312 Synthetic Precipitation Leaching Procedure (SPLP), Cyanide by EPA Method 9012, pH by EPA Method 9045 and Percent Solids by Modified EPA Method 160.3.

The data were reviewed in accordance with the principles presented in *USEPA National Functional Guidelines for Laboratory Data Review, Organics* (EPA, 2005), *USEPA National Functional Guidelines for Laboratory Data Review, Inorganics* (EPA, 2004), and per the requirements of the QAPP, the laboratory standard operating procedures and the specified methods.

Data for the following samples were reviewed.

CAS Job No.	Client ID
1047225	OU1-SS-SB308-26.5-27.5
1047226	OU1-SS-SB308-26.5-27.5
1047227	OU1-SS-SB308-36.5-37.5
1047228	OU1-SS-SB308-0-1
1047229	OU1-SS-SB309-0-1 MS/MSD

1047230	OU1-SS-SB309-48-49
1047231	OU1-SS-SB305-0-1
1047234	OU1-SS-SB309-28.25-29.25
1047236	OU1-SS-SB309-18.25-19.25
1047239	OU1-SS-SB406-0-1
1047242	OU1-SS-SB305-90-91
1047243	OU1-SS-SB305-89-90
1047244	OU1-SS-SB308-36.5-37.5
1047245	OU1-SS-SB309-48-49 MS/MSD
1047246	OU1-SS-SB406-0-1
1047250	OU1-SS-SB308-36.5-37.5
1047251	OU1-SS-SB309-48-49 MS/MSD
1047252	OU1-SS-SB406-0-1
1047253	OU1-SS-SB308-36.5-37.5
1047254	OU1-SS-SB309-48-49 MS/MSD
1047255	OU1-SS-SB406-0-1
1047261	OU1-SS-SB309-28.5-29.5 MS/MSD
1047267	OU1-SS-SB309-0-1MS/MSD
1047269	OU1-SS-SB305-0-1
1047271	OU1-SS-SB406-0-1
1047277	OU1-SW-MW401-B
1047279	OU1-SW-MW401-B
1047280	OU1-SW-MW401-B
1047281	OU1-SW-MW401
1047282	OU1-SW-MW401-B
1047283	OU1-SW-MW405
1047284	OU1-SW-MW401-B
1047285	OU1-SW-MW401
1047286	OU1-SW-MW405-B
1047287	OU1-SW-MW405
1047288	OU1-SW-MW401-B
1047289	OU1-SW-MW401
1047290	OU1-SW-MW405A
1047291	OU1-SW-MW401A
1047292	OU1-SS-SB406-0-1
1047293	OU1-SW-MW405-B
1047294	OU1-SW-MW405
1047295	OU1-SW-MW401
1047296	OU1-SW-MW401
1047297	OU1-SW-MW401
1047298	OU1-SS-SB305-90-91

Matrix – soil, 2 aqueous equipment blanks and 3 field blanks

Executive Summary

All analyses were performed as requested on the chain of custody (COC). The dates of sample collection and date sample were relinquished on the COC only included the month and day; the

year was not included in the date. It was assumed, based on the date of sample receipt at the laboratory, that the year was 2007.

All holding times were met.

1.0 Volatile Organic Compounds (EPA Method 8260B)

Full validation including recalculation was performed with the laboratory data for the analysis of volatile organic compounds (EPA Method 8260B). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ✓ Internal Standards
- ✓ Performance Check Sample
- ⊗ Blanks
- ✓ System Monitoring Compounds (Surrogates)
- ⊗ Matrix Spike/Matrix Spike Duplicate Sample
- ✓ Laboratory Control Samples
- ✓ Compound Identification and Quantitation

1.1 Data Completeness

All analyses were performed as requested on the COC.

1.2 Holding Times and Preservation

All samples were analyzed within the 14 day technical holding time from date of collection for volatiles.

1.3 Calibrations

1.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the percent relative standard deviation (%RSD) of the relative response factors (RRFs). For all target analytes, the RRFs met the method criteria; the RSDs met the method criteria for all compounds or the coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibrations.

1.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the RRFs met the method criteria; the percent differences (%D) between the RRFs in the initial and continuing calibration standards for all target analytes were within the method acceptance criteria,

with the following exceptions. Bromomethane and 1,1,2-trichloro-1,2,2,-trifluoroethane were outside of the acceptance limits in the CCV associated with the analyses of the field QC samples (all aqueous samples). Therefore, the undetected concentrations of bromomethane and 1,1,2-trichloro-1,2,2,-trifluoroethane in the field QC samples are UJ qualified as not detected less than the reporting limits (RL).

Sample ID	Date Collected	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-SW-MW405	10/17/07	Bromomethane	2.0 U	2.0 UJ
		1,1,2-trichloro-1,2,2,-trifluoroethane	1.0 U	1.0 UJ
OU1-SW-MW401-B	10/17/07	Bromomethane	2.0 U	2.0 UJ
		1,1,2-trichloro-1,2,2,-trifluoroethane	1.0 U	1.0 UJ
OU1-SW-401	10/17/07	Bromomethane	2.0 U	2.0 UJ
		1,1,2-trichloro-1,2,2,-trifluoroethane	1.0 U	1.0 UJ
OU1-SW-405-B	10/17/07	Bromomethane	2.0 U	2.0 UJ
		1,1,2-trichloro-1,2,2,-trifluoroethane	1.0 U	1.0 UJ
OU1-SW-405	10/18/07	Bromomethane	2.0 U	2.0 UJ
		1,1,2-trichloro-1,2,2,-trifluoroethane	1.0 U	1.0 UJ

1.4 Internal Standards

All internal standard retention times are within ±30 seconds of the associated continuing calibration internal standard retention time. All internal standard area counts were within the acceptance criteria (>50% and <150%) of the associated continuing calibration internal standard area counts

1.5 Performance Check Samples

An instrument performance check sample (tune standard) was analyzed at the beginning of each 12-hour period during sample analysis. The samples were analyzed within the 12-hour period. All ion abundance criteria were met for bromofluorobenzene (BFB).

1.6 Blanks

Acetone and methylene chloride were detected in the method blank associated with the soil samples analyzed on 10/26/07 and acetone was detected in the method blank

associated with the soil samples analyzed on 10/29/07, at estimated concentrations greater than the method detection limit (MDL) but less than the RL. Therefore, based on the concentration of acetone in the method blank and in sample OU1-SS-SB309-48-49, the concentration of acetone is U qualified as not detected at an elevated RL. The estimated concentrations of methylene chloride in samples OU1-SS-SB309-48-49 and OU1-SS-SB406-0-1 greater than the MDL but less than the RL are U qualified as not detected at the RL.

Sample ID	Compound	Laboratory Result (ug/kg)	Validation Result (ug/kg)
OU1-SS-SB309-48-49	Acetone	28 B	28 U
	Methylene chloride	0.53 JB	5.0 U
OU1-SS-SB406-0-1	Methylene chloride	0.64 JB	5.0 U

Samples OU1-SW-MW-401-B (collected 10/17/07) and OU1-SW-MW-401 (collected 10/17/07) are equipment blanks and samples OU1-SW-MW-405 (collected 10/17/07), OU1-SW-MW-405-B (collected 10/17/07) and OU1-SW-MW-405 (collected 10/18/07) are field blanks. A trip blank was not sent with the samples. The following compounds were detected in each of these blanks at estimated concentrations less than the RL, but greater than the MDL. No soil sample qualifications were required, based on these detections and the concentrations of the compounds in the associated samples.

OU1-SW-MW-401-B (collected 10/17/07, equipment blank) – acetone and styrene
OU1-SW-MW-401 (collected 10/17/07, equipment blank) – acetone and styrene
OU1-SW-MW-405 (collected 10/17/07, field blank) – acetone
OU1-SW-MW-405-B (collected 10/17/07, field blank) – acetone, bromodichloromethane and chloroform
OU1-SW-MW-405 (collected 10/18/07, field blank) – bromodichloromethane and chloroform

1.7 System Monitoring Compounds (Surrogates)

All surrogate recoveries were within the laboratory acceptance limits.

1.8 Laboratory Control Samples (LCS)

All LCS recoveries were within the laboratory control limits, with the exception of high dichlorodifluoromethane recovery outside of the laboratory control limits in the LCS associated with the analysis of sample OU1-SS-SB308-36.5-37.5. Since dichlorodifluoromethane was not detected in sample OU1-SS-SB308-36.5-37.5, no sample qualification was required.

1.9 Matrix Spike/Matrix Spike Duplicate Sample (MS/MSD)

Sample OU1-SS-SB309-48-49 was analyzed as the MS/MSD. All compound recoveries were within the laboratory control limits, with the following exceptions. 1,4-Dichlorobenzene, styrene, 1,2,4-trichlorobenzene and vinyl chloride had low recoveries outside of the laboratory control limits in the MS and/or the MSD; therefore, the undetected concentrations of 1,4-dichlorobenzene, styrene, 1,2,4-

trichlorobenzene and vinyl chloride in sample OU1-SS-SB309-48-49 are UJ qualified as estimated less than the RL.

Sample ID	Compound	Laboratory Result (ug/kg)	Validation Result (ug/kg)
OU1-SS-SB309-48-49	1,4-Dichlorobenzene	6.7 U	6.7 UJ
	Styrene	6.7 U	6.7 UJ
	1,2,4-Trichlorobenzene	6.7 U	6.7 UJ
	Vinyl chloride	6.7 U	6.7 UJ

1.10 Compound Identification and Quantitation

All compound identifications and quantitations were appropriate.

2.0 Semivolatile Organic Compounds (EPA Method 8270C)

Full validation including recalculation was performed on the laboratory data for the analysis of semivolatile organic compounds (EPA Method 8270C). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Data Completeness
✓ Holding Times and Preservation
✓ Calibrations
✓ Internal Standards
⊗ Performance Check Sample
✓ Blanks
✓ System Monitoring Compounds (Surrogates)
✓ Laboratory Control Samples
✓ Matrix Spike/Matrix Spike Duplicate
⊗ Compound Identification and Quantitation

2.1 Data Completeness

All analyses were performed as requested on the COC.

2.2 Holding Times and Preservation

The samples for semivolatile analysis were extracted within the 7 day technical holding time (water) and 14 day technical holding time (soil) from date of collection and analyzed within the 40 day technical holding time from date of extraction.

2.3 Calibrations

2.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the %RSD of the RRFs. For all target analytes, the RRFs met the method criteria; the RSDs met the method criteria for all compounds or the coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibrations.

2.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the RRFs met the method criteria; the percent differences (%D) between the RRFs in the initial and continuing calibration standards for all target analytes were within the method acceptance criteria.

2.4 Internal Standards

All internal standard retention times are within ±30 seconds of the associated continuing calibration internal standard retention time. All internal standard area counts were within the acceptance criteria (>50% and <150%) of the associated continuing calibration internal standard area counts.

2.5 Performance Check Samples

An instrument performance check sample was analyzed at the beginning of each 12-hour period during sample analysis. The samples were analyzed within the 12-hour period. All ion abundance criteria were met for decafluorotriphenyl-phosphine (DFTPP). It was noted that on all 5B forms, the percent relative abundances for mass 441 compared to mass 443 were wrong. However, the raw data confirmed that mass 441 passed the method criteria; therefore, no sample qualifications were required. The laboratory was notified of this error.

2.6 Blanks

There were no detections of the project compounds of concern in the laboratory method blanks.

Sample OU1-SW-MW401-B was the equipment blank. No compounds were detected in the equipment blank.

2.7 System Monitoring Compounds (Surrogates)

All surrogate recoveries were within the laboratory acceptance limits.

2.8 Laboratory Control Samples (LCS)

All LCS recoveries were within the laboratory control limits.

2.9 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Sample OU1-SS-SB309-48-49 was analyzed as the MS/MSD. All compound recoveries were within the laboratory control limits.

2.10 Compound Identification and Quantitation

All compound identifications and quantitations were appropriate, with the following exception. The concentration of benzo(a)pyrene in sample OU1-SS-SB308-36.5-37.5 was reported incorrectly. The correct estimated concentration of benzo(a)pyrene in

sample OU1-SS-SB308-36.5-37.5, corrected for the percent solids in the sample, is noted in the table below.

Sample ID	Compound	Laboratory Result (ug/kg)	Validation Result (ug/kg)
OU1-SS-SB308-36.5-37.5	Benzo(a)pyrene	110 J	120 J

3.0 Organochlorine Pesticides (EPA Method 8081A)

Full validation including recalculation was performed on the laboratory data for the analysis of Organochlorine Pesticides (EPA Method 8081A). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ✓ Blanks
- ✓ System Monitoring Compounds (Surrogates)
- ✓ Laboratory Control Samples
- ✓ Matrix Spike/Matrix Spike Duplicate
- ✓ Compound Identification and Quantitation

3.1 Data Completeness

All analyses were performed as requested on the COC.

3.2 Holding Times and Preservation

The samples for organochlorine pesticide analysis were extracted within the 7 day technical holding time (water) and 14 day technical holding time (soil) time from date of collection and analyzed within the 40 day technical holding time from date of extraction.

3.3 Calibrations

3.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the %RSD of the average response factors (RFs). For all target analytes, the RSDs met the method criteria for all compounds.

3.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the percent differences (%D) between the average RFs in the initial and continuing calibration standards for all target analytes were within the method acceptance criteria.

3.4 Blanks

There were no detections of the project compounds of concern in the laboratory method blank.

Samples OU1-SW-MW401 and OU1-SW-MW401-B were the equipment blanks. No compounds were detected in the equipment blanks.

3.5 System Monitoring Compounds (Surrogates)

All surrogate recoveries were within the laboratory acceptance limits.

3.6 Laboratory Control Samples (LCS)

All LCS/LCS duplicate (LCSD) recoveries and RPDs were within the laboratory control limits.

3.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Sample OU1-SS-SB309-0-1 was analyzed as the MS/MSD. All compound recoveries were within the laboratory control limits.

3.8 Compound Identification and Quantitation

All compound identifications and quantitations were appropriate. It was noted that J qualified concentrations (sample concentrations between the MDL and RL) were not reported by the laboratory.

4.0 PCBs (EPA Method 8082)

Full validation including recalculation was performed on the laboratory data for the analysis of PCBs (EPA Method 8082). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ✓ Blanks
- ✓ System Monitoring Compounds (Surrogates)
- ✓ Laboratory Control Samples
- ✓ Matrix Spike/Matrix Spike Duplicate
- ✓ Compound Identification and Quantitation

4.1 Data Completeness

All analyses were performed as requested on the COC.

4.2 Holding Times and Preservation

The samples for PCB analysis were extracted within the 14 day technical holding time from date of collection and analyzed within the 40 day technical holding time from date of extraction.

4.3 Calibrations

4.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the %RSD of the average response factors (RFs). For all target analytes, the RSDs met the method criteria for all compounds.

4.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the percent differences (%D) between the average RFs in the initial and continuing calibration standards for all target analytes were within the method acceptance criteria.

4.4 Blanks

There were no detections of the project compounds of concern in the laboratory method blank.

4.5 System Monitoring Compounds (Surrogates)

All surrogate recoveries were within the laboratory acceptance limits.

4.6 Laboratory Control Samples (LCS)

All LCS/LCS duplicate (LCSD) recoveries and RPDs were within the laboratory control limits.

4.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Sample OU1-SS-SB309-0-1 was analyzed as the MS/MSD. All compound recoveries were within the laboratory control limits.

4.8 Compound Identification and Quantitation

All compound identifications and quantitations were appropriate.

5.0 Metals (EPA Methods 6020/6010B/7470A/74741A)

The soil and water samples were analyzed for the requested metals and Mercury (EPA 6020/6010B/7470A/7471A) following total metals digestion and Mercury digestion. Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPS and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of

review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ⊗ Blanks
- ⊗ Laboratory Control Samples
- ⊗ Matrix Spike/Matrix Spike Duplicate Samples
- ⊗ Laboratory Duplicate Samples
- ⊗ Serial Dilutions
- ⊗ Compound Identification and Quantitation

5.1 Data Completeness

All analyses were performed as requested on the COC.

The laboratory used the client sample ID OU1-SW-MW405 for field blank OU1-SW-MW405, collected 10/17/07 and client sample ID OU1-SW-MW405A for field blank OU1-SW-MW405, collected 10/18/07. The COC lists the same client sample ID (OU1-SW-MW405) for both of the field blank samples collected on 10/17/07 and 10/18/07.

The laboratory used the client sample ID OU1-SW-MW401 for equipment blank OU1-SW-MW401, collected 10/17/07 and client sample ID OU1-SW-MW401A for equipment blank OU1-SW-MW401, collected 10/18/07. The COC lists the same client sample ID (OU1-SW-MW401) for both of the equipment blank samples collected on 10/17/07 and 10/18/07.

5.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

5.3 Calibrations

5.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for inductively coupled plasma/mass spectrometry (ICP/MS) analysis, inductively coupled plasma (ICP) analysis and cold vapor atomic absorption (CVAA) initial calibrations.

5.3.2 Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV)

The percent recoveries in all associated ICVs and CCVs were within the QC acceptance limits (for waters), with the following exception. Aluminum was slightly high (111%, limits 90-110%) and outside of the QC acceptance limits in the closing CCV for the soil analyses; however, based on professional judgment, no sample qualifications were made.

5.3.3 CRDL (Detection Limit) Standard

The CRDL standards were within the control limits, with the following exception. Selenium recovery was low and outside of the acceptance limits in the closing CRDL for the soil analyses. Based on professional judgment and due to the sample concentration, the estimated concentration of selenium in sample OU1-SS-SB-305-90-91 was J- qualified as estimated with a low bias. All other sample concentrations were above the RL.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SS-SB-305-90-91	Selenium	0.668 B	0.668 J-

5.3.4 ICSA/ICSAB (Interference Check) Standards

The ICSA/ICSAB standards met all acceptance criteria.

5.4 Blanks

5.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria with the following exceptions; chromium, copper, lead and manganese were detected in the water preparation blank at estimated concentrations less than the RL, but greater than the instrument detection limits (IDL). Therefore, the concentrations of chromium, copper, lead and manganese detected in the associated samples at concentrations less than the RL, but greater than the IDL are U qualified as not detected at the RL.

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-SW-MW405-B	Chromium	1.2 B	3.0 U
	Copper	0.577 B	1.0 U
	Lead	0.068 B	1.0 U
OU1-SW-MW405	Chromium	1.0 B	3.0 U
	Copper	0.547 B	1.0 U
	Lead	0.051 B	1.0 U
OU1-SW-MW401-B	Chromium	1.1 B	3.0 U
	Copper	0.103 B	1.0 U
	Lead	0.127 B	1.0 U
	Manganese	0.973 B	10 U
OU1-SW-MW401	Chromium	1.1 B	3.0 U
	Copper	0.191 B	1.0 U
	Lead	0.483 B	1.0 U
	Manganese	5.6 B	10 U
OU1-SW-MW405A	Chromium	0.929 B	3.0 U
	Copper	0.249 B	1.0 U
	Lead	0.049 B	1.0 U
OU1-SW-MW401A	Chromium	0.296 B	3.0 U
	Copper	0.189 B	1.0 U
	Lead	0.483 B	1.0 U

Antimony, chromium and lead were detected in the soil preparation blank at estimated concentrations less than the RL, but greater than the IDL. Therefore, the concentrations of antimony detected in the associated samples at concentrations less than the RL but greater than the IDL were U qualified as not detected at the RL. Based on professional judgment, no qualifications were made if the antimony concentration was greater than 10 times the blank concentration. Additionally, no qualifications were required for the chromium and lead, as all sample concentrations were greater than the RL.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SS-SB305-90-91	Antimony	3.8 B	6.0 U
OU1-SS-SB305-89-90	Antimony	3.2 B	6.0 U

5.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICBs and CCBs met the acceptance criteria with a few exceptions; several ICBs and CCBs had metal detections at estimated concentrations less than the RL, but greater than the IDLs. However, based on professional judgment and since the metals concentrations in the associated samples were either greater than the RL or not detected, no additional sample qualifications were made.

5.4.3 Field QC Samples

Samples OU1-SW-MW-401, OU1-SW-MW-401A and OU1-SW-MW-401-B are equipment blanks and OU1-SW-MW-405, OU1-SW-MW-405-B and OU1-SW-MW-405A are field blanks. The following compounds were detected in each of these blanks at estimated concentrations less than the RL, but greater than the IDL. No soil sample qualifications were required, based on these detections and the concentrations of the metals in the associated samples.

OU1-SW-MW-405-B (field blank, collected 10/17/07) – barium, chromium, copper, lead, nickel, potassium, vanadium and zinc.
OU1-SW-MW-405 (field blank, collected 10/17/07) - chromium, copper, lead, nickel and vanadium.
OU1-SW-MW-405A (field blank, collected 10/18/07) - barium, chromium, copper, lead and vanadium.
OU1-SW-MW-401-B (equipment blank, collected 10/17/07) – barium, chromium, copper, lead, manganese, nickel, sodium and zinc.
OU1-SW-MW-401 (equipment blank, collected 10/17/07) - barium, chromium, copper, lead, manganese, nickel and vanadium.
OU1-SW-MW-401A (equipment blank, collected 10/18/07) – aluminum, barium, calcium, chromium, copper, lead, nickel, sodium and vanadium.

The following compounds were detected in each of these blanks at concentrations greater than the RL:

OU1-SW-MW-405-B (field blank, collected 10/17/07) – sodium
OU1-SW-MW-405A (field blank, collected 10/18/07) – sodium
OU1-SW-MW-401A (equipment blank, collected 10/18/07) – manganese, zinc

Based on professional judgment, no sample qualifications were made to the manganese and zinc sample concentrations, since the manganese and zinc sample concentrations were at least ten times the equipment blank concentrations. However, based on the sodium concentrations in field blanks OU1-SW-MW-405-B of 17000 ug/L (equivalent to 1700 mg/kg) and OU1-SW-MW-405A of 11900 ug/L (equivalent to 1190 mg/kg), the following associated sample concentrations for sodium are R qualified as rejected since they are less than the field blank concentrations.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SS-SB308-26.5-27.5	Sodium	326	326 R
OU1-SS-SB308-36.5-37.5	Sodium	514 B	514 R
OU1-SS-SB308-0-1	Sodium	564	564 R
OU1-SS-SB309-0-1	Sodium	520	520 R
OU1-SS-SB309-48-49	Sodium	228	228 R
OU1-SS-SB305-0-1	Sodium	1260	1260 R
OU1-SS-SB309-28.25-29.25	Sodium	391	391 R
OU1-SS-SB309-18.25-19.25	Sodium	614	614 R
OU1-SS-SB406-0-1	Sodium	791	791 R
OU1-SS-SB305-90-91	Sodium	614	614 R
OU1-SS-SB305-89-90	Sodium	696	696 R

5.5 Laboratory Control Samples (LCS)

All percent recoveries in the water LCS were within the acceptance limits.

All percent recoveries in the soil LCS were within the acceptance limits, with the following exceptions. Aluminum, antimony, iron, and magnesium had high recoveries, outside of the laboratory control limits in the LCS. Therefore, the concentrations of aluminum, antimony, iron, and magnesium in the associated samples are J+ qualified as estimated with a high bias.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SS-SB308-26.5-27.5	Aluminum	5400	5400 J+
	Antimony	16.0	16.0 J+
	Iron	64800	64800 J+
	Magnesium	1890	1890 J+
OU1-SS-SB308-36.5-37.5	Aluminum	9800	9800 J+
	Antimony	35.6	35.6 J+
	Iron	34100	34100 J+
	Magnesium	16100	16100 J+
OU1-SS-SB308-0-1	Aluminum	11900	11900 J+
	Antimony	13.3	13.3 J+
	Iron	49500	49500 J+
	Magnesium	3680	3680 J+
OU1-SS-SB309-0-1	Aluminum	9460	9460 J+
	Antimony	9.8	9.8 J+
	Iron	29100	29100 J+
	Magnesium	627	627 J+
OU1-SS-SB309-48-49	Aluminum	4340	4340 J+

	Antimony	5.9 B	5.9 J+
	Iron	34700	34700 J+
	Magnesium	17600	17600 J+
OU1-SS-SB305-0-1	Aluminum	13200	13200 J+
	Antimony	6.0 B	6.0 J+
	Iron	35300	35300 J+
	Magnesium	3590	3590 J+
OU1-SS-SB309-28.25-29.25	Aluminum	8110	8110 J+
	Antimony	81.4	81.4 J+
	Iron	123000	123000 J+
	Magnesium	2540	2540 J+
OU1-SS-SB309-18.25-19.25	Aluminum	17200	17200 J+
	Antimony	17.5	17.5 J+
	Iron	33800	33800 J+
	Magnesium	871	871 J+
OU1-SS-SB406-0-1	Aluminum	19400	19400 J+
	Antimony	11.0	11.0 J+
	Iron	34700	34700 J+
	Magnesium	1920	1920 J+
OU1-SS-SB305-90-91	Aluminum	16700	16700 J+
	Antimony	3.8 B	3.8 J+
	Iron	35700	35700 J+
	Magnesium	5870	5870 J+
OU1-SS-SB305-89-90	Aluminum	13600	13600 J+
	Antimony	3.2 B	3.2 J+
	Iron	32400	32400 J+
	Magnesium	2090	2090 J+

5.6 Matrix Spike (MS)

Sample OU1-SW-MW405-B was analyzed as the water MS. Only the metals analyzed by EPA Method 6010B were spiked; all compound recoveries were within the laboratory control limits.

The metals analyzed by EPA Method 6020 for waters were spiked into a batch QC sample. No information was provided on the batch QC sample results.

Sample OU1-SS-SB309-0-1 was analyzed as the soil MS. The following compounds were outside of the laboratory control limits. However, since the concentration of these metals in the unspiked sample exceeded the spike concentration by a factor of four or greater, the spike recovery control limits do not apply and qualification of the data is not required: aluminum, arsenic, barium, cadmium, calcium, chromium, cobalt, copper, iron, lead, manganese, nickel, vanadium and zinc. The recoveries for beryllium and selenium were low and outside of the laboratory control limits and the recovery of magnesium was high and outside of the laboratory control limits. The post digestion spike for beryllium, magnesium and selenium were acceptable.

Therefore, the concentrations of beryllium, magnesium and selenium in sample OU1-SS-SB309-0-1 are J qualified as estimated.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SS-SB309-0-1	Beryllium	2.3	2.3 J
	Magnesium	627	627 J
	Selenium	2.0	2.0 J

5.7 Laboratory Duplicate Samples

Sample OU1-SW-MW405-B was analyzed as the water laboratory duplicate. Only the metals analyzed by EPA Method 6010B were assessed in the laboratory duplicate. All RPD results were acceptable, with the exception of potassium and zinc. However, since potassium and zinc were either not detected or detected at a estimated concentration less than the RL, but greater than the IDL, no sample qualifications were required.

The metals analyzed by EPA Method 6020 for waters were assessed using a batch QC sample. No information was provided on the batch QC sample results.

Sample OU1-SS-SB309-0-1 was analyzed as the soil laboratory duplicate. The following metals were outside of the laboratory acceptance limits for RPD: aluminum, antimony, arsenic, beryllium, cadmium, calcium, chromium, cobalt, copper, magnesium, manganese, potassium, selenium, silver, sodium, thallium, vanadium, and zinc. Therefore, the concentrations of aluminum, antimony, arsenic, beryllium, cadmium, calcium, chromium, cobalt, copper, magnesium, manganese, potassium, selenium, sodium, thallium, vanadium and zinc are J qualified as estimated; the concentration of silver is UJ qualified as estimated less than the RL.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SS-SB309-0-1	Aluminum	9460	9460 J
	Antimony	9.8	9.8 J
	Arsenic	53.6	53.6 J
	Beryllium	2.3	2.3 J
	Cadmium	68.3	68.3 J
	Calcium	13700	13700 J
	Chromium	17.5	17.5 J
	Cobalt	14.4	14.4 J
	Copper	1460	1460 J
	Magnesium	627	627 J
	Manganese	1510	1510 J
	Potassium	727	727 J
	Selenium	2.0	2.0 J
	Silver	0.360 U	0.360 UJ
	Sodium	520	520 J

	Thallium	0.294 B	0.294 J
	Vanadium	35.0	35.0 J
	Zinc	8310	8310 J

5.8 Serial Dilutions

The percent differences for the serial dilution for the total metals water analysis of sample OU1-SW-MW405-B were outside of the laboratory acceptance criteria for manganese, potassium and zinc; however, the manganese, potassium and zinc concentrations in the serial dilution are less than 50 times the IDL. Therefore, no sample qualifications are required. The serial dilution was only performed for the metals analyzed by EPA Method 6010B. The serial dilution for the metals analyzed by EPA Method 6020 for waters was assessed using a batch QC sample. No information was provided on the batch QC sample results.

The percent differences for the serial dilution for the total metals soil analysis of sample OU1-SS-SB309-0-1 were outside of the laboratory acceptance criteria for arsenic, beryllium, chromium, cobalt, nickel, potassium, selenium, sodium and vanadium; however, the beryllium, chromium, cobalt and selenium concentrations in the serial dilution are less than 50 times the IDL. Therefore, no sample qualifications are required for those metals. The concentrations of arsenic, nickel, potassium, sodium and vanadium in sample OU1-SS-SB309-0-1 are J qualified as estimated since the sample concentrations are greater than 50 times the IDL.

Sample ID	**Compound**	**Laboratory Result (mg/kg)**	**Validation Result (mg/kg)**
OU1-SS-SB309-0-1	Arsenic	53.6	53.6 J
	Nickel	27.8	27.8 J
	Potassium	727	727 J
	Sodium	520	520 J
	Vanadium	35.0	35.0 J

5.9 Compound Identification and Quantitation

The project acceptance limits for the ICP-MS internal standards are 30-170% recovery. All internal standard recoveries were within the project acceptance limits.

The concentrations of some compounds in the samples were B qualified by the laboratory, indicating an estimated sample concentration less than the RL, but greater than the IDL. These concentrations are J qualified as estimated.

Sample	**Metal**	**Laboratory Concentration (ug/L)**	**Validation Concentration (ug/L)**
OU1-SW-MW405-B	Nickel	0.208 B	0.208 J
	Potassium	181 B	181 J
	Vanadium	0.440 B	0.440 J
	Zinc	3.8 B	3.8 J

OU1-SW-MW405	Nickel	0.113 B	0.113 J
	Vanadium	0.204 B	0.204 J
OU1-SW-MW401-B	Barium	0.229 B	0.229 J
	Nickel	0.101 B	0.101 J
	Vanadium	0.477 B	0.477 J
OU1-SW-MW401	Barium	0.651 B	0.651 J
	Nickel	0.135 B	0.135 J
	Sodium	69.6 B	69.6 J
	Zinc	7.2 B	7.2 J
OU1-SW-MW405 A	Barium	0.147 B	0.147 J
	Vanadium	0.406 B	0.406 J
OU1-SW-MW401A	Aluminum	63.8 B	63.8 J
	Barium	0.788 B	0.788 J
	Calcium	317 B	317 J
	Nickel	0.090 B	0.090 J
	Sodium	90.9 B	90.9 J
	Vanadium	0.202 B	0.202 J

Sample	**Metal**	**Laboratory Concentration (mg/kg)**	**Validation Concentration (mg/kg)**
OU1-SS-SB308-26.5-27.5	Beryllium	1.1 B	1.1 J
	Thallium	0.343 B	0.343 J
OU1-SS-SB308-36.5-37.5	Antimony	35.6 B	35.6 J
	Potassium	828 B	828 J
	Sodium	514 B	514 J
OU1-SS-SB309-0-1	Thallium	0.294 B	0.294 J
OU1-SS-SB309-48-49	Antimony	5.9 B	5.9 J
	Beryllium	0.358 B	0.358 J
	Mercury	0.020 B	0.020 J
	Thallium	0.181 B	0.181 J
OU1-SS-SB305-0-1	Antimony	6.0 B	6.0 J
	Beryllium	1.2 B	1.2 J
OU1-SS-SB309-28.25-29.25	Thallium	0.293 B	0.293 J
OU1-SS-SB309-18.25-19.25	Silver	0.659 B	0.659 J
	Thallium	0.565 B	0.565 J
OU1-SS-SB406-0-1	Thallium	0.265 B	0.265 J
OU1-SS-SB305-90-91	Antimony	3.8 B	3.8 J
	Beryllium	1.1 B	1.1 J
	Selenium	0.668 B	0.668 J
	Thallium	0.264 B	0.264 J
OU1-SS-SB305-89-90	Antimony	3.2 B	3.2 J
	Beryllium	0.780 B	0.780 J

	Thallium	0.214 B	0.214 J

6.0 SPLP Metals (EPA Methods 1312/6020/6010B/7470A)

The soil samples were analyzed for the requested metals and Mercury (EPA 6020/6010B/7470A) following a Synthetic Precipitation Leaching Procedure (EPA Method 1213, SPLP). Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPs and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Data Completeness
✓ Holding Times and Preservation
✓ Calibrations
⊗ Blanks
✓ Laboratory Control Samples
⊗ Matrix Spike/Matrix Spike Duplicate Samples
✓ Laboratory Duplicate Samples
✓ Serial Dilutions
⊗ Compound Identification and Quantitation

6.1 Data Completeness

All analyses were performed as requested on the COC, with the following exceptions. Samples OU1-SW-MW401 (collected 10/17/07), OU1-SW-MW401-B (collected 10/17/07) and OU1-SW-MW401 (collected 10/18/07) were listed on the COC for SPLP analyses, but were not reported. Additionally, sample OU1-SS-SB309-48-49 was analyzed, but not listed on the COC for SPLP analysis.

The SPLP extraction log was requested from the laboratory and was sent by email.

6.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

6.3 Calibrations

6.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for inductively coupled plasma/mass spectrometry (ICP/MS) analysis, inductively coupled plasma (ICP) analysis and cold vapor atomic absorption (CVAA) initial calibrations.

6.3.2 Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV)

The percent recoveries in all associated ICVs and CCVs were within the QC acceptance limits, with the following exception. One CCV had copper recovery

slightly high and outside of the method acceptance limits (112%, limits 90-110%). However, based on professional judgment and since this was a CCV that did not bracket any sample results, no sample qualifications were made.

6.3.3 CRDL (Detection Limit) Standard

The CRDL standards were within the control limits.

6.3.4 ICSA/ICSAB (Interference Check) Standards

The ICSA/ICSAB met all acceptance criteria.

6.4 Blanks

6.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria with the following exceptions; arsenic, chromium, lead and zinc were detected in the preparation blank at estimated concentrations less than the RL, but greater than the IDL. Therefore, based on the samples' arsenic, chromium, lead and zinc estimated concentrations which are less than the RL but greater than the IDL, the sample estimated concentrations are U qualified as not detected at the RL.

Sample	Metal	Laboratory Estimated concentration (ug/L)	Validation Concentration (ug/L)
OU1-SS-SB308-26.5-27.5	Chromium	2.3 B	3.0 U
OU1-SS-SB309-48-49	Arsenic	0.198 B	1.0 U
	Chromium	0.779 B	3.0 U
	Lead	0.291 B	1.0 U
OU1-SS-SB309-28.5-29.5	Chromium	0.899 B	3.0 U
	Lead	0.305 B	1.0 U
OU1-SS-SB406-0-1	Chromium	0.885 B	3.0 U
	Lead	0.227 B	1.0 U
OU1-SS-SB305-90-91	Arsenic	0.382 B	1.0 U
	Chromium	0.968 B	3.0 U
	Lead	0.281 B	1.0 U

6.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICBs and CCBs met the acceptance criteria with a few exceptions; several ICBs and CCBs had metal detections at estimated concentrations less than the RL, but greater than the IDLs. However, based on professional judgment and since the metals concentrations in the associated samples were either greater than RL or not detected, no additional sample qualifications were made.

6.5 Laboratory Control Samples (LCS)

All percent recoveries in the LCS were within the acceptance limits.

6.6 Matrix Spike (MS)

Samples OU1-SS-SB309-48-49 and OU1-SS-SB309-28.5-29.5 were analyzed as the MSs. All compound recoveries were within the laboratory control limits, with the

exception of low calcium recoveries in both MSs. However, since the concentration of calcium in both unspiked samples exceeded the spike concentration by a factor of four or greater, the spike recovery control limits do not apply and qualification of the data is not required.

6.7 Laboratory Duplicate Samples

Samples OU1-SS-SB309-48-49 and OU1-SS-SB309-28.5-29.5 were analyzed as the laboratory duplicates. The relative percent differences (RPD) were within the acceptance limits, with the following exceptions. Iron, mercury and vanadium were outside of the acceptance limits in the duplicate of sample OU1-SS-SB309-48-49; however, since the concentrations of iron, mercury and vanadium in both the sample and duplicate were less than the RL, no sample qualifications are required. Mercury and vanadium were outside of the acceptance limits in the duplicate of sample OU1-SS-SB309-28.5-29.5; however, since the concentrations of mercury and vanadium in both the sample and duplicate were less than the RL, no sample qualifications are required.

6.8 Serial Dilutions

The percent differences for the compounds for the serial dilution for the SPLP analysis of sample OU1-SS-SB309-48-49 were outside of the laboratory acceptance criteria for arsenic, cobalt, iron, magnesium, vanadium and zinc; however, since the concentrations of these metals are less than 50 times the IDL, no sample qualifications are required.

The percent differences for the compounds for the serial dilution for the SPLP analysis of sample OU1-SS-SB309-28.5-29.5 were outside of the laboratory acceptance criteria for aluminum, antimony, iron, selenium, silver and vanadium; however, since the concentrations of these metals are less than 50 times the IDL, no sample qualifications are required.

6.9 Compound Identification and Quantitation

The project acceptance limits for the ICP-MS internal standards are 30-170% recovery. All internal standard recoveries were within the project acceptance limits. It was erroneously noted in the laboratory report narrative that all SPLP samples had low internal standard recoveries, resulting in low biases for vanadium, chromium and cobalt. All samples analyzed for SPLP had acceptable internal standard recoveries; there is no low bias for any SPLP sample results based on internal standard recoveries.

The concentrations of some compounds in the samples were B qualified by the laboratory, indicating an estimated sample concentration less than the RL, but greater than the IDL. These concentrations are J qualified as estimated.

Sample	Metal	Laboratory Concentration (ug/L)	Validation Concentration (ug/L)
OU1-SS-SB308-26.5-27.5	Cadmium	0.293 B	0.293 J
	Chromium	2.3 B	2.3 J
	Cobalt	0.108 B	0.108 J
	Mercury	0.189 B	0.189 J
	Nickel	1.6 B	1.6 J
	Potassium	653 B	653 J
	Vanadium	0.834 B	0.834 J
OU1-SS-SB309-48-49	Arsenic	0.198 B	0.198 J
	Chromium	0.779 B	0.779 J
	Cobalt	0.079 B	0.079 J
	Copper	0.858 B	0.858 J
	Iron	24.9 B	24.9 J
	Lead	0.291 B	0.291 J
	Nickel	0.698 B	0.698 J
	Potassium	920 B	920 J
	Vanadium	0.676 B	0.676 J
	Zinc	18.9 B	18.9 J
OU1-SS-SB309-28.5-29.5	Aluminum	52.0 B	52.0 J
	Antimony	14.3 B	14.3 J
	Chromium	0.899 B	0.899 J
	Iron	4.55 B	4.55 J
	Lead	0.305 B	0.305 J
	Mercury	0.028 B	0.028 J
	Potassium	1580 B	1580 J
	Selenium	0.582 B	0.582 J
	Silver	2.3 B	2.3 J
	Vanadium	0.457 B	0.457 J
OU1-SS-SB406-0-1	Antimony	15.1 B	15.1 J
	Cadmium	0.295 B	0.295 J
	Chromium	0.885 B	0.885 J
	Cobalt	0.671 B	0.671 J
	Iron	30.5 B	30.5 J
	Lead	0.227 B	0.227 J
	Mercury	0.024 B	0.024 J
	Potassium	636 B	636 J
	Selenium	0.537 B	0.537 J
	Vanadium	0.204 B	0.204 J
OU1-SS-SB305-90-91	Aluminum	49.2 B	49.2 J
	Antimony	8.9 B	8.9 J
	Arsenic	0.382 B	0.382 J
	Chromium	0.968 B	0.968 J
	Iron	55.2 B	55.2 J
	Lead	0.281 B	0.281 J
	Mercury	0.029 B	0.029 J
	Thallium	0.044 B	0.044 J

7.0 Cyanide (EPA Method 9012), pH (EPA Method 9045) and Percent Solids (Modified Method 160.3)

The soil samples were analyzed for cyanide (EPA Method 9012), pH, (EPA Method 9045) and percent solids (EPA Modified Method 160.3). Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPs and the quality of the data reported. The following summarizes the results of this review. In addition, the percent solids data was reviewed and found to be acceptable.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Data Completeness
✓ Holding Times and Preservation
✓ Calibrations
✓ Blanks
✓ Laboratory Control Sample
✓ Matrix Spike Sample
✓ Laboratory Duplicate Sample

7.1 Data Completeness

All analyses were performed as requested on the COC.

7.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

7.3 Calibrations

7.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for Cyanide analysis.

7.3.2 Continuing Calibration Verification (CCV)

The percent recoveries in all associated CCVs were within the QC acceptance limits for Cyanide.

7.4 Blanks

7.4.1 Preparation (Method) Blank

The preparation blank met the acceptance criteria; Cyanide was not detected in the method blank.

7.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICB and CCBs met the acceptance criteria; no Cyanide was detected in either the ICB or CCBs.

7.5 Laboratory Control Sample (LCS)

The cyanide percent recoveries in the LCSs (water and soil) were within the acceptance limits (85-115% recovery).

7.6 Matrix Spike (MS)

Sample OU1-SS-SB309-48-49 was analyzed as the MS. The recovery of cyanide was within the laboratory acceptance limits.

7.7 Laboratory Duplicate Samples

Sample OU1-SS-SB309-48-49 was analyzed as the laboratory duplicate. Cyanide was not detected in either the original sample or the duplicate.

ATTACHMENT A
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by GeoSyntec's Data Review Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher that the concentration of the analyte in the sample due to bias attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower that the concentration of the analyte in the sample due to bias attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Geosyntec consultants

1531 Dick Lonas Road, Building A
Knoxville, TN 37909
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Memorandum

TO: Nandra Weeks

DATE: March 5, 2008

FROM: Geosyntec Consultants QA/QC Group

SITE: Mattheissen and Hegeler Zinc Company Site, OU1

SUBJECT: Summary of Tier III Validation of analytical results for CAS Report R2740355

Introduction

This report summarizes the findings of the full validation of 3 soil samples, one equipment blank, one trip blank and one field blank collected on behalf of the Mattheissen and Hegeler Zinc Company Site, OU1 project. These samples were collected on October 16, 2007. The samples were analyzed by Columbia Analytical Services, Inc. (CAS), Rochester, New York. The samples were analyzed for Volatile Organic Compounds by EPA Method 8260B, Semivolatile Organic Compounds by EPA Method 8270C, Total Metals by EPA Methods 6020 and 6010B, Mercury by EPA Methods 74740A and 7471A, Metals by EPA Methods 6020, 6010 and 7470A following EPA Method 1312 Synthetic Precipitation Leaching Procedure (SPLP), Cyanide by EPA Method 9012, pH by EPA Method 9045 and Percent Solids by Modified EPA Method 160.3.

The data were reviewed in accordance with the principles presented in *USEPA National Functional Guidelines for Laboratory Data Review, Organics* (EPA, 2005), *USEPA National Functional Guidelines for Laboratory Data Review, Inorganics* (EPA, 2004), and per the requirements of the QAPP, the laboratory standard operating procedures and the specified methods.

Data for the following samples were reviewed.

CAS Job No.	Client ID
1046886	OU1-SW-MW-401
1046887	OU1-SW-MW-401
1046891	OU1-SW-MW-401
1046894	OU1-SW-MW-401
1046895	OU1-MW-402
1046896	OU1-SW-MW-405
1046899	OU1-SW-MW-401
1046900	OU1-SW-MW-405

1046903	OU1-SS-SB-306-0-1
1046909	OU1-SS-SB-306-0-1
1046910	OU1-SS-SB-306-0-1
1046915	OU1-SS-SB-306-0-1
1046916	OU1-SS-SB-306-67-68
1046917	OU1-SS-SB-306-67-68
1046918	OU1-SS-SB-306-66-67

Matrix – soil, 1 aqueous trip blank, 1 aqueous field blank and 1 aqueous equipment blank

Executive Summary

All analyses were performed as requested on the chain of custody (COC). The dates of sample collection and date sample were relinquished on the COC only included the month and day; the year was not included in the date. It was assumed, based on the date of sample receipt at the laboratory, that the year was 2007.

All holding times were met.

1.0 Volatile Organic Compounds (EPA Method 8260B)

Full validation including recalculation was performed with the laboratory data for the analysis of volatile organic compounds (EPA Method 8260B). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ✓ Internal Standards
- ✓ Performance Check Sample
- ⊗ Blanks
- ✓ System Monitoring Compounds (Surrogates)
- ⊗ Matrix Spike/Matrix Spike Duplicate Sample
- ✓ Laboratory Control Samples
- ✓ Compound Identification and Quantitation

1.1 Data Completeness

All analyses were performed as requested on the COC.

1.2 Holding Times and Preservation

All samples were analyzed within the 14 day technical holding time from date of collection for volatiles.

1.3 Calibrations

1.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the percent relative standard deviation (%RSD) of the relative response factors (RRFs). For all target analytes, the RRFs met the method criteria; the RSDs met the method criteria for all compounds or the coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibrations.

1.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the RRFs met the method criteria; the percent differences (%D) between the RRFs in the initial and continuing calibration standards for all target analytes were within the method acceptance criteria.

1.4 Internal Standards

All internal standard retention times are within ±30 seconds of the associated continuing calibration internal standard retention time. All internal standard area counts were within the acceptance criteria (>50% and <150%) of the associated continuing calibration internal standard area counts

1.5 Performance Check Samples

An instrument performance check sample (tune standard) was analyzed at the beginning of each 12-hour period during sample analysis. The samples were analyzed within the 12-hour period. All ion abundance criteria were met for bromofluorobenzene (BFB).

1.6 Blanks

Acetone, carbon disulfide, methylene chloride and toluene were detected in the method blank associated with the soil sample, at estimated concentrations greater than the method detection limit (MDL) but less than the reporting limit (RL). Acetone was detected in the associated sample at a concentration greater than five times the RL; therefore, no sample qualifications were made to the sample acetone concentration. However, based on the estimated concentrations of carbon disulfide, methylene chloride and toluene in the associated sample greater than the MDL but less than the RL, the concentrations of carbon disulfide, methylene chloride and toluene in the sample are U qualified as not detected at the RL.

Sample ID	Compound	Laboratory Result (ug/kg)	Validation Result (ug/kg)
OU1-SS-SB-306-0-1	Carbon disulfide	5.8 J	10 U
	Methylene chloride	0.74 J	5.0 U
	Toluene	1.3 JB	5.0 U

Sample OU1-SW-MW-401 is the equipment blank, sample OU1-MW-402 is the trip blank, and OU1-SW-MW-405 is the field blank. The following compounds were

detected in each of these blanks at estimated concentrations less than the RL, but greater than the MDL. No soil sample qualifications were required, based on these detections and the concentrations of the compounds in the associated samples.

OU1-SW-MW-401 (equipment blank) - acetone, carbon disulfide, methylene chloride, styrene
OU1-MW-402 (trip blank) - acetone
OU1-SW-MW-405 (field blank) - acetone, methylene chloride, 4-methyl-2-pentanone, toluene, o-xylene and m,p-xylene.

The method blank associated with the field QC samples listed above had methylene chloride detected at an estimated concentration less than the RL, but greater than the MDL. Methylene chloride was not detected in sample OU1-MW-402 (trip blank); therefore, no sample qualifications were required. However, based on the method blank concentration, the estimated concentrations of methylene chloride in samples OU1-SW-MW-401 and OU1-SW-MW-405 (greater than the MDL but less than the RL) are U qualified as not detected at the RL.

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-SW-MW-401	Methylene chloride	0.20 JB	1.0 U
OU1-SW-MW-405	Methylene chloride	0.23 JB	1.0 U

1.7 System Monitoring Compounds (Surrogates)
All surrogate recoveries were within the laboratory acceptance limits.

1.8 Laboratory Control Samples (LCS)
All LCS recoveries were within the laboratory control limits.

1.9 Matrix Spike/Matrix Spike Duplicate Sample (MS/MSD)
A MS/MSD pair was not analyzed.

1.10 Compound Identification and Quantitation
All compound identifications and quantitations were appropriate.

2.0 Semivolatile Organic Compounds (EPA Method 8270C)

Full validation including recalculation was performed on the laboratory data for the analysis of semivolatile organic compounds (EPA Method 8270C). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Data Completeness
✓ Holding Times and Preservation

⊗ Calibrations
✓ Internal Standards
⊗ Performance Check Sample
✓ Blanks
✓ System Monitoring Compounds (Surrogates)
⊗ Laboratory Control Samples
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Compound Identification and Quantitation

2.1 Data Completeness

All analyses were performed as requested on the COC.

2.2 Holding Times and Preservation

The samples for semivolatile analysis were extracted within the 7 day technical holding time (water) and 14 day technical holding time (soil) from date of collection and analyzed within the 40 day technical holding time from date of extraction.

2.3 Calibrations

2.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the %RSD of the RRFs. For all target analytes, the RRFs met the method criteria; the RSDs met the method criteria for all compounds or the coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibrations.

2.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the RRFs met the method criteria; the percent differences (%D) between the RRFs in the initial and continuing calibration standards for all target analytes were within the method acceptance criteria, with the following exceptions. Benzaldehyde in the CCV associated with the soil sample and benzaldehyde and 2,4-dinitrophenol in the CCV associated with the water sample were outside of the acceptance criteria. Therefore, the concentrations of benzaldehyde and 2,4-dinitrophenol in these samples are UJ qualified as estimated less than the RL.

Sample ID	Compound	Laboratory Result (ug/kg)	Validation Result (ug/kg)
OU1-SS-SB-306-0-1	Benzaldehyde	430 U	430 UJ

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-SW-MW-401	Benzaldehyde	9.4 U	9.4 UJ
	2,4-dinitrophenol	47 U	47 UJ

2.4 Internal Standards

All internal standard retention times are within ±30 seconds of the associated continuing calibration internal standard retention time. All internal standard area counts were within the acceptance criteria (>50% and <150%) of the associated continuing calibration internal standard area counts.

2.5 Performance Check Samples

An instrument performance check sample was analyzed at the beginning of each 12-hour period during sample analysis. The samples were analyzed within the 12-hour period. All ion abundance criteria were met for decafluorotriphenyl-phosphine (DFTPP). It was noted that on all of the 5B forms, the percent relative abundances for mass 441 compared to mass 443 were wrong. Recalculation using the raw data confirmed that mass 441 passed the method criteria; therefore, no sample qualifications were required. The laboratory was notified.

2.6 Blanks

There were no detections of the project compounds of concern in the laboratory method blanks.

Sample OU1-SW-MW-401 is the equipment blank. No compounds were detected in the equipment blank.

2.7 System Monitoring Compounds (Surrogates)

All surrogate recoveries were within the laboratory acceptance limits.

2.8 Laboratory Control Sample/ Laboratory Control Sample Duplicate (LCS/LCSD)

All LCS recoveries were within the laboratory control limits, with the exception of high recoveries outside of the laboratory control limits for benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, indeno(1,2,3-cd)pyrene, chrysene, dibenz(a,h)anthracene and di-n-octylphthalate in the water LCS and/or LCSD. However, since none of these compounds were detected in the associated sample, no sample qualifications were required. All soil LCS/LCSD recoveries and RPDs were acceptable.

2.9 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

A MS/MSD pair was not analyzed.

2.10 Compound Identification and Quantitation

All compound identifications and quantitations were appropriate

3.0 Total Metals (EPA Methods 6020/6010B/7470A/7471A)

The soil and water samples were analyzed for the requested metals and Mercury (EPA 6020/6010B/7470A/7471A) following a total metals digestion and Mercury digestion. Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPS and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of

review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ⊗ Blanks
- ⊗ Laboratory Control Samples
- ⊗ Matrix Spike/Matrix Spike Duplicate Samples
- ⊗ Laboratory Duplicate Samples
- ⊗ Serial Dilutions
- ⊗ Compound Identification and Quantitation

3.1 Data Completeness

All analyses were performed as requested on the COC.

3.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

3.3 Calibrations

3.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for inductively coupled plasma/mass spectrometry (ICP/MS) analysis, inductively coupled plasma (ICP) analysis and cold vapor atomic absorption (CVAA) initial calibrations.

3.3.2 Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV)

The percent recoveries in all associated ICVs and CCVs were within the QC acceptance limits, with the following exception. Beryllium recovery was low and outside of the QC acceptance limits in the closing CCV bracketing the analyses of samples OU1-SS-SB306-0-1, OU1-SS-SB306-67-68 and OU1-SS-SB306-66-67; therefore, the concentrations of beryllium in these samples are J-qualified as estimated with a low bias.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SS-SB306-0-1	Beryllium	0.915 B	0.915 J-
OU1-SS-SB306-67-68	Beryllium	2.1 B	2.1 J-
OU1-SS-SB306-66-67	Beryllium	1.3 B	1.3 J-

3.3.3 CRDL (Detection Limit) Standard

The CRDL standards were within the control limits.

3.3.4 ICSA/ICSAB (Interference Check) Standards

The ICSA/ICSAB standards met all acceptance criteria.

3.4 Blanks

3.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria with the following exceptions; chromium, copper and manganese were detected in the water preparation blank at estimated concentrations less than the RL, but greater than the instrument detection limits (IDL). Barium, calcium, chromium, lead, sodium and zinc were detected in the soil preparation blank at estimated concentrations less than the RL, but greater than the IDL. However, since the compounds detected in the blanks were either detected in the associated samples at concentrations greater than the RL or not detected, no sample qualifications were required.

3.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICBs and CCBs met the acceptance criteria with a few exceptions; several ICBs and CCBs had metal detections at estimated concentrations less than the RL, but greater than the IDLs. However, since the metals concentrations in the associated samples were greater than the RL, no sample qualifications were required.

3.4.3 Field QC Samples

Sample OU1-SW-MW-401 is the equipment blank and OU1-SW-MW-405 is the field blank. The following compounds were detected in each of these blanks at estimated concentrations less than the RL, but greater than the IDL. No soil sample qualifications were required, based on these detections and the concentrations of the metals in the associated samples, since the concentrations in the associated samples were greater than the RL.

OU1-SW-MW-401 (equipment blank) – barium, calcium, chromium, copper, lead, manganese, nickel, sodium, vanadium and zinc.
OU1-SW-MW-405 (field blank) - chromium, copper, lead, nickel and vanadium.

3.5 Laboratory Control Samples (LCS)

All percent recoveries in the LCS were within the acceptance limits.

3.6 Matrix Spike (MS)

An MS was not analyzed.

3.7 Laboratory Duplicate Samples

A laboratory duplicate was not analyzed.

3.8 Serial Dilutions

The percent differences for the compounds for the serial dilution for the total metals analysis of sample OU1-SW-MW-405 were outside of the laboratory acceptance criteria for copper, lead, nickel and zinc; however, the copper, lead, nickel and zinc concentrations in the serial dilution are less than 50 times the IDL. Therefore, no sample qualifications are required.

The percent differences for the compounds for the serial dilution for the total metals analysis of sample OU1-SS-SB306-67-68 were outside of the laboratory acceptance criteria for aluminum, beryllium, antimony, arsenic, calcium, chromium, lead and magnesium; however, the beryllium, antimony, arsenic calcium, chromium, lead and magnesium in the serial dilution are less than 50 times the IDL. Therefore, no sample qualifications are required. The concentrations of aluminum and calcium are J qualified as estimated, since the sample concentrations are greater than 50 times the IDL.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SS-SB306-67-68	Aluminum	13900 E	13900 J
	Calcium	127000 E	127000 J

3.9 Compound Identification and Quantitation

The project acceptance limits for the ICP-MS internal standards are 30-170% recovery. All internal standard recoveries were within the project acceptance limits.

The concentrations of some compounds in the samples were B qualified by the laboratory, indicating an estimated sample concentration less than the RL, but greater than the IDL. These concentrations are J qualified as estimated.

Sample	Metal	Laboratory Concentration (ug/L)	Validation Concentration (ug/L)
OU1-SW-MW-401	Calcium	173 B	173 J
	Chromium	2.1 B	2.1 J
	Copper	0.618 B	0.618 J
	Manganese	9.2 B	9.2 J
	Nickel	0.264 B	0.264 J
	Sodium	75.1 B	75.1 J
	Vanadium	0.784 B	0.784 J
	Zinc	6.3 B	6.3 J
OU1-SW-MW-405	Chromium	1.3 B	1.3 J
	Copper	0.600 B	0.600 J
	Lead	0.130 B	0.130 J
	Nickel	0.109 B	0.109 J
	Vanadium	0.280 B	0.280 J

Sample	Metal	Laboratory Concentration (mg/kg)	Validation Concentration (mg/kg)
OU1-SS-SB306-0-1	Antimony	4.2 B	4.2 J
	Beryllium	0.915 B	0.915 J
	Selenium	0.874 B	0.874 J
	Silver	1.3 B	1.3 J
	Sodium	126 B	126 J
	Thallium	0.395 B	0.395 J

OU1-SS-SB306-67-68	Antimony	4.8 B	4.8 J
	Beryllium	2.1 B	2.1 J
	Mercury	0.005 B	0.005 J
	Sodium	457 B	457 J
	Thallium	0.159 B	0.159 J
OU1-SS-SB306-66-67	Antimony	5.1 B	5.1 J
	Arsenic	0.192 B	0.192 J
	Chromium	1.8 B	1.8 J

4.0 SPLP Metals (EPA Methods 1312/6020/6010B/7470A)

The soil samples were analyzed for the requested metals and Mercury (EPA 6020/6010B/7470A) following a Synthetic Precipitation Leaching Procedure (SPLP). Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPs and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ⊗ Blanks
- ✓ Laboratory Control Samples
- ⊗ Matrix Spike/Matrix Spike Duplicate Samples
- ✓ Laboratory Duplicate Samples
- ✓ Serial Dilutions
- ⊗ Compound Identification and Quantitation

4.1 Data Completeness

All analyses were performed as requested on the COC. The SPLP extraction log was requested from the laboratory and was sent by email.

4.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

4.3 Calibrations

4.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for inductively coupled plasma/mass spectrometry (ICP/MS) analysis, inductively coupled plasma (ICP) analysis and cold vapor atomic absorption (CVAA) initial calibrations.

4.3.2 Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV)

The percent recoveries in all associated ICVs and CCVs were within the QC acceptance limits.

4.3.3 CRDL Standard

The CRDL standards were within the control limits.

4.3.4 ICSA/ICSAB Standards

The ICSA/ICSAB met all acceptance criteria.

4.4 Blanks

4.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria with the following exceptions; arsenic, chromium, lead and zinc were detected in the preparation blank at estimated concentrations less than the RL, but greater than the IDL. Therefore, based on the samples' arsenic, chromium, iron, lead and zinc concentrations which were less than the RL, but greater than the IDL, the concentrations are U qualified as not detected at the RL.

Sample	Metal	Laboratory Concentration (ug/L)	Validation Concentration (ug/L)
OU1-SS-SB-306-67-68	Chromium	1.2 B	3.0 U
	Lead	0.297 B	1.0 U
OU1-SW-MW-401	Chromium	1.7 B	1.0 U
	Zinc	10.4 B	20 U

4.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICBs and CCBs met the acceptance criteria with a few exceptions; several ICBs and CCBs had metal detections at estimated concentrations less than the RL, but greater than the IDL. However, since the metals concentrations in the associated samples were greater than the RL, no sample qualifications were required.

4.5 Laboratory Control Samples (LCS)

All percent recoveries in the LCS were within the acceptance limits.

4.6 Matrix Spike (MS)

A MS was not analyzed..

4.7 Laboratory Duplicate Samples

A sample duplicate was not analyzed.

4.8 Serial Dilutions

The percent differences for the compounds for the serial dilution for the SPLP analysis of sample OU1-SS-SB-306-67-68 were outside of the laboratory acceptance criteria for copper, nickel, lead, thallium and vanadium; however, since the concentrations of copper, lead, thallium and vanadium are less than 50 times the IDL,

no sample qualifications are required. The concentration of nickel in sample OU1-SS-SB-306-67-68 is J qualified since it is greater than 50 times the IDL.

Sample	Metal	Laboratory Concentration (ug/L)	Validation Concentration (ug/L)
OU1-SS-SB-306-67-68	Nickel	61.4	61.4 J

4.9 Compound Identification and Quantitation

The project acceptance limits for the ICP-MS internal standards are 30-170% recovery. All internal standard recoveries were within the project acceptance limits.

The concentrations of some compounds in the samples were B qualified by the laboratory, indicating an estimated sample concentration less than the RL, but greater than the instrument detection limit. These concentrations are J qualified as estimated.

Sample	Metal	Laboratory Concentration (ug/L)	Validation Concentration (ug/L)
OU1-SS-SB-306-67-68	Chromium	1.2 B	1.2 J
	Iron	50.6 B	50.6 J
	Lead	0.297 B	0.297 J
	Thallium	0.066 B	0.066 J
	Vanadium	0.481 B	0.481 J
OU1-SW-MW-401	Calcium	176 B	176 J
	Chromium	1.7 B	1.7 J
	Copper	0.619 B	0.619 J
	Iron	33.9 B	33.9 J
	Magnesium	9.4 B	9.4 J
	Nickel	0.314 B	0.314 J
	Sodium	204 B	204 J
	Vanadium	0.393 B	0.393 J
	Zinc	10.4 B	10.4 J

5.0 Cyanide (EPA Method 9012) and Percent Solids (Modified Method 160.3)

The samples were analyzed for cyanide (EPA Method 9012) and percent solids (EPA Modified Method 160.3). Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPs and the quality of the data reported. The following summarizes the results of this review. In addition, the percent solids data was reviewed and found to be acceptable.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ✓ Blanks
- ✓ Laboratory Control Sample
- ✓ Matrix Spike Sample
- ✓ Laboratory Duplicate Sample

5.1 Data Completeness

All analyses were performed as requested on the COC.

5.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

5.3 Calibrations

5.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for Cyanide analysis.

5.3.2 Continuing Calibration Verification (CCV)

The percent recoveries in all associated CCVs were within the QC acceptance limits for Cyanide.

5.4 Blanks

5.4.1 Preparation (Method) Blank

The preparation blank met the acceptance criteria; Cyanide was not detected in the method blank.

5.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICB and CCBs met the acceptance criteria; no Cyanide was detected in either the ICB or CCBs.

5.5 Laboratory Control Sample (LCS)

The cyanide percent recovery in the LCS was within the acceptance limits (85-115% recovery).

5.6 Matrix Spike (MS)

A MS was not analyzed.

5.7 Laboratory Duplicate Samples

A laboratory duplicate was not analyzed.

.

ATTACHMENT A
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by GeoSyntec's Data Review Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher that the concentration of the analyte in the sample due to bias attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower that the concentration of the analyte in the sample due to bias attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Geosyntec consultants

1531 Dick Lonas Road, Building A
Knoxville, TN 37909
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Memorandum

TO: Nandra Weeks

DATE: March 5, 2008

FROM: Geosyntec Consultants QA/QC Group

SITE: Mattheissen and Hegeler Zinc Company Site, OU1

SUBJECT: Summary of Tier III Validation of analytical results for CAS Report R2740269

Introduction

This report summarizes the findings of the full validation of four soil samples and one trip blank collected on behalf of the Mattheissen and Hegeler Zinc Company Site, OU1 project. These samples were collected on October 11, 2007. The samples were analyzed by Columbia Analytical Services, Inc. (CAS), Rochester, New York. The samples were analyzed for Volatile Organic Compounds by EPA Method 8260B, Semivolatile Organic Compounds by EPA Method 8270C, Organochlorine Pesticides by EPA Method 8081A, Polychlorinated Biphenyls (PCBs) by EPA Method 8082, Total Metals by EPA Methods 6020 and 6010, Mercury by EPA Method 7471A, Metals by EPA Methods 6020, 6010 and 7470A following EPA Method 1312 Synthetic Precipitation Leaching Procedure (SPLP), Cyanide by EPA Method 9012, pH by EPA Method 9045 and Percent Solids by Modified EPA Method 160.3.

The data were reviewed in accordance with the principles presented in *USEPA National Functional Guidelines for Laboratory Data Review, Organics* (EPA, 2005), *USEPA National Functional Guidelines for Laboratory Data Review, Inorganics* (EPA, 2004), and per the requirements of the QAPP, the laboratory standard operating procedures and the specified methods.

Data for the following samples were reviewed.

CAS Job No.	Client ID
1045269	OU1-SS-SB303-0-1
1045270	OU1-SS-SB303-85-86
1045271	OU1-SS-SB303-89-90
1045272	OU1-SS-SB303-108-109
1045274	OU1-SS-SB303-0-1
1045275	OU1-SS-SB303-89-90
1045276	OU1-SS-SB303-108-109

1045277	OU1-SS-SB303-89-90
1045278	OU1-SS-SB303-89-90
1045279	OU1-SS-SB303-89-90
1045285	OU1-SS-SB402

Matrix – soil and 1 aqueous trip blank

Executive Summary
All analyses were performed as requested on the chain of custody (COC).

All holding times were met.

1.0 Volatile Organic Compounds (EPA Method 8260B)
Full validation including recalculation was performed with the laboratory data for the analysis of volatile organic compounds (EPA Method 8260B). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ✓ Internal Standards
- ✓ Performance Check Sample
- ⊗ Blanks
- ✓ System Monitoring Compounds (Surrogates)
- ⊗ Matrix Spike/Matrix Spike Duplicate Sample
- ✓ Laboratory Control Samples
- ✓ Compound Identification and Quantitation

1.1 Data Completeness
All analyses were performed as requested on the chain of custody (COC).

1.2 Holding Times and Preservation
All samples were analyzed within the 14 day technical holding time from date of collection for volatiles.

1.3 Calibrations

1.3.1 Initial Calibrations (ICAL)
Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the percent relative standard deviation (%RSD) of the relative response factors (RRFs). For all target analytes, the RRFs met the method criteria; the RSDs met the method criteria

for all compounds or the coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibrations.

1.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the RRFs met the method criteria; the percent differences (%D) between the RRFs in the initial and continuing calibration standards for all target analytes were within the method acceptance criteria.

1.4 Internal Standards

All internal standard retention times are within ±30 seconds of the associated continuing calibration internal standard retention time. All internal standard area counts were within the acceptance criteria (>50% and <150%) of the associated continuing calibration internal standard area counts

1.5 Performance Check Samples

An instrument performance check sample (tune standard) was analyzed at the beginning of each 12-hour period during sample analysis. The samples were analyzed within the 12-hour period. All ion abundance criteria were met for bromofluorobenzene (BFB).

1.6 Blanks

Acetone, carbon disulfide, methylene chloride and toluene were detected in the method blank associated with the soil sample, at estimated concentrations greater than the method detection limit (MDL) but less than the reporting limit (RL). No sample qualifications were required for acetone and carbon disulfide due to the high concentrations of these compounds in the associated sample. However, the concentrations of methylene chloride and toluene in sample OU1-SS-SB303-89-90 are U qualified as not detected at the RL.

Sample ID	Compound	Laboratory Result (ug/kg)	Validation Result (ug/kg)
OU1-SS-SB303-89-90	Methylene Chloride	0.85 JB	5.0 U
	Toluene	0.94 JB	5.0 U

Sample OU1-SS-SB402 is mislabeled and is the trip blank; the QAPP specifies the trip blank ID to be identified as OU1-SW-MW402. Acetone and methylene chloride were detected in the trip blank at estimated concentrations greater than the MDL but less than the RL. Due to the high concentration of acetone in the associated sample, no sample qualification is required for acetone. The concentration of methylene chloride in sample OU1-SS-SB303-89-90 is U qualified as not detected at the RL due to the estimated concentration of methylene chloride in the sample greater than the MDL but less than the RL.

Sample ID	Compound	Laboratory Result (ug/kg)	Validation Result (ug/kg)
OU1-SS-SB303-89-90	Methylene Chloride	0.85 JB	5.0 U

1.7 System Monitoring Compounds (Surrogates)
All surrogate recoveries were within the laboratory acceptance limits.

1.8 Laboratory Control Samples (LCS)
All LCS recoveries were within the laboratory control limits.

1.9 Matrix Spike/Matrix Spike Duplicate Sample (MS/MSD)
A MS/MSD pair was not analyzed.

1.10 Compound Identification and Quantitation
All compound identifications and quantitations were appropriate.

2.0 Semivolatile Organic Compounds (EPA Method 8270C)
Full validation including recalculation was performed on the laboratory data for the analysis of semivolatile organic compounds (EPA Method 8270C). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Data Completeness
✓ Holding Times and Preservation
✓ Calibrations
✓ Internal Standards
✓ Performance Check Sample
✓ Blanks
✓ System Monitoring Compounds (Surrogates)
⊗ Laboratory Control Samples
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Compound Identification and Quantitation

2.1 Data Completeness
All analyses were performed as requested on the COC.

2.2 Holding Times and Preservation
The samples for semivolatile analysis were extracted within the 14 day technical holding time from date of collection and analyzed within the 40 day technical holding time from date of extraction.

2.3 Calibrations

2.3.1 Initial Calibrations (ICAL)
Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the %RSD of the RRFs. For all

target analytes, the RRFs met the method criteria; the RSDs met the method criteria for all compounds or the coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibrations.

2.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the RRFs met the method criteria; the percent differences (%D) between the RRFs in the initial and continuing calibration standards for all target analytes were within the method acceptance criteria.

2.4 Internal Standards

All internal standard retention times are within ±30 seconds of the associated continuing calibration internal standard retention time. All internal standard area counts were within the acceptance criteria (>50% and <150%) of the associated continuing calibration internal standard area counts.

2.5 Performance Check Samples

An instrument performance check sample was analyzed at the beginning of each 12-hour period during sample analysis. The samples were analyzed within the 12-hour period. All ion abundance criteria were met for decafluorotriphenyl-phosphine (DFTPP).

2.6 Blanks

There were no detections of the project compounds of concern in the laboratory method blanks.

2.7 System Monitoring Compounds (Surrogates)

All surrogate recoveries were within the laboratory acceptance limits.

2.8 Laboratory Control Samples (LCS)

All LCS recoveries were within the laboratory control limits, with the exception of benzaldehyde and di-n-octylphthalate which had high recoveries, outside of the laboratory control limits, in the LCS and/or LCSD. However, since benzaldehyde and di-n-octylphthalate were not detected in any of the samples, no sample qualifications were required.

2.9 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

A MS/MSD pair was not analyzed.

2.10 Compound Identification and Quantitation

All compound identifications and quantitations were appropriate

3.0 Organochlorine Pesticides (EPA Method 8081A)

Full validation including recalculation was performed on the laboratory data for the analysis of Organochlorine Pesticides (EPA Method 8081A). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Data Completeness
✓ Holding Times and Preservation
✓ Calibrations
✓ Blanks
✓ System Monitoring Compounds (Surrogates)
✓ Laboratory Control Samples
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Compound Identification and Quantitation

3.1 Data Completeness
All analyses were performed as requested on the COC.

3.2 Holding Times and Preservation
The samples for organochlorine pesticide analysis were extracted within the 14 day technical holding time from date of collection and analyzed with the 40 day technical holding time from date of extraction.

3.3 Calibrations

3.3.1 Initial Calibrations (ICAL)
Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the %RSD of the average response factors (RFs). For all target analytes, the RSDs met the method criteria for all compounds.

3.3.2 Continuing Calibration Verification (CCV)
For all target analytes, the percent differences (%D) between the average RFs in the initial and continuing calibration standards for all target analytes were within the method acceptance criteria.

3.4 Blanks
There were no detections of the project compounds of concern in the laboratory method blank.

3.5 System Monitoring Compounds (Surrogates)
All surrogate recoveries were within the laboratory acceptance limits.

3.6 Laboratory Control Samples (LCS)
All LCS/LCS duplicate (LCSD) recoveries and RPDs were within the laboratory control limits.

3.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)
A MS/MSD pair was not analyzed.

3.8 Compound Identification and Quantitation

All compound identifications and quantitations were appropriate

4.0 PCBs (EPA Method 8082)

Full validation including recalculation was performed on the laboratory data for the analysis of PCBs (EPA Method 8082). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ✓ Blanks
- ✓ System Monitoring Compounds (Surrogates)
- ✓ Laboratory Control Samples
- ⊗ Matrix Spike/Matrix Spike Duplicate
- ✓ Compound Identification and Quantitation

4.1 Data Completeness

All analyses were performed as requested on the COC.

4.2 Holding Times and Preservation

The samples for PCB analysis were extracted within the 14 day technical holding time from date of collection and analyzed with the 40 day technical holding time from date of extraction.

4.3 Calibrations

4.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the %RSD of the average response factors (RFs). For all target analytes, the RSDs met the method criteria for all compounds.

4.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the percent differences (%D) between the average RFs in the initial and continuing calibration standards for all target analytes were within the method acceptance criteria.

4.4 Blanks

There were no detections of the project compounds of concern in the laboratory method blank.

4.5 System Monitoring Compounds (Surrogates)
All surrogate recoveries were within the laboratory acceptance limits.

4.6 Laboratory Control Samples (LCS)
All LCS/LCS duplicate (LCSD) recoveries and RPDs were within the laboratory control limits.

4.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)
A MS/MSD pair was not analyzed.

4.8 Compound Identification and Quantitation
All compound identifications and quantitations were appropriate.

5.0 Metals (EPA Methods 6020/6010B/7470A)

The soil samples were analyzed for the requested metals and Mercury (EPA 6020/6010B/7471A) following a total metals digestion and Mercury digestion. Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPS and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Data Completeness
✓ Holding Times and Preservation
✓ Calibrations
⊗ Blanks
⊗ Laboratory Control Samples
⊗ Matrix Spike/Matrix Spike Duplicate Samples
⊗ Laboratory Duplicate Samples
⊗ Serial Dilutions
⊗ Compound Identification and Quantitation

5.1 Data Completeness
All analyses were performed as requested on the COC.

5.2 Holding Times and Preservation
All analyses were performed within the method-specified holding times.

5.3 Calibrations

5.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for inductively coupled plasma/mass spectrometry (ICP/MS) analysis, inductively coupled plasma (ICP) analysis and cold vapor atomic absorption (CVAA) initial calibrations.

5.3.2 Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV)

The percent recoveries in all associated ICVs and CCVs were within the QC acceptance limits, with the following exception. Beryllium was low and outside of the QC acceptance limits in the CCVs bracketing the analysis of sample OU1-SS-SB303-89-90; therefore, the concentration of beryllium in sample OU1-SS-SB303-89-90 is J- qualified as estimated with a low bias.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
SS-SB303-89-90	Beryllium	2.0	2.0 J-

5.3.3 CRDL (Detection Limit) Standard

The CRDL standards were within the control limits, with the exception of low iron recovery outside the method acceptance limits in the closing CRDL standard. However, since the samples associated with this closing CRDL had iron concentrations greater than two times the RL, no sample qualifications are required.

5.3.4 ICSA/ICSAB (Interference Check) Standards

The ICSA/ICSAB standards met all acceptance criteria.

5.4 Blanks

5.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria with the following exceptions; barium, calcium, chromium, lead, sodium and zinc were detected in the preparation blank at estimated concentrations less than the RL but greater than the instrument detection limits (IDL). However, since barium, calcium, chromium, lead, sodium and zinc were detected in the associated samples at concentrations greater than the RL, no sample qualifications were required.

5.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICBs and CCBs met the acceptance criteria with a few exceptions; several ICBs and CCBs had metal detections at estimated concentrations less than the RL, but greater than the IDLs. However, since the metals concentrations in the associated samples were greater than the RLs, no sample qualifications were required.

5.5 Laboratory Control Samples (LCS)

All percent recoveries in the LCS were within the acceptance limits.

5.6 Matrix Spike (MS)

Sample OU1-SS-SB303-0-1 was analyzed as the MS for the ICP/MS, ICP and Mercury analyses. The following compound recoveries were outside of the control limits: aluminum, calcium, iron, magnesium, manganese, mercury, potassium, and zinc. The compounds were not qualified since the sample concentrations were greater than four times the spike concentrations.

5.7 Laboratory Duplicate Samples

Laboratory duplicates were prepared for all of the samples in the data set. The relative percent differences (RPDs) were within the acceptance limits (0-20%) for all compounds but zinc, which was high and outside the acceptance limits; therefore, the concentrations of zinc in the samples are J qualified as estimated.

Sample	Metal	Laboratory Concentration (mg/kg)	Validation concentration (mg/kg)
OU1-SS-SB303-0-1	Zinc	1970	1970 J
OU1-SS-SB303-85-86	Zinc	6010	6010 J
OU1-SS-SB303-89-90	Zinc	8890	8890 J
OU1-SS-SB303-108-109	Zinc	123	123 J

5.8 Serial Dilutions

The percent differences for the serial dilution for the total metals analysis of sample OU1-SS-SB303-0-1 were outside the laboratory acceptance criteria for antimony, magnesium, silver and sodium; however, the antimony and magnesium concentrations are less than 50 times the IDL. Therefore no sample qualifications are required. Since the silver and sodium concentrations in sample OU1-SS-SB303-0-1 are greater than 50 times the IDL, the silver and sodium concentrations in sample OU1-SS-SB303-0-1 are J qualified as estimated.

Sample	Metal	Laboratory Concentration (mg/kg)	Validation concentration (mg/kg)
OU1-SS-SB303-0-1	Silver	11.1	11.1 J
	Sodium	370	370 J

5.9 Compound Identification and Quantitation

The project acceptance limits for the ICP-MS internal standards are 30-170% recovery. All internal standard recoveries were within the project acceptance limits.

The concentrations of some compounds in the samples were B qualified by the laboratory, indicating an estimated sample concentration less than the RL, but greater than the IDL. These concentrations are J qualified as estimated.

Sample	Metal	Laboratory Concentration (mg/kg)	Validation concentration (mg/kg)
OU1-SS-SB303-0-1	Beryllium	5.1 B	5.1 J
	Chromium	17.6 B	17.6 J
OU1-SS-SB03-85-86	Antimony	9.6 B	9.6 J
	Arsenic	15.5 B	15.5 J
	Beryllium	5.9 B	5.9 J
	Chromium	9.1 B	9.1 J
	Mercury	0.007 B	0.007 J
	Nickel	16.8 B	16.8 J
	Potassium	2110 B	2110 J
	Sodium	413 B	413 J
OU1-SS-SB303-89-90	Antimony	7.5 B	7.5 J
	Thallium	0.251 B	0.251 J
OU1-SS-SB303-108-109	Antimony	1.2 B	1.2 J
	Beryllium	0.245 B	0.245 J
	Thallium	0.092 B	0.092 J

6.0 SPLP Metals (EPA Methods 1312/6020/6010B/7470A)

The soil samples were analyzed for the requested metals and Mercury (EPA 6020/6010B/7470A) following a Synthetic Precipitation Leaching Procedure (SPLP). Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPS and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ⊗ Blanks
- ✓ Laboratory Control Samples
- ⊗ Matrix Spike/Matrix Spike Duplicate Samples
- ✓ Laboratory Duplicate Samples
- ✓ Serial Dilutions
- ⊗ Compound Identification and Quantitation

6.1 Data Completeness

All analyses were performed as requested on the COC. The SPLP extraction logs were not included in the data package. The SPLP extraction log was requested from the laboratory and was sent by email.

6.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

6.3 Calibrations

6.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for inductively coupled plasma/mass spectrometry (ICP/MS) analysis, inductively coupled plasma (ICP) analysis and cold vapor atomic absorption (CVAA) initial calibrations.

6.3.2 Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV)

The percent recoveries in all associated ICVs and CCVs were within the QC acceptance limits.

6.3.3 CRDL Standard

The detection limit (CRDL) standards were within the control limits.

6.3.4 ICSA/ICSAB Standards

The interference check standards (ICSA/ICSAB) met all acceptance criteria.

6.4 Blanks

6.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria with the following exceptions; arsenic, chromium, iron, lead, and zinc were detected in the preparation blank at estimated concentrations less than the RL but greater than the IDL; however, since arsenic, iron, lead, and zinc were detected in the associated samples at concentrations greater than the RL, no sample qualifications were required. Chromium in sample OU1-SS-SB303-89-90 is U qualified at the RL since it is detected at an estimated concentration less than the RL but greater than the IDL.

Sample	**Metal**	**Laboratory Concentration (ug/L)**	**Validation concentration (ug/L)**
OU1-SS-SB303-89-90	Chromium	0.710 B	1.0 U

6.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICBs and CCBs met the acceptance criteria with a few exceptions; several ICBs and CCBs had metal detections at concentrations less than the RL, but greater than the IDLs. However, since the metals concentrations in the associated samples were greater than the RLs, no sample qualifications were required.

6.5 Laboratory Control Samples (LCS)

All percent recoveries in the LCS were within the acceptance limits.

6.6 Matrix Spike (MS)

A MS was not analyzed.

6.7 Laboratory Duplicate Samples

A sample duplicate was not analyzed.

6.8 Serial Dilutions

The percent differences for the compounds for the serial dilution for the SPLP analysis of sample OU1-SS-SB303-108-109 were outside the laboratory acceptance criteria for arsenic, cobalt, copper, lead, magnesium, selenium and vanadium; however, since the concentrations of these metals are less than 50 times the IDL, no sample qualifications are required.

6.9 Compound Identification and Quantitation

The project acceptance limits for the ICP-MS internal standards are 30-170% recovery. All internal standard recoveries were within the project acceptance limits.

The concentrations of some compounds in the samples were B qualified by the laboratory, indicating an estimated sample concentration less than the RL, but greater than the IDL. These concentrations are J qualified as estimated.

Sample	Metal	Laboratory Concentration (ug/L)	Validation concentration (ug/L)
OU1-SS-SB303-89-90	Arsenic	0.445 B	0.445 J
	Copper	0.954 B	0.954 J
	Lead	0.250 B	0.250 J
	Mercury	0.018 B	0.018 J
	Vanadium	0.607 B	0.607 J
OU1-SS-SB303-108-109	Arsenic	0.432 B	0.432 J
	Cobalt	0.171 B	0.171 J
	Lead	0.394 B	0.394 J
	Manganese	3.4 B	3.4 J
	Mercury	0.021 B	0.021 J
	Potassium	299 B	299 J
	Selenium	0.457 B	0.457 J

7.0 Cyanide (EPA Method 9012), pH (EPA Method 9045) and Percent Solids (Modified Method 160.3)

The soil samples were analyzed for cyanide (EPA Method 9012), pH (EPA Method 9045) and percent solids (EPA Modified Method 160.3). Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPs and the quality of the data reported. The following summarizes the results of this review. In addition, the percent solids data was reviewed and found to be acceptable.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ✓ Blanks
- ✓ Laboratory Control Sample
- ✓ Matrix Spike Sample
- ✓ Laboratory Duplicate Sample

7.1 Data Completeness

All analyses were performed as requested on the chain-of-custody records.

7.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

7.3 Calibrations

7.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for Cyanide analysis.

The pH meter was calibrated appropriately.

7.3.2 Continuing Calibration Verification (CCV)

The percent recoveries in all associated CCVs were within the QC acceptance limits for Cyanide. The pH CCVs were appropriate to the method.

7.4 Blanks

7.4.1 Preparation (Method) Blank

The preparation blank met the acceptance criteria; Cyanide was not detected in the method blank.

7.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICB and CCBs met the acceptance criteria; no Cyanide was detected in either the ICB or CCBs.

7.5 Laboratory Control Sample (LCS)

The cyanide percent recovery in the LCS was within the acceptance limits (85-115% recovery).

7.6 Matrix Spike (MS)

A batch MS was analyzed; recovery was within the acceptance limits.

7.7 Laboratory Duplicate Samples

A batch laboratory duplicate was analyzed; cyanide was not detected in either the original or the duplicate sample.

ATTACHMENT A
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by GeoSyntec's Data Review Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher that the concentration of the analyte in the sample due to bias attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower that the concentration of the analyte in the sample due to bias attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Geosyntec consultants

1531 Dick Lonas Road, Building A
Knoxville, TN 37909
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Memorandum

TO: Nandra Weeks

DATE: March 5, 2008

FROM: Geosyntec Consultants QA/QC Group

SITE: Mattheissen and Hegeler Zinc Company Site, OU1

SUBJECT: Summary of Tier III Validation of analytical results for CAS Report R2740248

Introduction

This report summarizes the findings of the full validation of 10 soil samples and one trip blank collected on behalf of the Mattheissen and Hegeler Zinc Company Site, OU1 project. These samples were collected on October 9, 2007. The samples were analyzed by Columbia Analytical Services, Inc. (CAS), Rochester, New York. The samples were analyzed for Volatile Organic Compounds by EPA Method 8260B, Semivolatile Organic Compounds by EPA Method 8270C, Organochlorine Pesticides by EPA Method 8081A, Polychlorinated Biphenyls (PCBs) by EPA Method 8082, Total Metals by EPA Methods 6020 and 6010B, Mercury by EPA Method 7471A, Metals by EPA Methods 6020, 6010 and 7470A following EPA Method 1312 Synthetic Precipitation Leaching Procedure (SPLP), Cyanide by EPA Method 9012, pH by EPA Method 9045 and Percent Solids by Modified EPA Method 160.3.

The data were reviewed in accordance with the principles presented in *USEPA National Functional Guidelines for Laboratory Data Review, Organics* (EPA, 2005), *USEPA National Functional Guidelines for Laboratory Data Review, Inorganics* (EPA, 2004), and per the requirements of the QAPP, the laboratory standard operating procedures and the specified methods.

Data for the following samples were reviewed.

CAS Job No.	Client ID
1044839	OU1-SS-SB302-0-1
1044840	OU1-SS-SB302-10.5-11.5
1044841	OU1-SS-SB302-12-13
1044842	OU1-SS-SB301-0-1
1044843	OU1-SS-SB301-44-50
1044844	OU1-SS-SB301-40-41
1044846	OU1-SS-SB304-0-1

1044848	OU1-SS-SB304-58-59
1044849	OU1-SS-SB304-59-60
1044860	OU1-SS-SB302-10.5-11.5
1044861	OU1-SS-SB301-0-1
1044862	OU1-SS-SB304-59-60
1044863	OU1-SS-SB302-10.5-11.5
1044865	OU1-SS-SB301-0-1
1044866	OU1-SS-SB304-59-60
1044868	OU1-SS-SB302-10.5-11.5
1044869	OU1-SS-SB301-0-1
1044870	OU1-SS-SB304-59-60
1044871	OU1-SS-SB402
1044872	OU1-SS-SB301-0-1
1044873	OU1-SS-SB302-10.5-11.5
1044874	OU1-SS-SB301-0-1
1044875	OU1-SS-SB304-0-1

Matrix – soil and 1 aqueous trip blank

Executive Summary

All analyses were performed as requested on the chain of custody (COC). The dates of sample collection and date samples were relinquished on the COC only included the month and day; the year was not included in the date. It was assumed, based on the date of sample receipt at the laboratory, that the year was 2007.

All holding times were met.

1.0 Volatile Organic Compounds (EPA Method 8260B)

Full validation including recalculation was performed with the laboratory data for the analysis of volatile organic compounds (EPA Method 8260B). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ✓ Internal Standards
- ✓ Performance Check Sample
- ⊗ Blanks
- ✓ System Monitoring Compounds (Surrogates)
- ⊗ Matrix Spike/Matrix Spike Duplicate Sample

- ✓ Laboratory Control Samples
- ✓ Compound Identification and Quantitation

1.1 Data Completeness

All analyses were performed as requested on the COC.

1.2 Holding Times and Preservation

All samples were analyzed within the 14 day technical holding time from date of collection for volatiles.

1.3 Calibrations

1.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the percent relative standard deviation (%RSD) of the relative response factors (RRFs). For all target analytes, the RRFs met the method criteria; the RSDs met the method criteria for all compounds or the coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibrations.

1.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the RRFs met the method criteria; the percent differences (%D) between the RRFs in the initial and continuing calibration standards for all target analytes were within the method acceptance criteria.

1.4 Internal Standards

All internal standard retention times are within ±30 seconds of the associated continuing calibration internal standard retention time. All internal standard area counts were within the acceptance criteria (>50% and <150%) of the associated continuing calibration internal standard area counts

1.5 Performance Check Samples

An instrument performance check sample (tune standard) was analyzed at the beginning of each 12-hour period during sample analysis. The samples were analyzed within the 12-hour period. All ion abundance criteria were met for bromofluorobenzene (BFB).

1.6 Blanks

Acetone, carbon disulfide, methylene chloride and toluene were detected in the method blank associated with the soil samples, at estimated concentrations greater than the method detection limit (MDL) but less than the reporting limit (RL). Therefore, based on the estimated concentrations of acetone, carbon disulfide, methylene chloride and toluene in the associated samples that are greater than the MDL but less than the RL, the concentrations of acetone, carbon disulfide, methylene chloride and toluene in the associated samples are U qualified as not detected at the RL.

Sample ID	Compound	Laboratory Result (ug/kg)	Validation Result (ug/kg)
OU1-SS-SB302-10.5-11.5	Acetone	20 JB	32 U
	Methylene chloride	0.51 JB	8.0 U
	Toluene	3.7 JB	8.0 U
OU1-SS-SB301-0-1	Acetone	26 JB	32 U
OU1-SS-SB304-59-60	Acetone	22 JB	26 U
	Carbon Disulfide	2.2 JB	13 U
	Methylene chloride	0.45 JB	6.4 U
	Toluene	4.4 J	6.4 U

Sample OU1-SS-SB402 is mislabeled and is the trip blank (the QAPP specifies the trip blank ID to be identified as OU1-SW-MW402). No compounds were detected in the trip blank above the MDL.

1.7 System Monitoring Compounds (Surrogates)
All surrogate recoveries were within the laboratory acceptance limits.

1.8 Laboratory Control Samples (LCS)
All LCS recoveries were within the laboratory control limits.

1.9 Matrix Spike/Matrix Spike Duplicate Sample (MS/MSD)
A MS/MSD pair was not analyzed.

1.10 Compound Identification and Quantitation
All compound identifications and quantitations were appropriate.

2.0 Semivolatile Organic Compounds (EPA Method 8270C)

Full validation including recalculation was performed on the laboratory data for the analysis of semivolatile organic compounds (EPA Method 8270C). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Data Completeness
✓ Holding Times and Preservation
✓ Calibrations
✓ Internal Standards
✓ Performance Check Sample
✓ Blanks
✓ System Monitoring Compounds (Surrogates)
⊗ Laboratory Control Samples
⊗ Matrix Spike/Matrix Spike Duplicate

✓ Compound Identification and Quantitation

2.1 Data Completeness

All analyses were performed as requested on the COC.

2.2 Holding Times and Preservation

The samples for semivolatile analysis were extracted within the 14 day technical holding time from date of collection and analyzed with the 40 day technical holding time from date of extraction.

2.3 Calibrations

2.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the %RSD of the RRFs. For all target analytes, the RRFs met the method criteria; the RSDs met the method criteria for all compounds or the coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibrations.

2.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the RRFs met the method criteria; the percent differences (%D) between the RRFs in the initial and continuing calibration standards for all target analytes were within the method acceptance criteria.

2.4 Internal Standards

All internal standard retention times are within ±30 seconds of the associated continuing calibration internal standard retention time. All internal standard area counts were within the acceptance criteria (>50% and <150%) of the associated continuing calibration internal standard area counts.

2.5 Performance Check Samples

An instrument performance check sample was analyzed at the beginning of each 12-hour period during sample analysis. The samples were analyzed within the 12-hour period. All ion abundance criteria were met for decafluorotriphenyl-phosphine (DFTPP).

2.6 Blanks

There were no detections of the project compounds of concern in the laboratory method blanks.

2.7 System Monitoring Compounds (Surrogates)

All surrogate recoveries were within the laboratory acceptance limits.

2.8 Laboratory Control Samples (LCS)

All LCS recoveries were within the laboratory control limits, with the exception of benzaldehyde and di-n-octylphthalate which had high recoveries, outside of the laboratory control limits, in the LCS and/or LCSD. However, since benzaldehyde and

di-n-octylphthalate were not detected in any of the samples, no sample qualifications were required.

2.9 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Sample OU1-SS-SB304-59-60 was analyzed as the MS/MSD. All compound recoveries were within the laboratory control limits, with the following exception. The recoveries of benzaldehyde in the MS/MSD were high and outside of the laboratory control limits. However, since benzaldehyde was not detected the sample, no sample qualifications were required.

2.10 Compound Identification and Quantitation

All compound identifications and quantitations were appropriate

3.0 Organochlorine Pesticides (EPA Method 8081A)

Full validation including recalculation was performed on the laboratory data for the analysis of Organochlorine Pesticides (EPA Method 8081A). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Data Completeness
✓ Holding Times and Preservation
✓ Calibrations
✓ Blanks
✓ System Monitoring Compounds (Surrogates)
✓ Laboratory Control Samples
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Compound Identification and Quantitation

3.1 Data Completeness

All analyses were performed as requested on the COC.

3.2 Holding Times and Preservation

The samples for organochlorine pesticide analysis were extracted within the 14 day technical holding time from date of collection and analyzed with the 40 day technical holding time from date of extraction.

3.3 Calibrations

3.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the %RSD of the average response factors (RFs). For all target analytes, the RSDs met the method criteria for all compounds.

3.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the percent differences (%D) between the average RFs in the initial and continuing calibration standards for all target analytes were within the method acceptance criteria.

3.4 Blanks

There were no detections of the project compounds of concern in the laboratory method blank.

3.5 System Monitoring Compounds (Surrogates)

All surrogate recoveries were within the laboratory acceptance limits.

3.6 Laboratory Control Samples (LCS)

All LCS/LCS duplicate (LCSD) recoveries and RPDs were within the laboratory control limits.

3.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

A MS/MSD pair was not analyzed.

3.8 Compound Identification and Quantitation

All compound identifications and quantitations were appropriate. It was noted that J qualified concentrations (sample concentrations between the MDL and RL) were not reported by the laboratory.

4.0 PCBs (EPA Method 8082)

Full validation including recalculation was performed on the laboratory data for the analysis of PCBs (EPA Method 8082). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Data Completeness
✓ Holding Times and Preservation
✓ Calibrations
✓ Blanks
✓ System Monitoring Compounds (Surrogates)
✓ Laboratory Control Samples
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Compound Identification and Quantitation

4.1 Data Completeness

All analyses were performed as requested on the COC.

4.2 Holding Times and Preservation

The samples for PCB analysis were extracted within the 14 day technical holding time from date of collection and analyzed with the 40 day technical holding time from date of extraction.

4.3 Calibrations

4.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the %RSD of the average response factors (RFs). For all target analytes, the RSDs met the method criteria for all compounds.

4.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the percent differences (%D) between the average RFs in the initial and continuing calibration standards for all target analytes were within the method acceptance criteria.

4.4 Blanks

There were no detections of the project compounds of concern in the laboratory method blank.

4.5 System Monitoring Compounds (Surrogates)

All surrogate recoveries were within the laboratory acceptance limits.

4.6 Laboratory Control Samples (LCS)

All LCS/LCS duplicate (LCSD) recoveries and RPDs were within the laboratory control limits.

4.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

A MS/MSD pair was not analyzed.

4.8 Compound Identification and Quantitation

All compound identifications and quantitations were appropriate.

5.0 Metals (EPA Methods 6020/6010B/7470A)

The soil samples were analyzed for the requested metals and Mercury (EPA 6020/6010B/7471A) following a total metals digestion and Mercury digestion. Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPS and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Data Completeness
✓ Holding Times and Preservation
✓ Calibrations
⊗ Blanks
⊗ Laboratory Control Samples
⊗ Matrix Spike/Matrix Spike Duplicate Samples
⊗ Laboratory Duplicate Samples
⊗ Serial Dilutions
⊗ Compound Identification and Quantitation

5.1 Data Completeness

All analyses were performed as requested on the COC.

5.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

5.3 Calibrations

5.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for inductively coupled plasma/mass spectrometry (ICP/MS) analysis, inductively coupled plasma (ICP) analysis and cold vapor atomic absorption (CVAA) initial calibrations.

5.3.2 Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV)

The percent recoveries in all associated ICVs and CCVs were within the QC acceptance limits, with the following exception. Beryllium recovery was low and outside of the QC acceptance limits in the CCVs bracketing the analyses of samples OU1-SS-SB302-0-1, OU1-SS-SB302-12-13, OU1-SS-SB301-40-41, OU1-SS-SB304-58-59 and OU1-SS-SB304-59-60; therefore, the concentrations of beryllium in these samples are J- qualified as estimated with a low bias.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SS-SB302-0-1	Beryllium	1.6	1.6 J-
OU1-SS-SB302-12-13	Beryllium	0.229 B	0.229 J-
OU1-SS-SB301-40-41	Beryllium	1.6	1.6 J-
OU1-SS-SB304-58-59	Beryllium	2.1	2.1 J-
OU1-SS-SB304-59-60	Beryllium	0.455 B	0.455 J-

5.3.3 CRDL (Detection Limit) Standard

The CRDL standards were within the control limits, with the exception of high manganese recovery outside of the method acceptance limits in the closing CRDL standard. However, since the samples associated with this closing CRDL had manganese concentrations greater than two times the RL, no sample qualifications are required.

5.3.4 ICSA/ICSAB (Interference Check) Standards

The ICSA/ICSAB standards met all acceptance criteria.

5.4 Blanks

5.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria with the following exceptions; aluminum, barium, chromium, lead, manganese and zinc were detected in the preparation blank at estimated concentrations less than the RL, but greater than the instrument detection limits (IDL). However, since aluminum, barium, chromium, lead, manganese and zinc were detected in the associated samples at concentrations greater than the RL, no sample qualifications were required.

5.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICBs and CCBs met the acceptance criteria with a few exceptions; several ICBs and CCBs had metal detections at estimated concentrations less than the RL, but greater than the IDLs. However, since the metals concentrations in the associated samples were greater than the RL, no sample qualifications were required.

5.5 Laboratory Control Samples (LCS)

All percent recoveries in the LCS were within the acceptance limits, with the exception of high recovery outside of the control limits for antimony. However, since antimony was either not detected or detected less than the RL, but greater than the IDL, no sample qualifications were required.

5.6 Matrix Spike (MS)

An MS was not analyzed

5.7 Laboratory Duplicate Samples

A laboratory duplicate was not analyzed.

5.8 Serial Dilutions

The percent differences for the compounds for the serial dilution for the total metals analysis of sample OU1-SS-SB302-12-13 were outside the laboratory acceptance criteria for beryllium, potassium, selenium and sodium; however, the beryllium, potassium, selenium and sodium concentrations in the serial dilution are less than 50 times the IDL. Therefore, no sample qualifications are required.

The serial dilution form in the data package indicates that the calcium, manganese and sodium recoveries are 7%, yet flagged the results with E, indicating the serial dilution failed. A corrected form was emailed.

5.9 Compound Identification and Quantitation

The project acceptance limits for the ICP-MS internal standards are 30-170% recovery. All internal standard recoveries were within the project acceptance limits.

The concentrations of some compounds in the samples were B qualified by the laboratory, indicating an estimated sample concentration less than the RL, but greater than the instrument detection limit. These concentrations are J qualified as estimated.

Sample	Metal	Laboratory Concentration (mg/kg)	Validation Concentration (mg/kg)
OU1-SS-SB302-0-1	Antimony	1.0 B	1.0 J
	Selenium	4.2 B	4.2 J
	Thallium	0.283 B	0.283 J
OU1-SS-SB02-10.5-11.5	Beryllium	0.742 B	0.742 J
	Mercury	0.024 B	0.024 J
	Thallium	0.488 B	0.488 J
OU1-SS-SB302-12-13	Beryllium	0.229 B	0.229 J
	Thallium	0.262 B	0.262 J
OU1-SS-SB301-0-1	Antimony	1.8 B	1.8 J
	Chromium	18.2 B	18.2 J
	Nickel	39.9 B	39.9 J
OU1-SS-SB301-44-50	Beryllium	1.5 B	1.5 J
	Cadmium	0.703 B	0.703 J
	Mercury	0.016 B	0.016 J
	Selenium	0.590 B	0.590 J
	Thallium	0.298 B	0.298 J
OU1-SS-SB301-40-41	Antimony	2.5 B	2.5 J
	Arsenic	45.5 B	45.5 J
	Nickel	41.1 B	41.1 J
	Potassium	157 B	157 J
	Silver	0.179 B	0.179 J
OU1-SS-SB301-40-41	Antimony	6.5B	6.5 J
	Beryllium	1.3 B	1.3 J
	Chromium	19.4 B	19.4 J
	Cobalt	10.4 B	10.4 J
	Selenium	4.4 B	4.4 J
	Thallium	0.622 B	0.622 J
OU1-SS-SB304-58-59	Thallium	0.064 B	0.064 J
OU1-SS-SB304-59-60	Beryllium	0.455 B	0.455 J
	Mercury	0.005 B	0.005 J
	Thallium	0.091 B	0.091 J

6.0 SPLP Metals (EPA Methods 1312/6020/6010B/7470A)

The soil samples were analyzed for the requested metals and Mercury (EPA 6020/6010B/7470A) following a Synthetic Precipitation Leaching Procedure (SPLP). Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPs and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of

review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ⊗ Blanks
- ✓ Laboratory Control Samples
- ⊗ Matrix Spike/Matrix Spike Duplicate Samples
- ✓ Laboratory Duplicate Samples
- ✓ Serial Dilutions
- ⊗ Compound Identification and Quantitation

6.1 Data Completeness

All analyses were performed as requested on the COC. The SPLP extraction log was requested from the laboratory and was sent by email.

6.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

6.3 Calibrations

6.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for inductively coupled plasma/mass spectrometry (ICP/MS) analysis, inductively coupled plasma (ICP) analysis and cold vapor atomic absorption (CVAA) initial calibrations.

6.3.2 Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV)

The percent recoveries in all associated ICVs and CCVs were within the QC acceptance limits.

6.3.3 CRDL Standard

The CRDL standards were within the control limits.

6.3.4 ICSA/ICSAB Standards

The ICSA/ICSAB met all acceptance criteria.

6.4 Blanks

6.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria with the following exceptions; arsenic, chromium, iron, lead and zinc were detected in the preparation blank at estimated concentrations less than the RL, but greater than the IDL. Therefore, based on the associated samples' arsenic, chromium, iron, lead and zinc concentrations, the estimated concentrations in the samples are U qualified as not detected at the RL.

Sample	Metal	Laboratory Concentration (ug/L)	Validation Concentration (ug/L)
OU1-SS-SB02-10.5-11.5	Chromium	0.799 B	3.0 U
	Lead	0.100 B	1.0 U
OU1-SS-SB301-0-1	Arsenic	0.477 B	1.0 U
	Chromium	0.987 B	3.0 U
	Iron	43.9 B	100 U
OU1-SS-SB304-0-1	Chromium	2.1 B	3.0 U

6.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICBs and CCBs met the acceptance criteria with a few exceptions; several ICBs and CCBs had metal detections at estimated concentrations less than the RL, but greater than the IDLs. However, since the metals concentrations in the associated samples were greater than the RL, no sample qualifications were required.

6.5 Laboratory Control Samples (LCS)

All percent recoveries in the LCS were within the acceptance limits.

6.6 Matrix Spike (MS)

A MS/MSD pair was not analyzed.

6.7 Laboratory Duplicate Samples

A sample duplicate was not analyzed.

6.8 Serial Dilutions

The percent differences for the compounds for the serial dilution for the SPLP analysis of sample OU1-SS-SB304-0-1 were outside of the laboratory acceptance criteria for chromium, copper, magnesium, potassium and vanadium; however, since the concentrations of these metals are less than 50 times the IDL. Therefore, no sample qualifications are required.

6.9 Compound Identification and Quantitation

The project acceptance limits for the ICP-MS internal standards are 30-170% recovery. All internal standard recoveries were within the project acceptance limits.

The concentrations of some compounds in the samples were B qualified by the laboratory, indicating an estimated sample concentration less than the RL, but greater than the IDL. These concentrations are J qualified as estimated.

Sample	Metal	Laboratory Concentration (ug/L)	Validation Concentration (ug/L)
OU1-SS-SB302-10.5-11.5	Chromium	0.799 B	0.799 J
	Copper	0.626 B	0.626 J
	Lead	0.100 B	0.100 J

	Magnesium	811 B	811 J
	Selenium	0.900 B	0.900 J
	Vanadium	0.445 B	0.445 J
OU1-SS-SB301-0-1	Aluminum	41.8 B	41.8 J
	Arsenic	0.477 B	0.477 J
	Chromium	0.987 B	0.987 J
	Cobalt	0.342 B	0.342 J
	Iron	43.9 B	43.9 J
	Magnesium	923 B	923 J
	Manganese	1.1 B	1.1 J
	Mercury	0.141 B	0.141 J
	Nickel	1.2 B	1.2 J
	Potassium	562 B	562 J
	Vanadium	0.348 B	0.348 J
OU1-SS-SB304-0-1	Chromium	2.1 B	2.1 J
	Cobalt	0.286 B	0.286 J
	Magnesium	681 B	681 J
	Mercury	0.081 B	0.081 J
	Nickel	1.5 B	1.5 J
	Potassium	256 B	256 J

7.0 Cyanide (EPA Method 9012) and Percent Solids (Modified Method 160.3)

The soil samples were analyzed for cyanide (EPA Method 9012) and percent solids (EPA Modified Method 160.3). Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPs and the quality of the data reported. The following summarizes the results of this review. In addition, the percent solids data was reviewed and found to be acceptable.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ✓ Blanks
- ✓ Laboratory Control Sample
- ⊗ Matrix Spike Sample
- ⊗ Laboratory Duplicate Sample

7.1 Data Completeness

All analyses were performed as requested on the COC.

7.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

7.3 Calibrations

7.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for Cyanide analysis.

7.3.2 Continuing Calibration Verification (CCV)

The percent recoveries in all associated CCVs were within the QC acceptance limits for Cyanide.

7.4 Blanks

7.4.1 Preparation (Method) Blank

The preparation blank met the acceptance criteria; Cyanide was not detected in the method blank.

7.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICB and CCBs met the acceptance criteria; no Cyanide was detected in either the ICB or CCBs.

7.5 Laboratory Control Sample (LCS)

The cyanide percent recovery in the LCS was within the acceptance limits (85-115% recovery).

7.6 Matrix Spike (MS)

A MS was not analyzed.

7.7 Laboratory Duplicate Samples

A laboratory duplicate was not analyzed.

.

ATTACHMENT A
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by GeoSyntec's Data Review Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher that the concentration of the analyte in the sample due to bias attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower that the concentration of the analyte in the sample due to bias attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Geosyntec consultants

1531 Dick Lonas Road, Building A
Knoxville, TN 37909
PH 865.330.0037
FAX 865.330.9949
www.geosyntec.com

Memorandum

TO: Nandra Weeks

DATE: March 11, 2008

FROM: Geosyntec Consultants QA/QC Group

SITE: Mattheissen and Hegeler Zinc Company Site, OU1

SUBJECT: Summary of Tier III Validation of analytical results for CAS Report R2841757

Introduction

This report summarizes the findings of the full validation of 5 groundwater samples, three trip blanks, one field blank and one equipment blank collected on behalf of the Mattheissen and Hegeler Zinc Company Site, OU1 project. These samples were collected on January 14, 15 and 17, 2008. The samples were analyzed by Columbia Analytical Services, Inc. (CAS), Rochester, New York. The samples were analyzed for Volatile Organic Compounds by EPA Method 8260B, Semivolatile Organic Compounds by EPA Method 8270C, Total and Dissolved metals by EPA Methods 6020 and 6010B, Total and Dissolved Mercury by EPA Method 7470A, Total Organic Carbon (TOC) by EPA Method 415.1, Cyanide by EPA Method 9012A, Sulfate by EPA Method 300.0 and ortho-Phosphate by EPA Method 365.1.

The data were reviewed in accordance with the principles presented in *USEPA National Functional Guidelines for Laboratory Data Review, Organics* (EPA, 2005), *USEPA National Functional Guidelines for Laboratory Data Review, Inorganics* (EPA, 2004), and per the requirements of the QAPP, the laboratory standard operating procedures and the specified methods.

Data for the following samples were reviewed.

Lab ID	Client ID
1068961	OU1-GW-MWZ
1068962	Soluble OU1-GW-MWZ
1068963	OU1-GW-P-18
1068972	OU1-GW-MW402
1069681	OU1-GW-P-17
1069683	OU1-GW-MW-321-H
1069687	OU1-GW-MW-322-H

1069690	OU1-GW-MW-402
1070091	OU1-GW-MW-401
1070094	OU1-GW-MW402
1070097	OU1-GW-MW405

Matrix – groundwater, 3 aqueous trip blank, 1 aqueous field blank and 1 aqueous equipment blank

Executive Summary

All analyses were performed as requested on the chain of custody (COC) , except as noted below.

There were no methods listed on the COC for TOC, cyanide, sulfate and ortho-phosphate analyses. The methods used by the laboratory for analysis were EPA Method 415.1, EPA Method 9012A, EPA Method 300.0 and EPA Method 365.1, respectively.

The collection dates for the trip blanks on the COC did not match the collection dates used by the laboratory. The laboratory assigned the trip blank collection date the same as the associated samples. This has no impact on the data. See the table below.

Lab ID	Client ID	COC Collection Date	Lab Collection Date
1068972	OU1-GW-MW402	1/4/08	1/14/08
1069690	OU1-GW-MW-402	1/4/08	1/15/08
1070094	OU1-GW-MW402	1/4/08	1/17/08

Incorrect error correction was observed on the COC instead of the proper procedure of a single strike through, correction, and initials and date of person making the correction.

All holding times were met.

1.0 Volatile Organic Compounds (EPA Method 8260B)

Full validation including recalculation was performed with the laboratory data for the analysis of volatile organic compounds (EPA Method 8260B). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ⊗ Calibrations
- ✓ Internal Standards

- ✓ Performance Check Sample
- ⊗ Blanks
- ✓ System Monitoring Compounds (Surrogates)
- ✓ Matrix Spike/Matrix Spike Duplicate Sample
- ✓ Laboratory Control Samples
- ✓ Compound Identification and Quantitation

1.1 Data Completeness

All analyses were performed as requested on the COC.

1.2 Holding Times and Preservation

All samples were analyzed within the 14 day technical holding time from date of collection for volatiles.

1.3 Calibrations

1.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the percent relative standard deviation (%RSD) of the relative response factors (RRFs). For all target analytes, the RRFs met the method criteria; the RSDs met the method criteria for all compounds or the coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibrations.

1.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the RRFs met the method criteria; the percent differences (%D) between the RRFs in the initial and continuing calibration standards for all target analytes were within the method acceptance criteria, with the following exceptions. Dichlorodifluoromethane in the CCV analyzed on 1/17/08 and 1,1,2,2-tetrachloroethane in the CCV analyzed on 1/19/08 were outside of the acceptance criteria. Therefore, the undetected concentrations of dichlorodifluoromethane and 1,1,2,2-tetrachloroethane in the associated samples are UJ qualified as estimated below the reporting limit (RL).

Sample ID	Compound	Laboratory Result (ug/L)	Validation Result (ug/L)
OU1-GW-MWZ	Dichlorodifluoromethane	1.0 U	1.0 UJ
OU1-GW-MW402	Dichlorodifluoromethane	1.0 U	1.0 UJ
OU1-GW-MW-322-H	1,1,2,2-Tetrachloroethane	1.0 U	1.0 UJ
OU1-GW-MW-402	1,1,2,2-Tetrachloroethane	1.0 U	1.0 UJ

1.4 Internal Standards

All internal standard retention times are within ±30 seconds of the associated continuing calibration internal standard retention time. All internal standard area counts were within the acceptance criteria (>50% and <150%) of the associated continuing calibration internal standard area counts.

1.5 Performance Check Samples

An instrument performance check sample (tune standard) was analyzed at the beginning of each 12-hour period during sample analysis. The samples were analyzed within the 12-hour period. All ion abundance criteria were met for bromofluorobenzene (BFB).

1.6 Blanks

There were no detections of the project compounds of concern in laboratory method blanks.

Three trip blanks, all with the client ID OU1-GW-MW402, were submitted. Acetone was detected in the trip blank associated with the samples collected on 1/15/08, at an estimated concentration greater than the method detection limit (MDL) , but less than the RL. However, since acetone was not detected in the associated samples, no sample qualifications were required.

Sample OU1-GW-MW405 was submitted as the field blank. Acetone and 2-butanone were detected in the field blank at estimated concentrations less than the RL, but greater than the MDL; bromodichloromethane and chloroform were detected in the field blank at a concentrations greater than the RL. However, acetone, 2-butanone, bromodichloromethane and chloroform were not detected in the associated samples; therefore, no sample qualifications were required.

Sample OU1-GW-MW401 was submitted as the equipment blank. Acetone and 2-butanone were detected in the equipment blank at estimated concentrations less than the RL, but greater than the MDL; bromodichloromethane and chloroform were detected in the field blank at a concentrations greater than the RL. However, acetone, 2-butanone, bromodichloromethane and chloroform were not detected in the associated samples; therefore, no sample qualifications were required.

1.7 System Monitoring Compounds (Surrogates)

All surrogate recoveries were within the laboratory acceptance limits.

1.8 Laboratory Control Samples (LCS)

All LCS recoveries were within the laboratory control limits.

1.9 Matrix Spike/Matrix Spike Duplicate Sample (MS/MSD)

A MS/MSD pair was not analyzed.

1.10 Compound Identification and Quantitation

All compound identifications and quantitations were appropriate.

2.0 Semivolatile Organic Compounds (EPA Method 8270C)

Full validation including recalculation was performed on the laboratory data for the analysis of semivolatile organic compounds (EPA Method 8270C). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ✓ Internal Standards
- ⊗ Performance Check Sample
- ✓ Blanks
- ✓ System Monitoring Compounds (Surrogates)
- ⊗ Laboratory Control Samples
- ⊗ Matrix Spike/Matrix Spike Duplicate
- ✓ Compound Identification and Quantitation

2.1 Data Completeness

All analyses were performed as requested on the COC.

2.2 Holding Times and Preservation

The samples for semivolatile analysis were extracted within the 7 day technical holding time from date of collection and analyzed within the 40 day technical holding time from date of extraction.

2.3 Calibrations

2.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the %RSD of the RRFs. For all target analytes, the RRFs met the method criteria; the RSDs met the method or validation criteria for all compounds or the coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibrations.

2.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the RRFs met the method criteria; the percent differences (%D) between the RRFs in the initial and continuing calibration standards for all target analytes were within the method or validation acceptance criteria.

2.4 Internal Standards

All internal standard retention times are within ±30 seconds of the associated continuing calibration internal standard retention time. All internal standard area counts were within the acceptance criteria (>50% and <150%) of the associated continuing calibration internal standard area counts.

2.5 Performance Check Samples

An instrument performance check sample was analyzed at the beginning of each 12-hour period during sample analysis. The samples were analyzed within the 12-hour period. All ion abundance criteria were met for decafluorotriphenyl-phosphine (DFTPP). It was noted that on all 5B Forms, the percent relative abundances for mass 441 compared to mass 443 were wrong. However, the raw data confirmed that mass 441 passed the method criteria; therefore, no sample qualifications were required.

2.6 Blanks

There were no detections of the project compounds of concern in the laboratory method blank.

Sample OU1-GW-MW401 was submitted as the equipment blank. No compounds of concern were detected in the equipment blank.

2.7 System Monitoring Compounds (Surrogates)

All surrogate recoveries were within the laboratory acceptance limits.

2.8 Laboratory Control Samples (LCS)

All LCS recoveries were within the laboratory control limits, with the exception of benzaldehyde, which had high recoveries, outside of the laboratory control limits, in the both LCSs and one LCSD. However, since benzaldehyde was not detected in any of the samples, no sample qualifications were required.

2.9 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

A MS/MSD pair was not analyzed.

2.10 Compound Identification and Quantitation

All compound identifications and quantitations were appropriate.

3.0 Metals (EPA Methods 6020/6010B/7470A)

The water samples were analyzed for the requested total and dissolved metals and Mercury (EPA 6020/6010B/7470A/7471A) following metals digestion and mercury digestion. Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPS and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Data Completeness
✓ Holding Times and Preservation
✓ Calibrations

- ✓ Blanks
- ✓ Laboratory Control Samples
- ⊗ Matrix Spike/Matrix Spike Duplicate Samples
- ⊗ Laboratory Duplicate Samples
- ⊗ Serial Dilutions
- ✓ Compound Identification and Quantitation

3.1 Data Completeness

All analyses were performed as requested on the COC. The data package sample results were not reported down to the instrument detection limit (IDL). The laboratory provided corrected forms by email.

3.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

3.3 Calibrations

3.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for inductively coupled plasma/mass spectrometry (ICP/MS) analysis, inductively coupled plasma (ICP) analysis and cold vapor atomic absorption (CVAA) initial calibrations.

3.3.2 Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV)

The percent recoveries in all associated ICVs and CCVs were within the QC acceptance limits.

3.3.3 CRDL (Detection Limit) Standard

The CRDL standards were within the control limits, with the following exception. Selenium had high recovery in the closing CRDL standard, outside of the method acceptance limits. However, based on professional judgment, no sample qualifications were made; all the selenium results were qualified due blank concentrations (see section 3.4 below).

3.3.4 ICSA/ICSAB (Interference Check) Standards

The ICSA/ICSAB standards met all acceptance criteria.

3.4 Blanks

3.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria, with the following exceptions; antimony, arsenic, chromium, copper, lead, nickel, selenium, and vanadium were detected in the preparation blank at estimated concentrations less than the RL, but greater than the IDL. However, since arsenic and vanadium were either not detected or detected in the associated samples at concentrations greater than the RL, no sample qualifications were required. For the samples with antimony, chromium, copper, lead, nickel, and selenium concentrations less than the RL, but greater than the IDL, the concentrations are U qualified as not detected at the RL.

Sample	Metal	Laboratory Concentration (ug/L)	Validation Concentration (ug/L)
OU1-GW-MWZ	Chromium	2.2 B	3.0 U
	Selenium	0.297 B	2.0 U
	Dissolved Antimony	0.394 B	1.0 U
	Dissolved Chromium	1.0 B	3.0 U
	Dissolved Selenium	0.168 B	2.0 U
OU1-GW-P-18	Antimony	0.271 B	1.0 U
	Chromium	1.1 B	3.0 U
	Lead	0.293 B	1.0 U
OU1-GW-P-17	Antimony	0.827 B	1.0 U
	Chromium	1.5 B	3.0 U
	Selenium	0.390 B	2.0 U
OU1-GW-MW-321-H	Antimony	0.668 B	1.0 U
	Chromium	2.6 B	3.0 U
	Selenium	1.1 B	2.0 U
OU1-GW-MW-322-H	Antimony	0.250 B	1.0 U
	Chromium	1.5 B	3.0 U
	Selenium	1.6 B	2.0 U
OU1-GW-MW-401	Antimony	0.171 B	1.0 U
	Chromium	1.5 B	3.0 U
	Copper	0.345 B	1.0 U
	Nickel	0.167 B	1.0 U
	Selenium	0.336 B	2.0 U
OU1-GW-MW405	Antimony	0.155 B	1.0 U
	Chromium	1.6 B	3.0 U
	Copper	0.340 B	1.0 U
	Nickel	0.081 B	1.0 U
	Selenium	0.364 B	2.0 U

3.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICBs and CCBs met the acceptance criteria, with the following exceptions. Antimony, cadmium, chromium, lead, manganese, selenium silver and sodium were detected in the ICB and/or CCB at estimated concentrations less than the RL, but greater than the IDL. However, since these metals were either not detected or detected in the associated samples at concentrations greater than the RL or were qualified due to the preparation blank concentrations, no additional sample qualifications were required.

3.4.3 Field QC Samples

Sample OU1-SW-MW-401 is the equipment blank and OU1-SW-MW-405 is the field blank. Sodium was detected in both field QC samples at concentrations greater than the RL. The following compounds were detected in each these field blanks at estimated concentrations less than the RL, but greater than the IDL. No soil sample qualifications were required, based on these

detections and the concentrations of the metals in the associated samples or the previous qualifications due to the preparation blank concentrations.

OU1-SW-MW-401 (equipment blank) – antimony, barium, chromium, copper, lead, manganese, nickel, potassium, selenium and zinc.
OU1-SW-MW-405 (field blank) – antimony, chromium, copper, manganese, nickel and selenium.

3.5 Laboratory Control Samples (LCS)

All percent recoveries in the LCS were within the acceptance limits.

3.6 Matrix Spike (MS)

Sample OU1-GW-MWZ was analyzed as the mercury MS. The recovery of mercury was acceptable.

Sample OU1-GW-MW-312-H was analyzed as the metals MS by Method 6010B (ICP). The compound recoveries were within the laboratory control limits, with the exception of calcium and manganese, which were outside of the laboratory control limits. However, since the sample concentrations were greater than four times the spike concentrations, no sample qualifications were required.

Sample OU1-GW-MW-322 H was analyzed as the metals MS by Method 6020 (ICP-MS). The compound recoveries were within the laboratory control limits, with the exception of selenium, which was high and outside of the laboratory control limits. Therefore, the concentration of selenium in sample OU1-GW-MW-322 H is J+ qualified as estimated with a high bias.

Sample	**Metal**	**Laboratory Concentration (ug/L)**	**Validation Concentration (ug/L)**
OU1-GW-MW-322 H	Selenium	1.6 B	1.6 J+

3.7 Laboratory Duplicate Samples

Sample OU1-GW-MWZ was analyzed as the mercury laboratory duplicate. The RPD result was acceptable.

Sample OU1-GW-MW-312-H was analyzed as the metals laboratory duplicate by Method 6010B (ICP). The RPD results were acceptable.

Sample OU1-GW-MW-322 H was analyzed as the laboratory duplicate by Method 6020 (ICP-MS). The RPD results were acceptable, with the exception of antimony and vanadium, which were high and outside of the laboratory control limits; however, since the antimony and vanadium concentrations in sample OU1-GW-MW-322 H are less than five times the RL, no sample qualifications are required.

3.8 Serial Dilutions

The percent differences for the compounds for the serial dilution by Method 6010B (ICP) of sample OU1-GW-MW-312-H were outside of the laboratory acceptance criteria for aluminum, potassium and silver; however, these metals concentrations in the serial dilution are less than 50 times the IDL. Therefore, no sample qualifications are required.

The percent differences for the compounds for the serial dilution by Method 6020 (ICP-MS) of sample OU1-GW-MW-322-H were outside of the laboratory acceptance criteria for antimony, chromium, selenium, and nickel; however, the antimony, chromium and selenium concentrations in the serial dilution are less than 50 times the IDL. Therefore, no sample qualifications are required for the antimony, chromium, and selenium concentrations in sample OU1-GW-MW-322-H. The nickel concentration in sample OU1-GW-MW-322-H is J qualified as estimated, due to the serial dilution results and a sample concentration greater than 50 times the IDL.

Sample	Metal	Laboratory Concentration (ug/L)	Validation Concentration (ug/L)
OU1-GW-MW-322-H	Nickel	134	134 J

3.9 Compound Identification and Quantitation

The project acceptance limits for the ICP-MS internal standards are 30-170% recovery. All internal standard recoveries were within the project acceptance limits.

One sample was analyzed for both total and dissolved metals. The sample had the total silver concentration slightly less than the dissolved silver concentrations. However, based on professional judgment, no sample qualifications were made.

Sample	Metal	Total Concentration (ug/L)	Dissolved Concentration (ug/L)	Percent Difference (%)	Total Validation Result (ug/L)	Dissolved Validation Result (ug/L)
OUI-GW-MWZ	Silver	1.4 B	1.6 B	NC	NA	NA

NA-not applicable
NC-not calculable

The concentrations of some compounds in the samples were B qualified by the laboratory, indicating an estimated sample concentration less than the RL, but greater than the IDL. These concentrations are J qualified as estimated.

Sample	Metal	Laboratory Concentration (ug/L)	Validation Concentration (ug/L)
OU1-GW-MWZ	Cadmium	0.713 B	0.713 J
	Mercury	0.054 B	0.054 J
	Silver	1.4 B	1.4 J
	Thallium	0.112 B	0.112 J
	Dissolved Silver	1.6 B	1.6 J
OU1-GW-P-18	Silver	0.832 B	0.832 J
OU1-GW-P17	Cadmium	0.456 B	0.456 J
	Mercury	0.038 B	0.038 J
	Silver	1.6 B	1.6 J
OU1-GW-MW-321-H	Cadmium	0.297 B	0.297 J
	Silver	3.8 B	3.8 J
	Vanadium	0.214 B	0.214 J
OU1-GW-MW-322-H	Silver	3.5 B	3.5 J
	Vanadium	0.724 B	0.724 J
OU1-GW-MW-401	Barium	0.452 B	0.452 J
	Lead	0.169 B	0.169 J
	Manganese	3.5 B	3.5 J
	Potassium	182 B	182 J
	Zinc	9.4 B	9.4 J
OU1-GW-MW-405	Manganese	0.423 B	0.423 J

4.0 Cyanide (EPA Method 9012), Total Organic Carbon (EPA Method 415.1), Sulfate (EPA Method 300.0) and ortho-Phosphate (EPA Method 365.1)

The water samples were analyzed for cyanide (EPA Method 9012), total organic carbon (TOC EPA Method 415.1), sulfate (EPA Method 300.0) and ortho-phosphate (EPA Method 365.1). Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPs and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Data Completeness
✓ Holding Times and Preservation
✓ Calibrations
✓ Blanks
✓ Laboratory Control Sample
⊗ Matrix Spike Sample
⊗ Laboratory Duplicate Sample

4.1 Data Completeness

All analyses were performed as requested on the COC, with the following exceptions. There were no methods listed on the COC for TOC, cyanide, sulfate and ortho-phosphate analyses. The methods used by the laboratory for analysis were EPA Method 415.1, EPA Method 9012A, EPA Method 300.0 and EPA Method 365.1, respectively.

4.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

4.3 Calibrations

4.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for all analyses.

4.3.2 Continuing Calibration Verification (CCV)

The percent recoveries in all associated CCVs were within the QC acceptance limits for all analyses.

4.4 Blanks

4.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria; no compounds were detected in the method blanks.

4.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICB and CCBs met the acceptance criteria; no compounds were detected in either the ICB or CCBs.

4.5 Laboratory Control Sample (LCS)

The percent recoveries in the LCSs were within the acceptance limits for all analyses.

4.6 Matrix Spike (MS)

A MS was not analyzed.

4.7 Laboratory Duplicate Samples

A laboratory duplicate was not analyzed.

ATTACHMENT A
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by GeoSyntec's Data Review Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher that the concentration of the analyte in the sample due to bias attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower that the concentration of the analyte in the sample due to bias attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

OU1-SS-SB316-0-1	1043108
OU1-SS-SB312-0-1	1043109
OU1-SS-SB311-2-4	1043110
OU1-SS-SB313-2-4	1043111
OU1-SS-SB313-0-1	1043112
OU1-SS-SB317-0-1	1043113
OU1-SS-SB317-2-4	1043114
OU1-SS-SB314-2-4	1043115
OU1-SS-SB314-0-1	1043116
OU1-SS-SB318-0-1	1043117
OU1-SS-SB318-2-4	1043118
OU1-SS-SB406	1043119
OU1-SS-SB315-2-4	1043120
OU1-SS-SB319-2-4	1043255

Matrix – soil and 1 aqueous trip blank

Executive Summary

All analyses were performed as requested on the chain of custody (COC). Sample OU1-SS-SB319-2-4 was received, but not listed on the COC for analysis. The sample was analyzed for metals by EPA Methods 6010B, 6020 and 7471A.

The laboratory narrative indicated that the samples were received outside of the temperature specifications of 4 ± 2°C at 8°C. No sample qualifications were made based on the sample receipt temperature.

All holding times were met, with the exception of the analysis of five soil samples for volatiles analysis, as discussed below.

1.0 Volatile Organic Compounds (EPA Method 8260B)

Full validation including recalculation was performed with the laboratory data for the analysis of volatile organic compounds (EPA Method 8260B). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ⊗ Holding Times and Preservation
- ✓ Calibrations
- ⊗ Internal Standards

⊗ Performance Check Sample
⊗ Blanks
✓ System Monitoring Compounds (Surrogates)
⊗ Matrix Spike/Matrix Spike Duplicate Sample
✓ Laboratory Control Samples
⊗ Compound Identification and Quantitation

1.1 Data Completeness

All analyses were performed as requested on the COC.

1.2 Holding Times and Preservation

Of the six samples analyzed for VOCs, one soil sample and the trip were analyzed within the 14 day technical holding time from date of collection for volatiles.

Five soil samples were not analyzed within the 14 day technical holding time from date of collection for volatiles, due to the tune standard initially analyzed with the samples not passing the method specified criteria. The tune standard, bromofluorobenzene (BFB), analyzed on 10/9/07, did not pass the method specified criteria due to an extra scan that was included in the initial evaluation. This error was not discovered in time to reanalyze the samples within the 14 day technical holding time. The samples were analyzed 23 days after sample collection. Therefore, all compounds detected in these five samples are J qualified as estimated; all compounds not detected in these five samples are UJ qualified as estimated below the reporting limits.

Sample ID	Compound	Laboratory Result (ug/kg)	Validation Result (ug/kg)
OU1-SS-SB316-2-4	Acetone	33 JB	33 J
	Benzene	3.6 J	3.6 J
	Bromodichloromethane	21 U	21 UJ
	Bromoform	21 U	21 UJ
	Bromomethane	21 U	21 UJ
	2-Butanone (MEK)	42 U	42 UJ
	Methyl-Tert-Butyl Ether	21 U	21 UJ
	Carbon Disulfide	42 U	42 UJ
	Carbon Tetrachloride	21 U	21 UJ
	Chlorobenzene	21 U	21 UJ
	Chloroethane	42 U	42 UJ
	Chloroform	21 U	21 UJ
	Chloromethane	21 U	21 UJ
	l,2-Dibromo-3-Chloropropane	21 U	21 UJ
	Cyclohexane	5.6 J	5.6 J
	Dibromochloromethane	21 U	21 UJ
	l,2-Dibromoethane	21 U	21 UJ
	l,3-Dichlorobenzene	21 U	21 UJ
	1,4-Dichlorobenzene	21 U	21 UJ
	1,2-Dichlorobenzene	21 U	21 UJ
	Dichlorodifluoromethane	21 U	21 UJ

	l,l-Dichloroethane	21 U	21 UJ
	1,2-Dichloroethane	21 U	21 UJ
	l,l-Dichloroethene	21 U	21 UJ
	Cis-l,2-Dichloroethene	21 U	21 UJ
	Trans-l,2-Dichloroethene	21 U	21 UJ
	1,2-Dichloropropane	21 U	21 UJ
	Cis-l,3-Dichloropropene	21 U	21 UJ
	Trans-l,3-Dichloropropene	21 U	21 UJ
	Ethylbenzene	1.6 J	1.6 J
	2-Hexanone	42 U	42 UJ
	Isopropylbenzene	21 U	21 UJ
	Methyl Acetate	42 U	42 UJ
	Methylcyclohexane	7.8 J	7.8 J
	Methylene Chloride	1.9 JB	1.9 J
	4-Methyl-2-Pentanone (MIBK)	42 U	42 UJ
	Styrene	21 U	21 UJ
	1,1,2,2-Tetrachloroethane	21 U	21 UJ
	Tetrachloroethene	21 U	21 UJ
	Toluene	5.8 J	5.8 J
	1,2,4-Trichlorobenzene	21 U	21 UJ
	1,1,1-Trichloroethane	21 U	21 UJ
	1,1,2-Trichloroethane	21 U	21 UJ
	Trichloroethene	21 U	21 UJ
	Trichlorofluoromethane	21 U	21 UJ
	1,1,2-Trichloro-l,2,2-Trifluoroethane	21 U	21 UJ
	Vinyl Chloride	21 U	21 UJ
	o-Xylene	21 U	21 UJ
	m+p-Xylene	2.9 J	2.9 J
OU1-SS-SB312-2-4	Acetone	10 JB	10 J
	Benzene	1.0 J	1.0 J
	Bromodichloromethane	7.3 U	7.3 UJ
	Bromoform	7.3 U	7.3 UJ
	Bromomethane	7.3 U	7.3 UJ
	2-Butanone (MEK)	15 U	15 UJ
	Methyl-Tert-Butyl Ether	7.3 U	7.3 UJ
	Carbon Disulfide	15 U	15 UJ
	Carbon Tetrachloride	7.3 U	7.3 UJ
	Chlorobenzene	7.3 U	7.3 UJ
	Chloroethane	15 U	15 UJ
	Chloroform	7.3 U	7.3 UJ
	Chloromethane	7.3 U	7.3 UJ
	l,2-Dibromo-3-Chloropropane	7.3 U	7.3 UJ
	Cyclohexane	0.63 J	0.63 J
	Dibromochloromethane	7.3 U	7.3 UJ
	l,2-Dibromoethane	7.3 U	7.3 UJ
	l,3-Dichlorobenzene	7.3 U	7.3 UJ

	1,4-Dichlorobenzene	7.3 U	7.3 UJ
	1,2-Dichlorobenzene	7.3 U	7.3 UJ
	Dichlorodifluoromethane	7.3 U	7.3 UJ
	l,l-Dichloroethane	7.3 U	7.3 UJ
	1,2-Dichloroethane	7.3 U	7.3 UJ
	l,l-Dichloroethene	7.3 U	7.3 UJ
	Cis-l,2-Dichloroethene	7.3 U	7.3 UJ
	Trans-l,2-Dichloroethene	7.3 U	7.3 UJ
	1,2-Dichloropropane	7.3 U	7.3 UJ
	Cis-l,3-Dichloropropene	7.3 U	7.3 UJ
	Trans-l,3-Dichloropropene	7.3 U	7.3 UJ
	Ethylbenzene	7.3 U	7.3 UJ
	2-Hexanone	15 U	15 UJ
	Isopropylbenzene	7.3 U	7.3 UJ
	Methyl Acetate	15 U	15 UJ
	Methylcyclohexane	0.75 J	0.75 J
	Methylene Chloride	0.70 JB	0.70 J
	4-Methyl-2-Pentanone (MIBK)	15 U	15 UJ
	Styrene	7.3 U	7.3 UJ
	1,1,2,2-Tetrachloroethane	7.3 U	7.3 UJ
	Tetrachloroethene	7.3 U	7.3 UJ
	Toluene	0.75 J	0.75 J
	1,2,4-Trichlorobenzene	7.3 U	7.3 UJ
	1,1,1-Trichloroethane	7.3 U	7.3 UJ
	1,1,2-Trichloroethane	7.3 U	7.3 UJ
	Trichloroethene	7.3 U	7.3 UJ
	Trichlorofluoromethane	7.3 U	7.3 UJ
	1,1,2-Trichloro-l,2,2-Trifluoroethane	7.3 U	7.3 UJ
	Vinyl Chloride	7.3 U	7.3 UJ
	o-Xylene	7.3 U	7.3 UJ
	m+p-Xylene	7.3 U	7.3 UJ
OU1-SS-SB311-0-4	Acetone	8.9 JB	8.9 J
	Benzene	6.2 U	6.2 UJ
	Bromodichloromethane	6.2 U	6.2 UJ
	Bromoform	6.2 U	6.2 UJ
	Bromomethane	6.2 U	6.2 UJ
	2-Butanone (MEK)	12 U	12 UJ
	Methyl-Tert-Butyl Ether	6.2 U	6.2 UJ
	Carbon Disulfide	0.63 J	0.63 J
	Carbon Tetrachloride	6.2 U	6.2 UJ
	Chlorobenzene	6.2 U	6.2 UJ
	Chloroethane	12 U	12 UJ
	Chloroform	6.2 U	6.2 UJ
	Chloromethane	6.2 U	6.2 UJ
	l,2-Dibromo-3-Chloropropane	6.2 U	6.2 UJ
	Cyclohexane	1.5 J	1.5 J

	Dibromochloromethane	6.2 U	6.2 UJ
	l,2-Dibromoethane	6.2 U	6.2 UJ
	l,3-Dichlorobenzene	6.2 U	6.2 UJ
	1,4-Dichlorobenzene	6.2 U	6.2 UJ
	1,2-Dichlorobenzene	6.2 U	6.2 UJ
	Dichlorodifluoromethane	6.2 U	6.2 UJ
	l,l-Dichloroethane	6.2 U	6.2 UJ
	1,2-Dichloroethane	6.2 U	6.2 UJ
	l,l-Dichloroethene	6.2 U	6.2 UJ
	Cis-l,2-Dichloroethene	6.2 U	6.2 UJ
	Trans-l,2-Dichloroethene	6.2 U	6.2 UJ
	1,2-Dichloropropane	6.2 U	6.2 UJ
	Cis-l,3-Dichloropropene	6.2 U	6.2 UJ
	Trans-l,3-Dichloropropene	6.2 U	6.2 UJ
	Ethylbenzene	0.43 J	0.43 J
	2-Hexanone	12 U	12 UJ
	Isopropylbenzene	6.2 U	6.2 UJ
	Methyl Acetate	12 U	12 UJ
	Methylcyclohexane	2.1 J	2.1 J
	Methylene Chloride	0.60 JB	0.60 J
	4-Methyl-2-Pentanone (MIBK)	12 U	12 UJ
	Styrene	6.2 U	6.2 UJ
	1,1,2,2-Tetrachloroethane	6.2 U	6.2 UJ
	Tetrachloroethene	6.2 U	6.2 UJ
	Toluene	0.93 J	0.93 J
	1,2,4-Trichlorobenzene	6.2 U	6.2 UJ
	1,1,1-Trichloroethane	6.2 U	6.2 UJ
	1,1,2-Trichloroethane	6.2 U	6.2 UJ
	Trichloroethene	6.2 U	6.2 UJ
	Trichlorofluoromethane	6.2 U	6.2 UJ
	1,1,2-Trichloro-l,2,2-Trifluoroethane	6.2 U	6.2 UJ
	Vinyl Chloride	6.2 U	6.2 UJ
	o-Xylene	6.2 U	6.2 UJ
	m+p-Xylene	6.2 U	6.2 UJ
OU1-SS-SB315-0-1	Acetone	34 JB	34 J
	Benzene	9.2 U	9.2 UJ
	Bromodichloromethane	9.2 U	9.2 UJ
	Bromoform	9.2 U	9.2 UJ
	Bromomethane	9.2 U	9.2 UJ
	2-Butanone (MEK)	1.9 J	1.9 J
	Methyl-Tert-Butyl Ether	9.2 U	9.2 UJ
	Carbon Disulfide	18 U	18 UJ
	Carbon Tetrachloride	9.2 U	9.2 UJ
	Chlorobenzene	9.2 U	9.2 UJ
	Chloroethane	18 U	18 UJ
	Chloroform	9.2 U	9.2 UJ
	Chloromethane	9.2 U	9.2 UJ

	l,2-Dibromo-3-Chloropropane	9.2 U	9.2 UJ
	Cyclohexane	9.2 U	9.2 UJ
	Dibromochloromethane	9.2 U	9.2 UJ
	l,2-Dibromoethane	9.2 U	9.2 UJ
	l,3-Dichlorobenzene	9.2 U	9.2 UJ
	1,4-Dichlorobenzene	9.2 U	9.2 UJ
	1,2-Dichlorobenzene	9.2 U	9.2 UJ
	Dichlorodifluoromethane	9.2 U	9.2 UJ
	l,l-Dichloroethane	9.2 U	9.2 UJ
	1,2-Dichloroethane	9.2 U	9.2 UJ
	l,l-Dichloroethene	9.2 U	9.2 UJ
	Cis-l,2-Dichloroethene	9.2 U	9.2 UJ
	Trans-l,2-Dichloroethene	9.2 U	9.2 UJ
	1,2-Dichloropropane	9.2 U	9.2 UJ
	Cis-l,3-Dichloropropene	9.2 U	9.2 UJ
	Trans-l,3-Dichloropropene	9.2 U	9.2 UJ
	Ethylbenzene	9.2 U	9.2 UJ
	2-Hexanone	18 U	18 UJ
	Isopropylbenzene	9.2 U	9.2 UJ
	Methyl Acetate	18 U	18 UJ
	Methylcyclohexane	9.2 U	9.2 UJ
	Methylene Chloride	9.2 U	9.2 UJ
	4-Methyl-2-Pentanone (MIBK)	18 U	18 UJ
	Styrene	9.2 U	9.2 UJ
	1,1,2,2-Tetrachloroethane	9.2 U	9.2 UJ
	Tetrachloroethene	9.2 U	9.2 UJ
	Toluene	9.2 U	9.2 UJ
	1,2,4-Trichlorobenzene	9.2 U	9.2 UJ
	1,1,1-Trichloroethane	9.2 U	9.2 UJ
	1,1,2-Trichloroethane	9.2 U	9.2 UJ
	Trichloroethene	9.2 U	9.2 UJ
	Trichlorofluoromethane	9.2 U	9.2 UJ
	1,1,2-Trichloro-l,2,2-Trifluoroethane	9.2 U	9.2 UJ
	Vinyl Chloride	9.2 U	9.2 UJ
	o-Xylene	9.2 U	9.2 UJ
	m+p-Xylene	9.2 U	9.2 UJ
OU1-SS-SB319-0-1	Acetone	530	530 J
	Benzene	38 U	38 UJ
	Bromodichloromethane	38 U	38 UJ
	Bromoform	38 U	38 UJ
	Bromomethane	38 U	38 UJ
	2-Butanone (MEK)	120	120 J
	Methyl-Tert-Butyl Ether	38 U	38 UJ
	Carbon Disulfide	11 J	11 J
	Carbon Tetrachloride	38 U	38 UJ
	Chlorobenzene	38 U	38 UJ

	Chloroethane	77 U	77 UJ
	Chloroform	38 U	38 UJ
	Chloromethane	38 U	38 UJ
	l,2-Dibromo-3-Chloropropane	38 U	38 UJ
	Cyclohexane	6.7 J	6.7 J
	Dibromochloromethane	38 U	38 UJ
	l,2-Dibromoethane	38 U	38 UJ
	l,3-Dichlorobenzene	38 U	38 UJ
	1,4-Dichlorobenzene	38 U	38 UJ
	1,2-Dichlorobenzene	38 U	38 UJ
	Dichlorodifluoromethane	38 U	38 UJ
	l,l-Dichloroethane	38 U	38 UJ
	1,2-Dichloroethane	38 U	38 UJ
	l,l-Dichloroethene	38 U	38 UJ
	Cis-l,2-Dichloroethene	38 U	38 UJ
	Trans-l,2-Dichloroethene	38 U	38 UJ
	1,2-Dichloropropane	38 U	38 UJ
	Cis-l,3-Dichloropropene	38 U	38 UJ
	Trans-l,3-Dichloropropene	38 U	38 UJ
	Ethylbenzene	38 U	38 UJ
	2-Hexanone	22 J	22 J
	Isopropylbenzene	38 U	38 UJ
	Methyl Acetate	77 U	77 UJ
	Methylcyclohexane	9.5 J	9.5 J
	Methylene Chloride	3.4 JB	3.4 J
	4-Methyl-2-Pentanone (MIBK)	17 J	17 J
	Styrene	38 U	38 UJ
	1,1,2,2-Tetrachloroethane	38 U	38 UJ
	Tetrachloroethene	38 U	38 UJ
	Toluene	4.6 J	4.6 J
	1,2,4-Trichlorobenzene	38 U	38 UJ
	1,1,1-Trichloroethane	38 U	38 UJ
	1,1,2-Trichloroethane	38 U	38 UJ
	Trichloroethene	38 U	38 UJ
	Trichlorofluoromethane	38 U	38 UJ
	1,1,2-Trichloro-l,2,2-Trifluoroethane	38 U	38 UJ
	Vinyl Chloride	38 U	38 UJ
	o-Xylene	38 U	38 UJ
	m+p-Xylene	38 U	38 UJ

1.3 Calibrations

1.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the percent relative standard deviation (%RSD) of the relative response factors (RRFs). For all target

analytes, the RRFs met the method criteria; the RSDs met the method criteria for all compounds or the coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibrations.

1.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the RRFs met the method criteria; the percent differences (%D) between the RRFs in the initial and continuing calibration standards for all target analytes were within the method acceptance criteria. The data package was missing the summary for 22 compounds in the CCV analyzed on 10/9/07. The missing page was sent by email.

1.4 Internal Standards

All internal standard retention times are within ±30 seconds of the associated continuing calibration internal standard retention time. All internal standard area counts were within the acceptance criteria (>50% and <150%) of the associated continuing calibration internal standard area counts, with the following exceptions. There were low internal standard recoveries, outside of the acceptance criteria, for d5-chlorobenzene and d4-1,4-dichlorobenzene in sample OU1-SS-SB406. Therefore, the concentrations of the associated undetected compounds in sample OU1-SS-SB406 are R qualified as rejected.

Sample ID	Compound	Laboratory Result (ug/kg)	Validation Result (ug/kg)
OU1-SS-SB406	Bromoform	6.3 U	6.3 R
	Chlorobenzene	6.3 U	6.3 R
	l,2-Dibromo-3-Chloropropane	6.3 U	6.3 R
	Dibromochloromethane	6.3 U	6.3 R
	l,2-Dibromoethane	6.3 U	6.3 R
	l,3-Dichlorobenzene	6.3 U	6.3 R
	1,4-Dichlorobenzene	6.3 U	6.3 R
	1,2-Dichlorobenzene	6.3 U	6.3 R
	Ethylbenzene	6.3 U	6.3 R
	2-Hexanone	13 U	13 R
	Isopropylbenzene	6.3 U	6.3 R
	Styrene	6.3 U	6.3 R
	1,1,2,2-Tetrachloroethane	6.3 U	6.3 R
	Tetrachloroethene	6.3 U	6.3 R
	1,2,4-Trichlorobenzene	6.3 U	6.3 R
	o-Xylene	6.3 U	6.3 R
	m+p-Xylene	6.3 U	6.3 R

1.5 Performance Check Samples

An instrument performance check sample (tune standard) was analyzed at the beginning of each 12-hour period during sample analysis. The samples were analyzed within the 12-hour period. All ion abundance criteria were met for bromofluorobenzene (BFB), with the exception noted under section 1.2 Holding Times and Preservation. The tune standard, BFB, analyzed on 10/9/07, did not pass the method specified criteria due to an extra scan that was included in the initial evaluation. All of the affected samples, with the exception of the MS/MSD of sample OU1-SS-SB315-0-1, were reanalyzed. However, this error was not discovered in time to reanalyze the samples within the 14 day technical holding time.

1.6 Blanks

Acetone and methylene chloride were detected in the method blank associated with the soil samples, at estimated concentrations greater than the method detection limit (MDL) but less than the reporting limit (RL). Therefore, the estimated concentrations of acetone and methylene chloride in the associated samples that are less than the RL but greater than the MDL are U qualified as not detected at the RL. The concentrations of acetone in samples OU1-SS-SB316-2-4 and OU1-SS-SB315-0-1 are U qualified as not detected at an elevated RL due to the concentrations of acetone in the samples.

Sample ID	Compound	Laboratory Result (ug/kg)	Validation Result (ug/kg)
OU1-SS-SB316-2-4	Acetone	33 JB	33 U
	Methylene Chloride	1.9 JB	5 U
OU1-SS-SB312-2-4	Acetone	10 JB	20 U
	Methylene Chloride	0.70 JB	5 U
OU1-SS-SB311-0-4	Acetone	8.9 JB	20 U
	Methylene Chloride	0.60 JB	5 U
OU1-SS-SB315-0-1	Acetone	34 JB	34 U
	Methylene Chloride	9.2 JB	20 U
OU1-SS-SB319-0-1	Methylene Chloride	3.4 JB	20 U

In addition, acetone was detected in the trip blank, sample OU1-GW-MW-402, at an estimated concentration greater than the MDL but less than the RL. However, since the concentrations of acetone in the associated samples were either not detected or greater than two times the trip blank concentration, no additional sample qualifications were required.

1.7 System Monitoring Compounds (Surrogates)

All surrogate recoveries were within the laboratory acceptance limits.

1.8 Laboratory Control Samples (LCS)

All LCS recoveries were within the laboratory control limits.

1.9 Matrix Spike/Matrix Spike Duplicate Sample (MS/MSD)

Sample OU1-SS-SB315-0-1 was analyzed as the MS/MSD. All recoveries were within the laboratory control limits, with the following exception. Acetone had high

recovery outside of the laboratory control limits in the MS; therefore, the concentration of acetone in sample OU1-SS-SB315-0-1 is J qualified as estimated.

The following compounds had low recoveries outside of the laboratory control limits in the MS and/or the MSD: bromoform, chlorobenzene, dibromochloromethane, 1,2-dibromoethane, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene, cis-1,3-dichloropropene, trans-1,3-dichloropropene, 2-hexanone, styrene, toluene, 1,1,2-trichloroethane and o-xylene. Therefore, the undetected concentrations of these compounds in sample OU1-SS-SB315-0-1 are UJ qualified as estimated less than the RL.

The recoveries of 1,2,4-trichlorobenzene in the MS and MSD were less than 20% (14% and 12%, respectively). Therefore, the concentration of 1,2,4-trichlorobenzene in sample OU1-SS-SB315-0-1 is R qualified as rejected.

Sample ID	Compound	Laboratory Result (ug/kg)	Validation Result (ug/kg)
OU1-SS-SB315-0-1	Acetone	34 JB	34 J
	Bromoform	9.2 U	9.2 UJ
	Chlorobenzene	9.2 U	9.2 UJ
	Dibromochloromethane	9.2 U	9.2 UJ
	l,2-Dibromoethane	9.2 U	9.2 UJ
	l,3-Dichlorobenzene	9.2 U	9.2 UJ
	1,4-Dichlorobenzene	9.2 U	9.2 UJ
	1,2-Dichlorobenzene	9.2 U	9.2 UJ
	cis-l,3-Dichloropropene	9.2 U	9.2 UJ
	Trans-l,3-Dichloropropene	9.2 U	9.2 UJ
	2-Hexanone	18 U	18 UJ
	Styrene	9.2 U	9.2 UJ
	Toluene	9.2 U	9.2 UJ
	1,2,4-Trichlorobenzene	9.2 U	9.2 R
	1,1,2-Trichloroethane	9.2 U	9.2 UJ
	o-Xylene	9.2 U	9.2 UJ

1.10 Compound Identification and Quantitation

All compound identifications and quantitations were appropriate, with the following exception. The laboratory indicated on the raw data for sample OU1-SS-SB312-2-4 that the detection of 2-butanone was below the MDL. The MDL for 2-butanone on the instrument used to analyze the sample is 0.76 ug/kg. Therefore, the calculated concentration of 2-butanone in sample OU1-SS-SB312-2-4 is above the MDL and less than the RL and J qualified as estimated.

Sample ID	Compound	Laboratory Result (ug/kg)	Validation Result (ug/kg)
OU1-SS-SB312-2-4	2-Butanone	15 U	1.0 J

2.0 Semivolatile Organic Compounds (EPA Method 8270C)

Full validation including recalculation was performed on the laboratory data for the analysis of semivolatile organic compounds (EPA Method 8270C). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Data Completeness
✓ Holding Times and Preservation
⊗ Calibrations
✓ Internal Standards
✓ Performance Check Sample
✓ Blanks
✓ System Monitoring Compounds (Surrogates)
⊗ Laboratory Control Samples
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Compound Identification and Quantitation

2.1 Data Completeness

All analyses were performed as requested on the COC.

2.2 Holding Times and Preservation

The samples for semivolatile analysis were extracted within the 14 day technical holding time from date of collection and analyzed with the 40 day technical holding time from date of extraction.

2.3 Calibrations

2.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the %RSD of the RRFs. For all target analytes, the RRFs met the method criteria; the RSDs met the method criteria for all compounds or the coefficient of determination (r^2) was greater than or equal to 0.990 for the curve fit calibrations.

2.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the RRFs met the method criteria; the percent differences (%D) between the RRFs in the initial and continuing calibration standards for all target analytes were within the method acceptance criteria,

with the following exceptions. Benzaldehyde was outside of the method acceptance criteria in all CCVs; Hexachlorocyclopentadiene and 2,4-dinitrophenol were outside of the method acceptance criteria in one CCV. However, all three compounds were within the validation acceptance criteria, so no sample qualifications were required.

2.4 Internal Standards

All internal standard retention times are within ±30 seconds of the associated continuing calibration internal standard retention time. All internal standard area counts were within the acceptance criteria (>50% and <150%) of the associated continuing calibration internal standard area counts.

2.5 Performance Check Samples

An instrument performance check sample was analyzed at the beginning of each 12-hour period during sample analysis. The samples were analyzed within the 12-hour period. All ion abundance criteria were met for decafluorotriphenyl-phosphine (DFTPP).

2.6 Blanks

There were no detections of the project compounds of concern in the laboratory method blanks.

2.7 System Monitoring Compounds (Surrogates)

All surrogate recoveries were within the laboratory acceptance limits.

2.8 Laboratory Control Samples (LCS)

All LCS recoveries were within the laboratory control limits, with the exception of benzaldehyde and di-n-octylphthalate which had high recoveries, outside of the laboratory control limits, in the LCS and/or LCSD. However, since benzaldehyde and di-n-octylphthalate were not detected in any of the samples, no sample qualifications were required.

2.9 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Sample OU1-SS-SB315-0-1 was analyzed as the MS/MSD. All compound recoveries were within the laboratory control limits, with the following exceptions. The recoveries of benzaldehyde were high and outside of the laboratory control limits. However, since benzaldehyde was not detected the sample, no sample qualifications were required.

Benzo(g,h,i)perylene and 2,4-dimethylphenol had low recoveries outside of the laboratory control limits in the MS and/or MSD. Therefore, the concentrations of benzo(g,h,i)perylene and 2,4-dimethylphenol in sample OU1-SS-SB315-0-1 are J qualified as estimated and UJ qualified as estimated less than the RL.

2,4-Dinitrophenol had no recovery in the MSD and 4,6-dinitro-2-methylphenol had low recoveries in the MS/MSD (<10%; 8% and 7%, respectively). Therefore, the concentrations of 2,4-dinitrophenol and 4,6-dinitro-2-methylphenol in sample OU1-SS-SB315-0-1 are R qualified as rejected.

Sample ID	Compound	Laboratory Result (ug/kg)	Validation Result (ug/kg)
OU1-SS-SB315-0-1	Benzo(g,h,i)perylene	64 J	64 J
	2,4-Dimethylphenol	380 U	380 UJ
	2,4-Dinitrophenol	1900 U	1900 R
	4,6-Dinitro-2-methylphenol	1900 U	1900 R

2.10 Compound Identification and Quantitation

All compound identifications and quantitations were appropriate

3.0 Organochlorine Pesticides (EPA Method 8081A)

Full validation including recalculation was performed on the laboratory data for the analysis of Organochlorine Pesticides (EPA Method 8081A). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Data Completeness
✓ Holding Times and Preservation
✓ Calibrations
✓ Blanks
✓ System Monitoring Compounds (Surrogates)
⊗ Laboratory Control Samples
⊗ Matrix Spike/Matrix Spike Duplicate
✓ Compound Identification and Quantitation

3.1 Data Completeness

All analyses were performed as requested on the COC.

3.2 Holding Times and Preservation

The samples for organochlorine pesticide analysis were extracted within the 14 day technical holding time from date of collection and analyzed with the 40 day technical holding time from date of extraction.

3.3 Calibrations

3.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the %RSD of the average

response factors (RFs). For all target analytes, the RSDs met the method criteria for all compounds.

3.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the percent differences (%D) between the average RFs in the initial and continuing calibration standards for all target analytes were within the method acceptance criteria.

3.4 Blanks

There were no detections of the project compounds of concern in the laboratory method blank.

3.5 System Monitoring Compounds (Surrogates)

All surrogate recoveries were within the laboratory acceptance limits.

3.6 Laboratory Control Samples (LCS)

All LCS/LCS duplicate (LCSD) recoveries were within the laboratory control limits; however, all of the RPDs were high and outside of the laboratory control limits. No compounds were detected above the RL in any of the samples; therefore, no sample qualifications were applied to the data results.

There were low recoveries outside of the laboratory control limits in the LCS for delta-BHC, 4,4'-DDD and heptachlor epoxide; all LCSD recoveries were acceptable. Therefore, based on the low LCS recoveries, the undetected concentrations of delta-BHC, 4,4'-DDD and heptachlor epoxide in the samples are UJ qualified as estimated less than the RL.

Sample ID	Compound	Laboratory Result (ug/kg)	Validation Result (ug/kg)
OU1-SS-SB316-2-4	delta-BHC	1.9 U	1.9 UJ
	4,4'-DDD	3.8 U	3.8 UJ
	Heptachlor epoxide	1.9 U	1.9 UJ
OU1-SS-SB312-2-4	delta-BHC	2.0 U	2.0 UJ
	4,4'-DDD	3.9 U	3.9 UJ
	Heptachlor epoxide	2.0 U	2.0 UJ
OU1-SS-SB311-0-4	delta-BHC	2.1 U	2.1 UJ
	4,4'-DDD	4.2 U	4.2 UJ
	Heptachlor epoxide	2.1 U	2.1 UJ
OU1-SS-SB315-0-1	delta-BHC	1.9 U	1.9 UJ
	4,4'-DDD	3.8 U	3.8 UJ
	Heptachlor epoxide	1.9 U	1.9 UJ
OU1-SS-SB319-0-1	delta-BHC	2.0 U	2.0 UJ
	4,4'-DDD	3.9 U	3.9 UJ
	Heptachlor epoxide	2.0 U	2.0 UJ
OU1-SS-SB406	delta-BHC	1.9 U	1.9 UJ
	4,4'-DDD	3.8 U	3.8 UJ
	Heptachlor epoxide	1.9 U	1.9 UJ

3.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Sample OU1-SS-SB315-0-1 was analyzed as the MS/MSD. All compound recoveries were within the laboratory control limits, with the following exceptions. The recoveries of beta-BHC, beta-endosulfan and methoxychlor were high and outside of the laboratory control limits in the MS and/or MSD. However, since beta-BHC, beta-endosulfan and methoxychlor were not detected in sample OU1-SS-SB315-0-1, no sample qualifications were required. The MS/MSD forms originally sent in the data package identified the MS/MSD sample incorrectly. Corrected forms were sent by email.

3.8 Compound Identification and Quantitation

All compound identifications and quantitations were appropriate

4.0 PCBs (EPA Method 8082)

Full validation including recalculation was performed on the laboratory data for the analysis of PCBs (EPA Method 8082). The laboratory data were reviewed to evaluate compliance with this method, and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ✓ Blanks
- ✓ System Monitoring Compounds (Surrogates)
- ✓ Laboratory Control Samples
- ✓ Matrix Spike/Matrix Spike Duplicate
- ✓ Compound Identification and Quantitation

4.1 Data Completeness

All analyses were performed as requested on the COC.

4.2 Holding Times and Preservation

The samples for organochlorine pesticide analysis were extracted within the 14 day technical holding time from date of collection and analyzed with the 40 day technical holding time from date of extraction.

4.3 Calibrations

4.3.1 Initial Calibrations (ICAL)

Appropriate initial calibrations were performed for each analyte. Based on the method of calibration, the laboratory calculated the %RSD of the average response factors (RFs). For all target analytes, the RSDs met the method criteria for all compounds.

4.3.2 Continuing Calibration Verification (CCV)

For all target analytes, the percent differences (%D) between the average RFs in the initial and continuing calibration standards for all target analytes were within the method acceptance criteria.

4.4 Blanks

There were no detections of the project compounds of concern in the laboratory method blank.

4.5 System Monitoring Compounds (Surrogates)

All surrogate recoveries were within the laboratory acceptance limits.

4.6 Laboratory Control Samples (LCS)

All LCS/LCS duplicate (LCSD) recoveries and RPDs were within the laboratory control limits.

4.7 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Sample OU1-SS-SB315-0-1 was analyzed as the MS/MSD. All compound recoveries were within the laboratory control limits

4.8 Compound Identification and Quantitation

All compound identifications and quantitations were appropriate

5.0 Metals (EPA Methods 6020/6010B/7471A)

The soil samples were analyzed for the requested metals and Mercury (EPA 6020/6010B/7471A) following a total metals digestion and Mercury digestion. Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPS and the quality of the data reported. The following summarizes the results of this review.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

⊗ Data Completeness
✓ Holding Times and Preservation
✓ Calibrations
⊗ Blanks
⊗ Laboratory Control Samples
⊗ Matrix Spike/Matrix Spike Duplicate Samples
⊗ Laboratory Duplicate Samples
⊗ Serial Dilutions
⊗ Compound Identification and Quantitation

5.1 Data Completeness

All analyses were performed as requested on the COC. As noted earlier in this report, sample OU1-SS-SB319-2-4 was received, but not listed on the COC for analysis. The sample was analyzed for metals by EPA Methods 6010B, 6020 and 7471A.

5.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

5.3 Calibrations

5.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for inductively coupled plasma/mass spectrometry (ICP/MS) analysis, inductively coupled plasma (ICP) analysis and cold vapor atomic absorption (CVAA) initial calibrations.

5.3.2 Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV)

The percent recoveries in all associated ICVs and CCVs were within the QC acceptance limits.

5.3.3 CRDL (Detection Limit) Standard

The CRDL standards were within the control limits.

5.3.4 ICSA/ICSAB (Interference Check) Standards

The ICSA/ICSAB standards met all acceptance criteria.

5.4 Blanks

5.4.1 Preparation (Method) Blank

The preparation blanks met the acceptance criteria with the following exceptions; calcium, copper and magnesium were detected in the preparation blanks at estimated concentrations less than the RL, but greater than the instrument detection limits (IDL). However, since calcium, copper and magnesium were detected in the associated samples at concentrations greater than the RL, no sample qualifications were required.

5.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICBs and CCBs met the acceptance criteria with a few exceptions; several ICBs and CCBs had metal detections at estimated concentrations less than the RL, but greater than the IDLs. However, since the metals concentrations in the associated samples were greater than the RL, no sample qualifications were required.

5.5 Laboratory Control Samples (LCS/LCS Duplicate, LCSD)

All percent recoveries in the LCS/LCSDs were within the acceptance limits (75-125% recovery), with the exception of high recovery, outside of the acceptance limits for antimony. Therefore, the concentrations of antimony detected in the samples are J+ qualified as estimated with a high bias.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SS-SB316-2-4	Antimony	4.9 B	4.9 J+
OU1-SS-SB312-2-4	Antimony	2.2 B	2.2 J+
OU1-SS-SB311-0-4	Antimony	0.766 B	0.766 J+
OU1-SS-SB315-0-1	Antimony	20.2	20.2 J+
OU1-SS-SB319-0-1	Antimony	3.8 B	3.8 J+
OU1-SS-SB316-0-1	Antimony	11.2	11.2 J+
OU1-SS-SB312-0-1	Antimony	5.4 B	5.4 J+
OU1-SS-SB311-2-4	Antimony	2.2 B	2.2 J+
OU1-SS-SB313-2-4	Antimony	4.1 B	4.1 J+
OU1-SS-SB313-0-1	Antimony	1.2 B	1.2 J+
OU1-SS-SB317-2-4	Antimony	2.6 B	2.6 J+
OU1-SS-SB314-2-4	Antimony	4.4 B	4.4 J+
OU1-SS-SB314-0-1	Antimony	2.9 B	2.9 J+
OU1-SS-SB318-0-1	Antimony	5.2 B	5.2 J+
OU1-SS-SB318-2-4	Antimony	6.5 B	6.5 J+
OU1-SS-SB406	Antimony	3.5 B	3.5 J+
OU1-SS-SB315-2-4	Antimony	3.5 B	3.5 J+

5.6 Matrix Spike (MS)

Sample OU1-SS-SB315-2-4 was analyzed as the MS for the ICP/MS, ICP and Mercury analyses. The following compounds were outside of the control limits: aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, selenium, vanadium and zinc. The following compounds were not qualified since the sample concentrations were greater than four times the spike concentrations: aluminum, barium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, vanadium and zinc. The concentrations of antimony, arsenic, beryllium, mercury and selenium in sample OU1-SS-SB315-2-4 are J- qualified as estimated with a low bias due to the low spike recoveries in the MS.

Sample ID	Compound	Laboratory Result (mg/kg)	Validation Result (mg/kg)
OU1-SS-SB315-2-4	Antimony	3.47 B	3.47 J-
	Arsenic	6.89	6.89 J-
	Beryllium	0.75 B	0.75 J-
	Mercury	0.528	0.528 J-
	Selenium	0.69 B	0.69 J-

5.7 Laboratory Duplicate Samples

Sample OU1-SS-SB315-2-4 was analyzed as the laboratory duplicate. The relative percent differences (RPD) were within the acceptance limits, with the following exceptions. Arsenic, barium, cadmium, calcium, lead, magnesium and manganese were all high and outside of the acceptance limits; therefore, the concentrations of arsenic, barium, cadmium, calcium, lead, magnesium and manganese in sample OU1-SS-SB315-2-4 are J qualified as estimated.

Sample	Metal	Laboratory Concentration (mg/kg)	Validation Concentration (mg/kg)
OU1-SS-SB315-2-4	Arsenic	6.89	6.89 J
	Barium	167	167 J
	Cadmium	18.5	18.5 J
	Calcium	87000	87000 J
	Lead	76.6	76.6 J
	Magnesium	21500	21500 J
	Manganese	3870	3870 J

5.8 Serial Dilutions

The percent differences for the compounds for the serial dilution for the total metals analysis of sample OU1-SS-SB313-2-4 were outside of the laboratory acceptance criteria for beryllium, selenium, thallium and vanadium; however, the beryllium, selenium and thallium concentrations are less than 50 times the IDL. Therefore, no sample qualifications are required. Since the vanadium concentration in sample OU1-SS-SB313-2-4 is greater than 50 times the IDL, the vanadium concentration in sample OU1-SS-SB313-2-4 is J qualified as estimated.

Sample	Metal	Laboratory Concentration (mg/kg)	Validation Concentration (mg/kg)
OU1-SS-SB313-2-4	Vanadium	13.22	13.22 J

5.9 Compound Identification and Quantitation

The project acceptance limits for the ICP-MS internal standards are 30-170% recovery. All internal standard recoveries were within the project acceptance limits.

The concentrations of some compounds in the samples were B qualified by the laboratory, indicating an estimated sample concentration less than the RL, but greater than the IDL. These concentrations are J qualified as estimated.

Sample	Metal	Laboratory Concentration (mg/kg)	Validation Concentration (mg/kg)
OU1-SS-SB316-2-4	Antimony	4.9 B	4.9 J
	Beryllium	0.458 B	0.458 J
	Silver	0.772 B	0.772 J

	Thallium	0.193 B	0.193 J
OU1-SS-SB312-2-4	Antimony	2.2 B	2.2 J
	Beryllium	0.598 B	0.598 J
	Cadmium	0.374 B	0.374 J
	Mercury	0.018 B	0.018 J
	Selenium	0.431 B	0.431 J
OU1-SS-SB311-0-4	Antimony	0.766 B	0.766 J
	Beryllium	0.183 B	0.183 J
	Cadmium	0.682 B	0.682 J
	Selenium	0.491 B	0.491 J
OU1-SS-SB315-0-1	Arsenic	33.6 B	33.6 J
	Nickel	20.5 B	20.5 J
	Thallium	0.264 B	0.264 J
OU1-SS-SB319-0-1	Antimony	3.8 B	3.8 J
	Beryllium	0.828 B	0.828 J
	Cadmium	0.649 B	0.649 J
	Selenium	1.0 B	1.0 J
	Thallium	0.121 B	0.121 J
OU1-SS-SB316-0-1	Thallium	0.380 B	0.380 J
OU1-SS-SB312-0-1	Antimony	5.4 B	5.4 J
	Beryllium	0.634 B	0.634 J
	Cobalt	5.1 B	5.1 J
	Selenium	0.493 B	0.493 J
	Thallium	0.190 B	0.190 J
OU1-SS-SB311-2-4	Antimony	2.2 B	2.2 J
	Beryllium	0.304 B	0.304 J
	Cadmium	0.665 B	0.665 J
	Mercury	0.034 B	0.034 J
	Selenium	0.396 B	0.396 J
	Thallium	0.331 B	0.331 J
OU1-SS-SB313-2-4	Antimony	4.1 B	4.1 J
	Arsenic	0.213 B	0.213 J
	Beryllium	1.0 B	1.0 J
	Cadmium	0.562 B	0.562 J
	Mercury	0.008 B	0.008 J
	Selenium	0.601 B	0.601 J
	Thallium	0.095 B	0.095 J
OU1-SS-SB313-0-1	Antimony	1.2 B	1.2 J
	Beryllium	0.26 B	0.26 J
	Cadmium	0.695 B	0.695 J
	Selenium	0.450 B	0.450 J
	Thallium	0.050 B	0.050 J
OU1-SS-SB317-0-1	Beryllium	0.090 B	0.090 J
	Cadmium	0.283 B	0.283 J
	Selenium	0.440 B	0.440 J
OU1-SS-SB317-2-4	Antimony	2.6 B	2.6 J
	Beryllium	0.585 B	0.585 J
	Mercury	0.026 B	0.026 J
	Selenium	0.691 B	0.691 J
	Thallium	0.193 B	0.193 J

OU1-SS-SB314-2-4	Antimony	4.4 B	4.4 J
	Beryllium	0.556 B	0.556 J
	Selenium	0.472 B	0.472 J
	Thallium	0.161 B	0.161 J
OU1-SS-SB314-0-1	Antimony	2.9 B	2.9 J
	Beryllium	0.590 B	0.590 J
	Cadmium	0.874 B	0.874 J
	Mercury	0.020 B	0.020 J
	Selenium	0.439 B	0.439 J
	Thallium	0.101 B	0.101 J
OU1-SS-SB318-0-1	Antimony	5.2 B	5.2 J
	Beryllium	0.818 B	0.818 J
	Selenium	2.2 B	2.2 J
	Silver	0.276 B	0.276 J
	Thallium	0.217 B	0.217 J
OU1-SS-SB318-2-4	Antimony	6.5 B	6.5 J
	Thallium	0.559 B	0.559 J
OU1-SS-SB406	Antimony	3.5 B	3.5 J
	Beryllium	0.677 B	0.677 J
	Mercury	0.026 B	0.026 J
	Selenium	0.857 B	0.857 J
	Thallium	0.170 B	0.170 J
OU1-SS-SB315-2-4	Antimony	3.5 B	3.5 J
	Beryllium	0.752 B	0.752 J
	Selenium	0.693 B	0.693 J
	Thallium	0.122 B	0.122 J
OU1-SS-SB319-2-4	Arsenic	0.264 B	0.264 J
	Beryllium	0.409 B	0.409 J
	Cadmium	0.566 B	0.566 J
	Mercury	0.008 B	0.008 J
	Selenium	0.496 B	0.496 J

6.0 Cyanide (EPA Methods 9012) and Percent Solids (Modified Method 160.3)

The soil samples were analyzed for Cyanide (EPA Method 9012). Validation was performed on the laboratory data. The laboratory data were reviewed to evaluate compliance with the methods, laboratory SOPS and the quality of the data reported. The following summarizes the results of this review. In addition, the percent solids data was reviewed and found to be acceptable.

The areas of review are listed below. Those areas that were only reviewed as part of full validation and recalculation are designated below. A leading check mark (✓) indicates an area of review in which all data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

- ✓ Data Completeness
- ✓ Holding Times and Preservation
- ✓ Calibrations
- ✓ Blanks
- ✓ Laboratory Control Samples

- ✓ Matrix Spike/Matrix Spike Duplicate Samples
- ✓ Laboratory Duplicate Samples

6.1 Data Completeness

All analyses were performed as requested on the COC.

6.2 Holding Times and Preservation

All analyses were performed within the method-specified holding times.

6.3 Calibrations

6.3.1 Initial Calibrations (IC)

All initial calibration requirements were met for Cyanide analysis.

6.3.2 Continuing Calibration Verification (CCV)

The percent recoveries in all associated CCVs were within the QC acceptance limits for Cyanide.

6.4 Blanks

6.4.1 Preparation (Method) Blank

The preparation blank met the acceptance criteria; Cyanide was not detected in the method blank.

6.4.2 Initial Calibration Blanks (ICB) and Continuing Calibration Blanks (CCB)

The ICB and CCBs met the acceptance criteria; no Cyanide was detected in either the ICB or CCBs.

6.5 Laboratory Control Sample (LCS)

The percent recovery in the LCS was within the acceptance limits (85-115% recovery).

6.6 Matrix Spike (MS)

Sample OU1-SS-SB315-0-1 was analyzed as the MS. The MS recovery was within the laboratory control limits (30-162%).

6.7 Laboratory Duplicate Samples

Sample OU1-SS-SB315-0-1 was analyzed as the laboratory duplicate. Cyanide was not detected in the original sample or the duplicate.

ATTACHMENT A
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by GeoSyntec's Data Review Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher that the concentration of the analyte in the sample due to bias attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower that the concentration of the analyte in the sample due to bias attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Sample Receipt Documentation

TEST America Knoxville

Columbia Analytical Services

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

H9H150104

SR #

CAS Contact

www.casfab.com One Mustard St., Suite 250 • Rochester, NY 14609-0859(585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 PAGE 1 OF 1

Project Name: Carus	Project Number: CWR1709
Project Manager: Rich Bergreen	Report CC: Joey McKinnon
Company/Address: 134 N LaSalle St. Suite 300 Chicago, IL 60602	
Phone #: 312-416-3925	FAX#:
Sampler's Signature:	Sampler's Printed Name: R. Siebenmann

ANALYSIS REQUESTED *(Include Method Number and Container Preservative)*

PRESERVATIVE: O

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's ☐8260 ☐624 ☐CLP	GC/MS SVOA's ☐8270 ☐625 ☐CLP	GC VOA's ☐8021 ☐601/602	PESTICIDES ☐8081 ☐608 ☐CLP	PCB's ☐8082 ☐608 ☐CLP	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	SEP, Metals	REMARKS/ ALTERNATE DESCRIPTION
OU1-SS-LRS4135-0908		8.12.09	13:05	SS	1								1	
OU1-SS-SLP4155-0908		8.12.09	11:13	SS DUP MS	1								1	

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other _____

REC. AT 2°C
RH 8-14-09 NOT CUSTODY SEAL INTACT
1 COOLER RH 8/14/09
FED EX #869607712649

SPECIAL INSTRUCTIONS/COMMENTS
Metals

* Project specified metals list

See QAPP ☒

TURNAROUND REQUIREMENTS
_____ RUSH (SURCHARGES APPLY)
_____ 24 hr _____ 48 hr _____ 5 day
X STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
_____ I. Results Only
_____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
_____ III. Results + QC and Calibration Summaries
_____ IV. Data Validation Report with Raw Data
_____ V. Specialized Forms / Custom Report
Edata _____ Yes _____ No

INVOICE INFORMATION
PO# RFAS
BILL TO: Rich Bergreen Geosyntec
SUBMISSION #:

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature:	Signature: Ryan Henry	Signature:	Signature:	Signature:	Signature:
Printed Name: Raphael Siebenmann	Printed Name: RYAN HENRY	Printed Name:	Printed Name:	Printed Name:	Printed Name:
Firm: Geosyntec	Firm:	Firm:	Firm:	Firm:	Firm:
Date/Time: 8/13/09 17:00	Date/Time: 8/14/09 1000	Date/Time:	Date/Time:	Date/Time:	Date/Time:

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

TESTAMERICA KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST

Client: _____ **Project:** _____ **Lot Number:** 490415010

Review Items	Yes	No	NA	If No, what was the problem?	Comments/Actions Taken
1. Do sample container labels match COC? (IDs, Dates, Times)	✓			☐ **1a** Do not match COC ☐ **1b** Incomplete information ☐ **1c** Marking smeared ☐ **1d** Label torn ☐ **1e** No label ☐ **1f** COC not received ☐ **1g** Other:	
2. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C; NC, 1668, 1613B: 0-4°C; VOST: 10°C; MA: 2-6 °C)	✓			☐ **2a** Temp Blank = _____ ☐ **2b** Cooler Temp = _____	
3. Were samples received with correct chemical preservative (excluding Encore)?			✓	☐ **3a** Sample preservative =	
4. Were custody seals present/intact on cooler and/or containers?	✓			☐ **4a** Not present ☐ **4b** Not intact ☐ **4c** Other:	
5. Were all of the samples listed on the COC received?	✓			☐ **5a** Samples received-not on COC ☐ **5b** Samples not received-on COC	
6. Were all of the sample containers received intact?	✓			☐ **6a** Leaking ☐ **6b** Broken	
7. Were VOA samples received without headspace?			✓	☐ **7a** Headspace (VOA only)	
8. Were samples received in appropriate containers?	✓			☐ **8a** Improper container	
9. Did you check for residual chlorine, if necessary?			✓	☐ **9a** Could not be determined due to matrix interference	
10. Were samples received within holding time?	✓			☐ **10a** Holding time expired	
11. For rad samples, was sample activity info. provided?			✓	☐ Incomplete information	
12. For 1613B water samples is pH<9?			✓	If no, was pH adjusted to pH 7 - 9 with sulfuric acid? _____	
13. Are the shipping containers intact?	✓			☐ **13a** Leaking ☐ **13b** Other:	
14. Was COC relinquished? (Signed/Dated/Timed)	✓			☐ **14a** Not relinquished	
15. Are tests/parameters listed for each sample?	✓			☐ **15a** Incomplete information	
16. Is the matrix of the samples noted?	✓			☐ **15a** Incomplete information	
17. Is the date/time of sample collection noted?	✓			☐ **15a** Incomplete information	
18. Is the client and project name/# identified?	✓			☐ **15a** Incomplete information	
19. Was the sampler identified on the COC?	✓				

Quote #: 83772 PM Instructions: _____

Sample Receiving Associate: Lynn Henry Date: 8/14/09

QA026R20.doc, 060409

Sample Receipt Documentation

Columbia Analytical Services

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

H9H181223

SR #

CAS Contact

www.caslab.com One Mustard St., Suite 250 • Rochester, NY 14609-0859(585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 PAGE 1 OF 1

Project Name: Carus	Project Number:
Project Manager: Deb Patton	Report CC:
Company/Address: CAS Rochester 1 Mustard st. Suite 250 Rochester NY 14609	
Phone #: (585) 288-5380	FAX #: (585) 288-8475
Sampler's Signature:	Sampler's Printed Name:

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

PRESERVATIVE: 8

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's ☐ 8260 ☐ 624 ☐ CLP	GC/MS SVOA's ☐ 8270 ☐ 625 ☐ CLP	GC VOA's ☐ 8021 ☐ 601/602	PESTICIDES ☐ 8081 ☐ 608 ☐ CLP	PCB's ☐ 8082 ☐ 608 ☐ CLP	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	SEP								REMARKS/ ALTERNATE DESCRIPTION
OU1-SS-LRS4125-0908		8-11-09	13:15	Solid	1								X								
OU1-SS-SB406-0908		8-11-09	14:15	↓	1								X								

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other Ice to 4°C

KE 8-17-09

SPECIAL INSTRUCTIONS/COMMENTS
Metals

Recd @ 1°C
~~No~~ custody seal intact
1498118119
1 cooler UPS # 1Z17W43B01 4737 3719

See QAPP ☐

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

TURNAROUND REQUIREMENTS
_____ RUSH (SURCHARGES APPLY)
_____ 24 hr _____ 48 hr _____ 5 day
_____ STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
_____ I. Results Only
_____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
_____ III. Results + QC and Calibration Summaries
X IV. Data Validation Report with Raw Data
_____ V. Specialized Forms / Custom Report
Edata _____ Yes _____ No

INVOICE INFORMATION
PO#
BILL TO:
SUBMISSION #:

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature:	Signature: Teri Galbraith	Signature	Signature	Signature	Signature
Printed Name: Gregory C. Esmerian	Printed Name: Teri Galbraith	Printed Name	Printed Name	Printed Name	Printed Name
Firm: CAS	Firm: Testamerica	Firm	Firm	Firm	Firm
Date/Time: 8-17-09 18:00	Date/Time: 8/18/09 9:45	Date/Time	Date/Time	Date/Time	Date/Time

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

TESTAMERICA KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST

Client: _____ **Project:** _____ **Lot Number:** H9H180223

Review Items	Yes	No	NA	If No, what was the problem?	Comments/Actions Taken
1. Do sample container labels match COC? (IDs, Dates, Times)	✓			☐ **1a** Do not match COC ☐ **1b** Incomplete information ☐ **1c** Marking smeared ☐ **1d** Label torn ☐ **1e** No label ☐ **1f** COC not received ☐ **1g** Other:	
2. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C; NC, 1668, 1613B: 0-4°C; VOST: 10°C; MA: 2-6 °C)	✓			☐ **2a** Temp Blank = _____ ☐ **2b** Cooler Temp = _____	
3. Were samples received with correct chemical preservative (excluding Encore)?			✓	☐ **3a** Sample preservative =	
4. Were custody seals present/intact on cooler and/or containers?	✓			☐ **4a** Not present ☐ **4b** Not intact ☐ **4c** Other:	
5. Were all of the samples listed on the COC received?	✓			☐ **5a** Samples received-not on COC ☐ **5b** Samples not received-on COC	
6. Were all of the sample containers received intact?	✓			☐ **6a** Leaking ☐ **6b** Broken	
7. Were VOA samples received without headspace?			✓	☐ **7a** Headspace (VOA only)	
8. Were samples received in appropriate containers?	✓			☐ **8a** Improper container	
9. Did you check for residual chlorine, if necessary?			✓	☐ **9a** Could not be determined due to matrix interference	
10. Were samples received within holding time?	✓			☐ **10a** Holding time expired	
11. For rad samples, was sample activity info. provided?			✓	☐ Incomplete information	
12. For 1613B water samples is pH<9?			✓	If no, was pH adjusted to pH 7 - 9 with sulfuric acid? _____	
13. Are the shipping containers intact?	✓			☐ **13a** Leaking ☐ **13b** Other:	
14. Was COC relinquished? (Signed/Dated/Timed)	✓			☐ **14a** Not relinquished	
15. Are tests/parameters listed for each sample?	✓			☐ **15a** Incomplete information	
16. Is the matrix of the samples noted?	✓			☐ **15a** Incomplete information	
17. Is the date/time of sample collection noted?	✓			☐ **15a** Incomplete information	
18. Is the client and project name/# identified?	✓			☐ **15a** Incomplete information	
19. Was the sampler identified on the COC?		✓			

Quote #: 83772 PM Instructions: NA

Sample Receiving Associate: _____ Date: 8/18/09

QA026R20.doc, 060409

Chain of Custody Documentation

Intra-Network Chain of Custody

1 Mustard Street, Suite 250 • Rochester, NY 14609 • 585-288-5380 • FAX 585-288-8475

CAS Contact: Deb Patton

R0904514

Project Name: Carus Metals
Project Number: FL
Project Manager: Richard Berggreen
Company: GeoSyntec Consultants

Lab Code	Client Sample ID	# of Cont.	Matrix	Sample Date	Sample Time	Date Received	Send To	Frz Dry Frz Dry	Hg 7471A	Homogen Homogen	LIPIDS Lipids	Metals T 200.8	Metals T 6010B	Se T 7740
R0904514-001	PT-CAR004-090811-Hog Nose	1	Animal Tissue	8/11/09	1235	8/12/09	KELSO	III	III	III	III	III	III	III
R0904514-002	PT-CAR004-090811-Common	1	Animal Tissue	8/11/09	1234	8/12/09	KELSO	III	III	III	III	III	III	III
R0904514-003	SB-CAR004-090811-Small	1	Animal Tissue	8/11/09	1234	8/12/09	KELSO	III	III	III	III	III	III	III
R0904514-004	OU1-MT-CAR003-090812	1	Animal Tissue	8/12/09	1030	8/13/09	KELSO	III	III	III	III	III	III	III
R0904514-005	OU1-MT-CAR002-090812	1	Animal Tissue	8/12/09	1615	8/13/09	KELSO	III	III	III	III	III	III	III
R0904514-006	OU1-PT-CAR003-090812 Hog	1	Animal Tissue	8/12/09	1037	8/13/09	KELSO	III	III	III	III	III	III	III
R0904514-007	OU1-SB-CAR003-090812	1	Animal Tissue	8/12/09	1037	8/13/09	KELSO	III	III	III	III	III	III	III
R0904514-008	OU1-SB-CAR002-090812	1	Animal Tissue	8/12/09	1530	8/13/09	KELSO	III	III	III	III	III	III	III
R0904514-009	OU1-PT-CAR003-090812	1	Animal Tissue	8/12/09	1040	8/13/09	KELSO	III	III	III	III	III	III	III
R0904514-010	OU1-SB-CAR003-090812	1	Animal Tissue	8/12/09	1041	8/13/09	KELSO	III	III	III	III	III	III	III
R0904514-011	OU1-PT-CAR002-090812 Hog	1	Animal Tissue	8/12/09	1530	8/13/09	KELSO	III	III	III	III	III	III	III
R0904514-012	OU1-M7-CAR001-090813 Plan	1	Animal Tissue	8/13/09	1100	8/14/09	KELSO	III	III	III	III	III	III	III

Special Instructions/Comments

Turnaround Requirements

____ **RUSH** (Surcharges Apply)

PLEASE CIRCLE WORK DAYS

1 2 3 4 5

____ **STANDARD**

Requested FAX Date: _____

Requested Report Date: 09/01/09

Report Requirements

____ I. Results Only

____ II. Results + QC Summaries

✓ III. Results + QC and Calibration Summaries

____ IV. Data Validation Report with Raw Data

PQL/MDL/J Y

EDD

Invoice Information

PO# R0904514

Bill to

Relinquished By: Matt Cam 9/1/09 1800

Received By: CAS 9/3/09 1015

Airbill Number: _____

Intra-Network Chain of Custody

1 Mustard Street, Suite 250 • Rochester, NY 14609 • 585-288-5380 • FAX 585-288-8475

CAS Contact: Deb Patton

Project Name: Carus Metals
Project Number: FL
Project Manager: Richard Berggreen
Company: GeoSyntec Consultants

Lab Code	Client Sample ID	# of Cont.	Matrix	Sample Date	Sample Time	Date Received	Send To	Frz Dry Frz Dry	Hg 7471A	Homogen Homogen	LIPIDS Lipids	Metals T 200.8	Metals T 6010B	Se T 7740
R0904514-013	OU1-PT-CAR001-090813 Hog	1	Animal Tissue	8/13/09	1030	8/14/09	KELSO	III	III	III	III	III	III	III
R0904514-014	001-SB-CAR001-090813 Small	1	Animal Tissue	8/13/09	1030	8/14/09	KELSO	III	III	III	III	III	III	III
R0904514-015	OU1-SB-CAR001-090813	1	Animal Tissue	8/13/09	1030	8/14/09	KELSO	III	III	III	III	III	III	III

Test Comments

Metals T - 200.8	R0904514-001,2,3,4,5,6,7,8,9,10,11,12,13,14,15	Cd,Tl,Ni,Cu,Be,Pb,Ag,Sb,As,Ba,Co,Al,Zn,Mn
Metals T - 6010B	R0904514-001,2,3,4,5,6,7,8,9,10,11,12,13,14,15	Cr,V,Na,Ca,Mg,Fe,K

Special Instructions/Comments	Turnaround Requirements	Report Requirements	Invoice Information
	____**RUSH** (Surcharges Apply) **PLEASE CIRCLE WORK DAYS** 1 2 3 4 5 ____ **STANDARD** Requested FAX Date: _____ Requested Report Date: 09/01/09	____ I. Results Only ____ II. Results + QC Summaries __✓__ III. Results + QC and Calibration Summaries ____ IV. Data Validation Report with Raw Data PQL/MDL/J __Y__ EDD	PO# R0904514 Bill to

Relinquished By: Matt Conn 9/1/09 1800 Received By: CHS 9/2/09 1015 Airbill Number: _____

CHAINS OF CUSTODY

INTERNAL CHAINS

Columbia Analytical Services™

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

SR #

CAS Contact

One Mustard St., Suite 250 • Rochester, NY 14609-0859(585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475

PAGE _____ OF _____

www.caslab.com

Project Name: Carus

Project Number: CWR1709

Project Manager: Rich Bergreen

Report CC: Joey McKinnon

Company/Address: 134 N. LaSalle St, Suite 300, Chicago, IL 60602

Phone #: 312-416-3925

FAX#:

Sampler's Signature: [signature]

Sampler's Printed Name: Joey McKinnon

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

PRESERVATIVE: 2 2

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other _____

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's ☐ 8260 ☐ 624 ☐ CLP	GC/MS SVOA's ☐ 8270 ☐ 625 ☐ CLP	GC VOA's ☐ 8021 ☐ 601/602	PESTICIDES ☐ 8081 ☐ 608 ☐ CLP	PCB's ☐ 8082 ☐ 608 ☐ CLP	METALS, TOTAL \ Hardness (List in comments below)	METALS, DISSOLVED (List in comments below)	SEP	SPLP	Metals, Total \ Soil pH					REMARKS/ ALTERNATE DESCRIPTION
OU1-SW-LVR401C-0908	-001/002	8.11.09	1230	SW	2						1	1								
OU1-SW-LVR401E-0908	-003/004	8.11.09	1245	SW	2						1	1								
OU1-SW-LVR401W-0908	-005/006	8.11.09	1200	SW	6						3	3								Sample; MS/MSD
~~OU1-GW-LVR4~~																				
OU1-GW-MW404-0908	-007/008	8.11.09	1210	GW	2						1	1								
OU1-SS-LRS412S-0908	009	8/11/09	1315	SS	2								~~1~~	1						
OU1-SS-LRS412T-0908	-010	8/11/09	1315	SS	2									2						Sample; MS/MSD
OU1-SS-SB406-0908	-022/023	8.11.09	1415	SS	3						~~1~~		~~1~~	1	1					
OU1-SE-LVR401C-0908	-011	8.11.09	1235	SE	1										1					
OU1-SE-LVR401W-0908	-012	8.11.09	1215	SE	2										2					Sample; MS/MSD

SPECIAL INSTRUCTIONS/COMMENTS
Metals

* See Project specified metals list.

See QAPP ☐

TURNAROUND REQUIREMENTS
____ RUSH (SURCHARGES APPLY)
____ 24 hr ____ 48 hr ____ 5 day
X STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
____ I. Results Only
____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III. Results + QC and Calibration Summaries
____ IV. Data Validation Report with Raw Data
____ V. Specialized Forms / Custom R
Edata ____ Yes ____ N

INVOICE INFORMATION
PO# Rich Bergreen
BILL TO: Geosyntec

R0904518
GeoSyntec Consultants
Carus Chemicals

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	
Signature: [signature]	Signature: Matth Carus	Signature	Signature	Signature	Signature
Printed Name: Joey McKinnon	Printed Name: Matthew Carus	Printed Name	Printed Name	Printed Name	Printed Name
Firm: Geosyntec Consultants	Firm: CAS	Firm	Firm	Firm	Firm
Date/Time: 8.11.09 / 1700	Date/Time: 8/12/09 0945	Date/Time	Date/Time	Date/Time	Date/Time

SCOC-1102-08

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

Columbia Analytical Services™ — CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

SR #

CAS Contact

www.caslab.com — One Mustard St., Suite 250 • Rochester, NY 14609-0859(585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 PAGE ____ OF ____

Project Name: Cerro

Project Number: CWR1709

Project Manager: Rich Bergreen

Report CC: ~~Joey McKinnon~~ Joey McKinnon

Company/Address: 134 N LaSalle St Suite 300

Chicago, IL 60602

Phone #: 312-416-3825

FAX#:

Sampler's Signature:

Sampler's Printed Name: R. Siebenmorgn

ANALYSIS REQUESTED *(Include Method Number and Container Preservative)*

PRESERVATIVE: 2 2 2

NUMBER OF CONTAINERS

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	# Containers	GC/MS VOA's ☐8260 ☐624 ☐CLP	GC/MS SVOA's ☐8270 ☐625 ☐CLP	GC VOA's ☐8021 ☐601/602	PESTICIDES ☐8081 ☐608 ☐CLP	PCB's ☐8082 ☐608 ☐CLP	METALS, TOTAL / Hardness (List in comments below)	METALS, DISSOLVED (List in comments below)	Metals, Total / Soil pH	REMARKS/ ALTERNATE DESCRIPTION
OU1-SW-SS010-090810	-013/014	8/10/09	1620	SW	2						1	1		
OU1-GW-MW403-090810	-015	8/10/09	1715	GW	1						1			
OU1-GW-MW403-090810	-016	8/10/09	1738	GW	1						1			
OU1-GW-MW401-090810	-017	8/10/09	1720	GW	1						1			
OU1-GW-MW401A-090810	-018	8/11/09	1515	GW	1							1		
OU1-GW-MW401B-090810	-019	8/11/09	1520	GW	1						1			
OU1-GW-MW402-090810	-020	8/11/09	1525	GW	1						1			
OU1-SE-LWR10LE-090810	-021	8/11/09	1255	SE	1								1	

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other ____

SPECIAL INSTRUCTIONS/COMMENTS

Metals

* Project specified metals list.

"A" KB 9/15/09

See QAPP ☐

TURNAROUND REQUIREMENTS

____ RUSH (SURCHARGES APPLY)

____ 24 hr ____ 48 hr ____ 5 day

X STANDARD

REQUESTED FAX DATE: ____

REQUESTED REPORT DATE: ____

REPORT REQUIREMENTS

____ I. Results Only

____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)

____ III. Results + QC and Calibration Summaries

____ IV. Data Validation Report with Raw Data

____ V. Specialized Forms / Custom Report

Edata ____ Yes ____ No

INVOICE INFORMATION

PO#

BILL TO: Rich Bergreen

GeoSyntec

R0904518
GeoSyntec Consultants
Carus Chemicals

SAMPLE RECEIPT: CONDITION/COOLER TEMP: ____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY
Signature: Joey McKinnon	Signature: Matthew Caron	Signature	Signature	Signature
Printed Name: Joey McKinnon	Printed Name: Matthew Caron	Printed Name	Printed Name	Printed Name
Firm: GeoSyntec Consultants	Firm: CAS	Firm	Firm	Firm
Date/Time: 8.11.09 / 1700	Date/Time: 8/12/09 0945	Date/Time	Date/Time	Date/Time

SCOC-1102-08

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

Appendix G-4-1a: Data Validation Reports, COCs, Analytical Lab Reports
Matthiessen & Hegeler Zinc Site
Final Remedial Investigation Report

Cooler Receipt And Preservation Check Form

Project/Client Geosyntec Submission Number R0904518

Cooler received on 8/12/09 by: MWC **COURIER:** CAS UPS (FEDEX) VELOCITY CLIENT

1.	Were custody seals on outside of cooler?	(YES)	NO			
2.	Were custody papers properly filled out (ink, signed, etc.)?	(YES)	NO			
3.	Did all bottles arrive in good condition (unbroken)?	(YES)	NO			
4.	Did any VOA vials have significant* air bubbles?	YES	NO	(N/A)		
5.	Were **Ice** or **Ice packs** present?	(YES)	NO			
6.	Where did the bottles originate?	(CAS/ROC),	CLIENT			
7.	Temperature of cooler(s) upon receipt:	6°	0°			
	Is the temperature within 0° - 6° C?:	(Yes)	(Yes)	Yes	Yes	Yes
	If No, Explain Below	No	No	No	No	No

Date/Time Temperatures Taken: 8/12/09 1030

Thermometer ID: 161 / IR GUN#2 / (IR GUN#3) Reading From: (Temp Blank) / Sample Bottle

If out of Temperature, note packing/ice condition, Client Approval to Run Samples: _____

PC Secondary Review: VB 8/17/09

Cooler Breakdown: Date: 8/12/09 by: MWC

1.	Were all bottle labels complete (*i.e.* analysis, preservation, etc.)?	(YES)	NO
2.	Did all bottle labels and tags agree with custody papers?	YES	(NO)
3.	Were correct containers used for the tests indicated?	(YES)	NO
4.	Air Samples: Cassettes / Tubes Intact Canisters Pressurized Tedlar® Bags Inflated		(N/A)

Explain any discrepancies: _____

pH	Reagent	YES	NO	Lot Received	Exp	Sample ID	Vol. Added	Lot Added	Final pH
≥12	NaOH								
≤2	HNO_3		✓	B0R26936	6/10	5, 03 and 7	1mL	B0R26956	≤2
≤2	H_2SO_4								
Residual Chlorine (-)	For TCN and Phenol			If present, contact PM to add ascorbic acid					
	$Na_2S_2O_3$	-	-						
	Zn Aceta	-	-						
	HCl	*	*						

*Not to be tested before analysis – pH tested and recorded by VOAs or GenChem on a separate worksheet

Yes = All samples OK

No = Samples were preserved at lab as listed

PM OK to Adjust: _____

Bottle lot numbers: 050409-2R, 037955, 042609-1R, 082007-1

Other Comments:

Location 5, 03 and 7 did not preserve. HNO_3 was added.

Location 13 and 14 ended in 0905 rather than 090516, the chain was follow

Location 16 and 17 ended in 090616 rather than 0906 the chain was follow

Samples 001-SW-A5W11-090516 and 001-SW-C5W12-090616 were not on chain (pm 0

PC Secondary Review: _____

*significant air bubbles are greater than 5-6 mm

PC was notified but they were closed.

H:\SMODOCS\Cooler Receipt 2.doc

CHAINS OF CUSTODY

INTERNAL CHAINS

Columbia Analytical Services — CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

SR #

CAS Contact

www.caslab.com — One Mustard St., Suite 250 • Rochester, NY 14609-0859(585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 — PAGE 1 OF 4

Project Name: Carus	Project Number: CWR1709
Project Manager: Rich Bergreen	Report CC: Joey McKinnon
Company/Address: 134 N LaSalle St. Suite 300 Chicago, IL 60602	
Phone #: 312-416-3925	FAX#
Sampler's Signature:	Sampler's Printed Name: R. Siebenmann

ANALYSIS REQUESTED *(Include Method Number and Container Preservative)*

PRESERVATIVE: 0 0 2 2

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's 8260 ☐624 ☐CLP	GC/MS SVOA's 8270 ☐625 ☐CLP	GC VOA's 8021 ☐601/602	PESTICIDES 8081 ☐608 ☐CLP	PCB's 8082 ☐608 ☐CLP	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	Soil pH	Metals, SPLP	Metals + Hardness	Metals	REMARKS/ ALTERNATE DESCRIPTION
OU1-SE-LVR404C-0908	-001	8.12.09	16:17	SE	1						1						
OU1-SE-LVR404E-0908	-002	8.12.09	16:30	SE	1						1						
OU1-SE-LVR404W-0908	-051	8.12.09	16:00	SE	1						1						
OU1-SS-LRS413S-0908	-052	8.12.09	13:05	SS	1								1				
OU1-SS-LRS413T-0908	-053	8.12.09	13:10	SS	1								1				
OU1-SE-LVR403C-0908	-005	8.12.09	11:50	SE	1						1						
OU1-SE-LVR403E-0908	-006	8.12.09	12:00	SE	1						1						
OU1-SE-LVR403W-0908	-007	8.12.09	11:35	SE	1						1						
OU1-GW-MW401A-090812	-009	8.12.09	19:35	GW	1						1 (MS)				1		
OU1-GW-MW401B-090812	-010	8.12.09	19:40	GW	1									1			

Preservative Key
0. NONE
1. HCl
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other _____

SPECIAL INSTRUCTIONS/COMMENTS
Metals
* Project specified metals list

See QAPP ☐

TURNAROUND REQUIREMENTS
____ RUSH (SURCHARGES APPLY)
____ 24 hr ____ 48 hr ____ 5 day
X STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
____ I. Results Only
____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III. Results + QC and Calibration Summaries
____ IV. Data Validation Report with Raw Data
____ V. Specialized Forms / Custom Report
Edata ____ Yes ____

INVOICE INFORMATION
PO#
BILL TO: Rich Bergreen
Geosyntec

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	
Signature	Signature	Signature	Signature	Signature	
Printed Name: Raphael Siebenmann	Printed Name: Gregory D. Esmerian	Printed Name	Printed Name	Printed Name	Printed Name
Firm: Geosyntec	Firm: CAS	Firm	Firm	Firm	Firm
Date/Time: 8/13/09 17:50	Date/Time: 8-14-09 9:40	Date/Time	Date/Time	Date/Time	Date/Time

R0904599
GeoSyntec Consultants
Carus Chemicals

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

Columbia Analytical Services™ CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

SR #

CAS Contact

www.caslab.com One Mustard St., Suite 250 • Rochester, NY 14609-0859(585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 PAGE 2 OF 4

Project Name: Carus	Project Number: CWR1709
Project Manager: Rich Bergreen	Report CC: Joey McKinnon
Company/Address: 134 N LaSalle St. Suite 300, Chicago, IL 60602	
Phone #: 312-416-3925	FAX#
Sampler's Signature	Sampler's Printed Name: R. Siebenmann

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

PRESERVATIVE: Q (VOA) 2 2

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's ☐ 8260 ☐ 624 ☐ CLP	GC/MS SVOA's ☐ 8270 ☐ 625 ☐ CLP	GC VOA's ☐ 8021 ☐ 601/602	PESTICIDES ☐ 8081 ☐ 608 ☐ CLP	PCB's ☐ 8082 ☐ 608 ☐ CLP	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	Metals + Hardness	REMARKS/ ALTERNATE DESCRIPTION
OU1-GW-MW405-090812	-011	8.12.09	1930	GW	1								1	
OU1-SW-LVR403C-0908	-012	8.12.09	11:45	SW	2							1	1	
OU1-SW-LVR403W-0908	~~-013~~ -014	8.12.09	11:25	SW	2							1	1	
OU1-SW-LVR403E-0908	~~-014~~ -016	8.12.09	11:50	SW	2							1	1	
OU1-SW-LVR402E-0908	-018	8.12.09	10:55	SW	2							1	1	
OU1-SW-LVR402W-0908	-020	8.12.09	10:00	SW	2							1	1	
OU1-SW-LVR402C-0908	-022	8.12.09	10:25	SW	2							1	1	
OU1-SE-LVR402E-0908	-024	8.12.09	11:05	SE	1						1			
OU1-SE-LVR402C-0908	-025	8.12.09	10:45	SE	1						1			
OU1-SE-LVR402W-0908	-026	8.12.09	10:10	SE	1						1			

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other _____

SPECIAL INSTRUCTIONS/COMMENTS
Metals
*Project Specified metals list

See QAPP ☐

TURNAROUND REQUIREMENTS
____ RUSH (SURCHARGES APPLY)
____ 24 hr ____ 48 hr ____ 5 day
X STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
____ I. Results Only
____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III. Results + QC and Calibration Summaries
____ IV. Data Validation Report with Raw Data
____ V. Specialized Forms / Custom Report
Edata ____ Yes ____ No

INVOICE INFORMATION
PO#
BILL TO: Rich Bergreen
Geosyntec
SUBMISSION #: R0904599

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature	Signature	Signature	Signature	Signature	Signature
Printed Name: K. Siebenmann	Printed Name: Gregory O. Esmerian	Printed Name	Printed Name	Printed Name	Printed Name
Firm: Geo Syntec	Firm: CAS	Firm	Firm	Firm	Firm
Date/Time: 8/13/09 17:50	Date/Time: 8-14-09 9:40	Date/Time	Date/Time	Date/Time	Date/Time

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

Appendix G-4-1a: Data Validation Reports, COCs, Analytical Lab Reports
Matthiessen & Hegeler Zinc Site
Final Remedial Investigation Report

Columbia Analytical Services™

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

SR #

CAS Contact

One Mustard St., Suite 250 • Rochester, NY 14609-0859(585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475

PAGE 3 OF 4

www.caslab.com

Project Name: CARUS

Project Number: CWR1709

Project Manager: RICH BERGREEN

Report CC: JOEY MCKINNON

Company/Address: 134 N LASALLE ST., SUITE 300, CHICAGO, IL 60602

Phone #: 312-416-3925

FAX#:

Sampler's Signature:

Sampler's Printed Name: W. AMBER

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

PRESERVATIVE: 0 2 2 2

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other _____

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's ☐ 8260 ☐ 624 ☐ CLP	GC/MS SVOA's ☐ 8270 ☐ 625 ☐ CLP	GC VOA's ☐ 8021 ☐ 601/602	PESTICIDES ☐ 8081 ☐ 608 ☐ CLP	PCB's ☐ 8082 ☐ 608 ☐ CLP	METALS, TOTAL / SOIL PH (List in comments below)	METALS, DISSOLVED (List in comments below)	METALS & HARDNESS	METALS							REMARKS/ ALTERNATE DESCRIPTION
OU1-SW-AS0411-090812	-027	8.12.09	08:35	SW	2							1	1								
OU1-SW-LVR404C-0908	-029	8.12.09	16:15	SW	2							1	1								
OU1-SW-LVR404E-0908	-031	8.12.09	16:25	SW	2							1	1								
OU1-SW-LVR404W-0908	-033	8.12.09	15:50	SW	2							1	1								
OU1-SW-AS0411-090813	-035	8.13.09	0950	SW	2							1	1								
OU1-SW-LVR405C-0908	-037	8.13.09	1515	SW	2							1	1								
OU1-SW-LVR405E-0908	-039	8.13.09	1530	SW	2							1	1								
OU1-GW-MW405-090813	-041	8.13.09	1640	GW	1								1								
OU1-GW-MW401A-090813	-042	8.13.09	1630	GW	1								3 (IA)	1							
OU1-GW-MW401B-090813	-043	8.13.09	1635	GW	1								1								

SPECIAL INSTRUCTIONS/COMMENTS

Metals

* PROJECT SPECIFIED METALS LIST

See QAPP ☐

TURNAROUND REQUIREMENTS

____ RUSH (SURCHARGES APPLY)

____ 24 hr ____ 48 hr ____ 5 day

X STANDARD

REQUESTED FAX DATE

REQUESTED REPORT DATE

REPORT REQUIREMENTS

____ I. Results Only

____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)

____ III. Results + QC and Calibration Summaries

____ IV. Data Validation Report with Raw Data

____ V. Specialized Forms / Custom Report

Edata ____ Yes ____ No

INVOICE INFORMATION

PO#

BILL TO: RICH BERGREEN

GEOSYNTEC

SUBMISSION #: R0904599

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature	Signature	Signature	Signature	Signature	Signature
Printed Name: R. Sickenmann	Printed Name: Gregory O. Esmerian	Printed Name	Printed Name	Printed Name	Printed Name
Firm: Geosyntec	Firm: CAS	Firm	Firm	Firm	Firm
Date/Time: 17:50 8/13/09	Date/Time: 8-14-09 9:40	Date/Time	Date/Time	Date/Time	Date/Time

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

Columbia Analytical Services

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

SR #

CAS Contact

www.caslab.com One Mustard St., Suite 250 • Rochester, NY 14609-0859(585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 PAGE 4 OF 4

Project Name: Carus	Project Number: CWR1709
Project Manager: Rich Bergreen	Report CC: Joey McVinnon
Company/Address: 134 N LaSalle St. Suite 300 Chicago, IL 60602	
Phone #: 312-416-3925	FAX#:
Sampler's Signature:	Sampler's Printed Name: R. Siebenmann

ANALYSIS REQUESTED *(Include Method Number and Container Preservative)*

PRESERVATIVE: 0 2 2 0

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's ☐ 8260 ☐ 624 ☐ CLP	GC/MS SVOA's ☐ 8270 ☐ 625 ☐ CLP	GC VOA's ☐ 8021 ☐ 601/602	PESTICIDES ☐ 8081 ☐ 608 ☐ CLP	PCB's ☐ 8082 ☐ 608 ☐ CLP	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	Metals + Hardness	Metals - SPLP	REMARKS/ ALTERNATE DESCRIPTION
OU1-SS-SLP415S-0908	-044	8.13.09	11:13	SS	1						X0			1	
OU1-SS-SLP415T-0908	-045	8.13.09	11:18	SS	1						X0			1	
OU1-SE-LVR405W-0908	-046	8.13.09	15:05	SE	1						1				
OU1-SE-LVR405C-0908	-047	8.13.09	15:25	SE	1						1				
OU1-SE-LVR405E-0908	-048	8.13.09	15:40	SE	1						1				
OU1-SW-LVR405W-0908	-049	8.13.09	14:55	SW	2							1	1		

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other _____

SPECIAL INSTRUCTIONS/COMMENTS
Metals

* Project Specified Metals List

See QAPP ☐

TURNAROUND REQUIREMENTS
_____ RUSH (SURCHARGES APPLY)
_____ 24 hr _____ 48 hr _____ 5 day
X STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
_____ I. Results Only
_____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
_____ III. Results + QC and Calibration Summaries
_____ IV. Data Validation Report with Raw Data
_____ V. Specialized Forms / Custom Report
Edata _____ Yes _____ No

SEE CONTRACT

INVOICE INFORMATION
PO#
BILL TO: Rich Bergreen Geosyntec
SUBMISSION #: R0904509

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature:	Signature:	Signature	Signature	Signature	Signature
Printed Name: R. Siebenmann	Printed Name: Gregory O. Esmerian	Printed Name	Printed Name	Printed Name	Printed Name
Firm: Geosyntec	Firm: CAS	Firm	Firm	Firm	Firm
Date/Time: 8/13/09 17:50	Date/Time: 8-14-09 9:40	Date/Time	Date/Time	Date/Time	Date/Time

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

Cooler Receipt And Preservation Check Form

Project/Client Geosyntec Submission Number R09 R09-4599

Cooler received on 8-14-09 by: ME **COURIER:** CAS UPS (FEDEX) VELOCITY CLIENT

1.	Were custody seals on outside of cooler?	(YES)	NO			
2.	Were custody papers properly filled out (ink, signed, etc.)?	(YES)	NO			
3.	Did all bottles arrive in good condition (unbroken)?	(YES)	NO			
4.	Did any VOA vials have significant* air bubbles?	YES	NO	(N/A)		
5.	Were **Ice** or **Ice packs** present?	(YES)	NO			
6.	Where did the bottles originate?	(CAS/ROC)	CLIENT			
7.	Temperature of cooler(s) upon receipt:	3°	5°			
	Is the temperature within 0° - 6° C?:	(Yes)	(Yes)	Yes	Yes	Yes
	If No, Explain Below	No	No	No	No	No

Date/Time Temperatures Taken: 8-14-09 @ 10:00

Thermometer ID: 161 / IR GUN#2 / (IR GUN#3) Reading From: Temp Blank / (Sample Bottle)

If out of Temperature, note packing/ice condition, Client Approval to Run Samples: _____

PC Secondary Review: 8/18/09

Cooler Breakdown: Date : 8-14-09 by: ME/ALH

1.	Were all bottle labels complete (*i.e.* analysis, preservation, etc.)?	(YES)	NO
2.	Did all bottle labels and tags agree with custody papers?	(YES)	NO
3.	Were correct containers used for the tests indicated?	(YES)	NO
4.	Air Samples: Cassettes / Tubes Intact Canisters Pressurized Tedlar® Bags Inflated		(N/A)

Explain any discrepancies: _____

pH	Reagent	YES	NO	Lot Received	Exp	Sample ID	Vol. Added	Lot Added	Final pH
≥12	NaOH								
≤2	HNO_3	✓	✓	BDB26936	06/10	See below	See below	BDB26950	All <2
≤2	H_2SO_4								
Residual Chlorine (-)	For TCN and Phenol			If present, contact PM to add ascorbic acid					
	$Na_2S_2O_3$	-	-						
	Zn Aceta	-	-						
	HCl	*	*						

*Not to be tested before analysis – pH tested and recorded by VOAs or GenChem on a separate worksheet

Yes = All samples OK

No = Samples were preserved at lab as listed

PM OK to Adjust: _____

Bottle lot numbers: _____

Other Comments:

Locations OU1-GW-MW401B-090813 – 2ml HNO_3 added
OU1-SW-LVR404W-0908 – 2ml HNO_3 added
OU1-SW LVR404E-0908 – 2ml HNO_3 added
OU1-SW-LVR403W-0908 – 1 ml HNO_3 added

PC Secondary Review: 8/18/09

*significant air bubbles are greater than 5-6 mm

H:\SMODOCS\Cooler Receipt 2.doc

CHAINS OF CUSTODY

INTERNAL CHAINS

Columbia Analytical Services — CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

SR #

CAS Contact

PAGE 1 OF 2

www.caslab.com — One Mustard St., Suite 250 • Rochester, NY 14609-0859(585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475

Project Name: Carus	Project Number: CWR1709
Project Manager: Rich Bergreen	Report CC: Joey McGinnan
Company/Address: 134N LaSalle St. Suite 300, Chicago, IL 60602	
Phone #: 312-416-3925	FAX#
Sampler's Signature:	Sampler's Printed Name: R. Siebenmann

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

PRESERVATIVE: 0 2 2 2

Preservative Key: 0. NONE; 1. HCL; 2. HNO_3; 3. H_2SO_4; 4. NaOH; 5. Zn. Acetate; 6. MeOH; 7. $NaHSO_4$; 8. Other

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's 8260 624 CLP	GC/MS SVOA's 8270 625 CLP	GC VOA's 8021 601/602	PESTICIDES 8081 608 CLP	PCB's 8082 608 CLP	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	Soil pH	Metals, Total + Hardness	Metals, Total	REMARKS/ ALTERNATE DESCRIPTION
OU1-SE-LVR406-0908	-001	8/14/09	9:15	SE	1						1					
OU1-SE-LVR407-0908	-002	8/14/09	9:40	SE	1						1					
OU1-SE-LVR408-0908	-003	8/14/09	10:50	SE	1						1					
OU1-SE-LVR409-0908	-004	8/14/09	13:50	SE	1						1					
OU1-SW-LVR408-0908	-005	8/14/09	10:45	SW	2							1	1			
OU1-SW-LVR409-0908	-006	8/14/09	13:40	SW	2							1	1			
OU1-SW-SD411-090814	-009	8/14/09	8:45	SW	4							2	2			MS/MSD
OU1-GW-MW404-090814	-011	8/14/09	8:50	GW	2							1	1			
OU1-GW-MW401A-090814	~~-014~~ -013	8/14/09	14:45	GW	1									1		
OU1-GW-MW401B-090814	-014	8/14/09	14:50	GW	1								1			

SPECIAL INSTRUCTIONS/COMMENTS

Metals

* Project specified metals list

See QAPP ☒

TURNAROUND REQUIREMENTS

____ RUSH (SURCHARGES APPLY)

____ 24 hr ____ 48 hr ____ 5 day

X STANDARD

REQUESTED FAX DATE

REQUESTED REPORT DATE

REPORT REQUIREMENTS

____ I. Results Only

____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)

____ III. Results + QC and Calibration Summaries

____ IV. Data Validation Report with Raw Data

____ V. Specialized Forms / Custom Report

SEE QAPP

Edata ____ Yes ____ No

INVOICE INFORMATION

PO#

BILL TO: Rich Bergreen

Geosyntec

SAMPLE RECEIPT: CONDITION/COOLER TEMP: 6°C

CUSTODY SEALS: Y / N

R0904612

GeoSyntec Consultants
Carus Chemicals

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	
Signature	Signature	Signature	Signature	Signature	Signature
Printed Name: R. Siebenmann	Printed Name: Gregory O. Esmerian	Printed Name	Printed Name	Printed Name	Printed Name
Firm: Geosyntec	Firm: CAS	Firm	Firm	Firm	Firm
Date/Time: 8/14/09 15:15	Date/Time: 8-15-09 9:35	Date/Time	Date/Time	Date/Time	Date/Time

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

Columbia Analytical Services™ CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

SR #

CAS Contact

www.caslab.com One Mustard St., Suite 250 • Rochester, NY 14609-0859(585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 PAGE 2 OF 2

Project Name: Carus	Project Number: CWR170a
Project Manager: Rich Bergreen	Report CC: Joey McKinnon
Company/Address: 134N LaSalle St. Suite 300 Chicago, IL 60602	
Phone #: 312-416-3925	FAX#:
Sampler's Signature:	Sampler's Printed Name: R. Siebenmann

ANALYSIS REQUESTED *(Include Method Number and Container Preservative)*

PRESERVATIVE: Q

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's ☐ 8260 ☐ 624 ☐ CLP	GC/MS SVOA's ☐ 8270 ☐ 625 ☐ CLP	GC VOA's ☐ 8021 ☐ 601/602	PESTICIDES ☐ 8081 ☐ 608 ☐ CLP	PCB's ☐ 8082 ☐ 608 ☐ CLP	METALS, TOTAL ↑Hardness (List in comments below)	METALS, DISSOLVED (List in comments below)	REMARKS/ ALTERNATE DESCRIPTION
out-GW-MW405-090814	-015	8/14/09	1440	GW	1						1		
out-GW-MW403-090814	-016	8/14/09	1500	GW	1						1		

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other _____

SPECIAL INSTRUCTIONS/COMMENTS
Metals

* Project specified metals list

See QAPP ☒

TURNAROUND REQUIREMENTS
____ RUSH (SURCHARGES APPLY)
____ 24 hr ____ 48 hr ____ 5 day
X STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
____ I. Results Only
____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III. Results + QC and Calibration Summaries
____ IV. Data Validation Report with Raw Data
____ V. Specialized Forms / Custom Report
Edata ____ Yes ____ No

INVOICE INFORMATION
PO#
BILL TO: Rich Bergreen Geosyntec
SUBMISSION #: R0904612

SAMPLE RECEIPT: CONDITION/COOLER TEMP: 6°C CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature	Signature	Signature	Signature	Signature	Signature
Printed Name: R. Siebenmann	Printed Name: Gregory O. Esmenjian	Printed Name	Printed Name	Printed Name	Printed Name
Firm: Geosyntec	Firm: CAS	Firm	Firm	Firm	Firm
Date/Time: 15:15 8.14.09	Date/Time: 8-15-09 9:35	Date/Time	Date/Time	Date/Time	Date/Time

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

Cooler Receipt And Preservation Check Form

Project/Client GeoSyntec Submission Number R0904612

Cooler received on 8-15-09 by: KE **COURIER:** CAS UPS (FEDEX) VELOCITY CLIENT

1.	Were custody seals on outside of cooler?	(YES)	NO			
2.	Were custody papers properly filled out (ink, signed, etc.)?	(YES)	NO			
3.	Did all bottles arrive in good condition (unbroken)?	(YES)	NO			
4.	Did any VOA vials have significant* air bubbles?	YES	NO	(N/A)		
5.	Were **Ice** or **Ice packs** present?	(YES)	NO			
6.	Where did the bottles originate?	(CAS/ROC,)	CLIENT			
7.	Temperature of cooler(s) upon receipt:	6°				
	Is the temperature within 0° - 6° C?:	(Yes)	Yes	Yes	Yes	Yes
	If No, Explain Below	No	No	No	No	No

Date/Time Temperatures Taken: 8-15-09 @ 10:35

Thermometer ID: 161 / IR GUN#2 / (IR GUN#3) Reading From: (Temp Blank) / Sample Bottle

If out of Temperature, note packing/ice condition, Client Approval to Run Samples: _____

PC Secondary Review: KB 8/17/09

Cooler Breakdown: Date: 8/17/09 by: MRP

1.	Were all bottle labels complete (*i.e.* analysis, preservation, etc.)?	(YES)	NO
2.	Did all bottle labels and tags agree with custody papers?	(YES)	NO
3.	Were correct containers used for the tests indicated?	(YES)	NO
4.	Air Samples: Cassettes / Tubes Intact Canisters Pressurized Tedlar® Bags Inflated		(N/A)

Explain any discrepancies: _____

pH	Reagent	YES	NO	Lot Received	Exp
≥12	NaOH				
≤2	HNO_3				
≤2	H_2SO_4				
Residual Chlorine (-)	For TCN and Phenol			If present, contact PM to add ascorbic acid	
	$Na_2S_2O_3$	-	-		
	Zn Aceta	-	-		
	HCl	*	*		

Sample ID	Vol. Added	Lot Added	Final pH

*Not to be tested before analysis – pH tested and recorded by VOAs or GenChem on a separate worksheet

Yes = All samples OK

No = Samples were preserved at lab as listed

PM OK to Adjust: _____

Bottle lot numbers: _____

Other Comments:

PC Secondary Review: [signature] 8/17/09

*significant air bubbles are greater than 5-6 mm

H:\SMODOCS\Cooler Receipt 2.doc

CHAINS OF CUSTODY

INTERNAL CHAINS

Columbia Analytical Services — CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

SR #

CAS Contact

PAGE 1 OF 1

www.caslab.com — One Mustard St., Suite 250 • Rochester, NY 14609-0859(585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475

Project Name: Carus	Project Number: CWR1709
Project Manager: Rich Bergreen	Report CC: Joey McKinnon
Company/Address: Geosyntec Consultants	
134 N. LaSalle St. Suite 300	
Chicago IL, 60602	
Phone #: 312.658.0500	FAX#:
Sampler's Signature: Joey McKinnon	Sampler's Printed Name: Joey McKinnon

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

PRESERVATIVE: 2 2

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's ☐8260 ☐624 ☐CLP	GC/MS SVOA's ☐8270 ☐625 ☐CLP	GC VOA's ☐8021 ☐601/602	PESTICIDES ☐8081 ☐608 ☐CLP	PCB's ☐8082 ☐608 ☐CLP	METALS, TOTAL / Hardness (List in comments below)	METALS, DISSOLVED (List in comments below)	REMARKS/ ALTERNATE DESCRIPTION
OU1-SW-AS0411-090817	-001, -002	8.17.09	1420	SW	2						1	1	
OU1-SW-CS0410-090817	-003, -004	8.17.09	1450	SW	2						1	1	
OU1-GW-MW405-090817	-005	8.17.09	1535	GW	1 (2)						1		
OU1-GW-MW401B-090817	-006	8.17.09	1540	GW	1						1		
OU1-SW-AS0411-090818	-007, -008	8.18.09	0910	SW	2						1	1	
OU1-GW-MW405-090818	-009	8.18.09	1025	GW	1						1		
OU1-GW-MW401B-090818	-010	8.18.09	1030	GW	1						1		

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other _____

SPECIAL INSTRUCTIONS/COMMENTS
Metals
* Project Specified Metals List

See QAPP ☐

TURNAROUND REQUIREMENTS
____ RUSH (SURCHARGES APPLY)
____ 24 hr ____ 48 hr ____ 5 day
X STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
____ I. Results Only
____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III. Results + QC and Calibration Summaries
____ IV. Data Validation Report with Raw Data
____ V. Specialized Forms / Custom Report
Edata ____ Yes ____

INVOICE INFORMATION
PO#
BILL TO: Rich Bergreen
Geosyntec

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

R0904671
GeoSyntec Consultants
Carus Chemicals

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	
Signature: Joey McKinnon	Signature: Amy Hentschke	Signature	Signature	Signature	
Printed Name: Joey McKinnon	Printed Name: Amy Hentschke	Printed Name	Printed Name	Printed Name	Printed Name
Firm: Geosyntec	Firm: CAS	Firm	Firm	Firm	Firm
Date/Time: 8.18.09 1445	Date/Time: 8/19/09 940	Date/Time	Date/Time	Date/Time	Date/Time

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

Appendix G-4-1a: Data Validation Reports, COCs, Analytical Lab Reports
Matthiessen & Hegeler Zinc Site
Final Remedial Investigation Report

Cooler Receipt And Preservation Check Form

Project/Client GeoSyntec Submission Number R0904671

Cooler received on 8/19/09 by: AWA **COURIER:** CAS UPS (FEDEX) VELOCITY CLIENT

1.	Were custody seals on outside of cooler?	(YES)	NO	
2.	Were custody papers properly filled out (ink, signed, etc.)?	(YES)	NO	
3.	Did all bottles arrive in good condition (unbroken)?	(YES)	NO	
4.	Did any VOA vials have significant* air bubbles?	YES	NO	(N/A)
5.	Were **Ice** or **Ice packs** present?	(YES)	NO	
6.	Where did the bottles originate?	(CAS/ROC)	CLIENT	

7. Temperature of cooler(s) upon receipt:	4°				
Is the temperature within 0° - 6° C?:	(Yes)	Yes	Yes	Yes	Yes
If No, Explain Below	No	No	No	No	No

Date/Time Temperatures Taken: 8/19/09 1004

Thermometer ID: 161 / IR GUN#2 / (IR GUN#3) Reading From: Temp Blank / (Sample Bottle)

If out of Temperature, note packing/ice condition, Client Approval to Run Samples: _____

PC Secondary Review: AM 8/19/09

Cooler Breakdown: Date: 8/19/09 by: MKP

1.	Were all bottle labels complete (*i.e.* analysis, preservation, etc.)?	(YES)	NO	
2.	Did all bottle labels and tags agree with custody papers?	(YES)	NO	
3.	Were correct containers used for the tests indicated?	(YES)	NO	
4.	Air Samples: Cassettes / Tubes Intact	Canisters Pressurized	Tedlar® Bags Inflated	(N/A)

Explain any discrepancies: _____

pH	Reagent	YES	NO	Lot Received	Exp
≥12	NaOH				
≤2	HNO_3				
≤2	H_2SO_4				
Residual Chlorine (-)	For TCN and Phenol			If present, contact PM to add ascorbic acid	
	$Na_2S_2O_3$	-	-		
	Zn Aceta	-	-		
	HCl	*	*		

Sample ID	Vol. Added	Lot Added	Final pH

*Not to be tested before analysis – pH tested and recorded by VOAs or GenChem on a separate worksheet

Yes = All samples OK

No = Samples were preserved at lab as listed

PM OK to Adjust: _____

Bottle lot numbers: _____

Other Comments:

PC Secondary Review: _____

*significant air bubbles are greater than 5-6 mm

Columbia Analytical Services — CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

SR #

CAS Contact

PAGE 1 OF 1

www.caslab.com — One Mustard St., Suite 250 • Rochester, NY 14609-0859(585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475

Project Name: Carus	Project Number: CWR1709
Project Manager: Rich Bergreen	Report CC: Joey McKinnon
Company/Address: 134 N. LaSalle St. Suite 300, Chicago, IL 60602	
Phone #: 312.416.3925	FAX#
Sampler's Signature: Joey McKinnon	Sampler's Printed Name: Joey McKinnon

ANALYSIS REQUESTED *(Include Method Number and Container Preservative)*

PRESERVATIVE: 2 2

Preservative Key: 0. NONE; 1. HCL; 2. HNO_3; 3. H_2SO_4; 4. NaOH; 5. Zn. Acetate; 6. MeOH; 7. $NaHSO_4$; 8. Other _____

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's ☐8260 ☐624 ☐CLP	GC/MS SVOA's ☐8270 ☐625 ☐CLP	GC VOA's ☐8021 ☐601/602	PESTICIDES ☐8081 ☐608 ☐CLP	PCB's ☐8082 ☐608 ☐CLP	METALS, TOTAL / Hardness (List in comments below)	METALS, DISSOLVED (List in comments below)	REMARKS/ ALTERNATE DESCRIPTION
~~OU1-GW-05~~ (5m)													
OU1-GW-ISW001-0908	-011, -016	8.19.09	1925	GW	2						1	1	
OU1-GW-ISW002-0908	-012, -017	8.20.09	1115	GW	2						1	1	
OU1-SW-AS0411-090820	-013, -018	8.20.09	1215	SW	2						1	1	
OU1-GW-MW405-090820	-014, ~~-019~~ -020	8.20.09	1350	GW	2						1	+0m	
OU1-GW-MW401R-090820	-015, ~~-021~~ -030	8.20.09	1355	GW	2						1	+0m 9/3/09	

SPECIAL INSTRUCTIONS/COMMENTS

Metals

* Project Specified metals list.

See QAPP ☒

TURNAROUND REQUIREMENTS

____ RUSH (SURCHARGES APPLY)

____ 24 hr ____ 48 hr ____ 5 day

X STANDARD

REQUESTED FAX DATE

REQUESTED REPORT DATE

REPORT REQUIREMENTS

____ I. Results Only

____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)

____ III. Results + QC and Calibration Summaries

____ IV. Data Validation Report with Raw Data

____ V. Specialized Forms / Custom Report

Edata ____ Yes ____

INVOICE INFORMATION

PO# Rich Bergreen

BILL TO: Geosyntec

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

R0904671

GeoSyntec Consultants
Carus Chemicals

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	
Signature: Joey McKinnon	Signature: Amy Hentschke	Signature	Signature	Signature	
Printed Name: Joey McKinnon	Printed Name: Amy Hentschke	Printed Name	Printed Name	Printed Name	Printed Name
Firm: Geosyntec Consultants	Firm: CAS	Firm	Firm	Firm	Firm
Date/Time: 8.20.09 / 1500	Date/Time: 8/21/09 945	Date/Time	Date/Time	Date/Time	Date/Time

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

Appendix G-4-1a: Data Validation Reports, COCs, Analytical Lab Reports
Matthiessen & Hegeler Zinc Site
Final Remedial Investigation Report

Cooler Receipt And Preservation Check Form

Project/Client Carus/Geosyntec Submission Number R09-4671

Cooler received on 8/21/09 by: AHH **COURIER:** CAS UPS (FEDEX) VELOCITY CLIENT

1.	Were custody seals on outside of cooler?	(YES)	NO			
2.	Were custody papers properly filled out (ink, signed, etc.)?	(YES)	NO			
3.	Did all bottles arrive in good condition (unbroken)?	(YES)	NO			
4.	Did any VOA vials have significant* air bubbles?	YES	NO	(N/A)		
5.	Were **Ice** or **Ice packs** present?	(YES)	NO			
6.	Where did the bottles originate?	(CAS/ROC,)	CLIENT			
7.	Temperature of cooler(s) upon receipt:	3°				
	Is the temperature within 0° - 6° C?:	(Yes)	Yes	Yes	Yes	Yes
	If No, Explain Below	No	No	No	No	No

Date/Time Temperatures Taken: 8/21/09 951

Thermometer ID: 161 / IR GUN#2 / IR GUN#3 Reading From: Temp Blank / Sample Bottle

If out of Temperature, note packing/ice condition, Client Approval to Run Samples: _____

PC Secondary Review: [illegible] 8/24/09

Cooler Breakdown: Date: 8/21/09 by: AHH

1.	Were all bottle labels complete (*i.e.* analysis, preservation, etc.)?	(YES)	NO	
2.	Did all bottle labels and tags agree with custody papers?	AHH 8/21/09 ~~YES~~	(NO)	*
3.	Were correct containers used for the tests indicated?	(YES)	NO	
4.	Air Samples: Cassettes / Tubes Intact Canisters Pressurized Tedlar® Bags Inflated			(N/A)

Explain any discrepancies: _____

pH	Reagent	YES	NO	Lot Received	Exp	Sample ID	Vol. Added	Lot Added	Final pH
≥12	NaOH								
≤2	HNO_3	✓		BDB26936	6/10				
≤2	H_2SO_4								
Residual Chlorine (-)	For TCN and Phenol			If present, contact PM to add ascorbic acid					
	$Na_2S_2O_3$	-	-						
	Zn Aceta	-	-						
	HCl	*	*						

*Not to be tested before analysis – pH tested and recorded by VOAs or GenChem on a separate worksheet

Yes = All samples OK

No = Samples were preserved at lab as listed

PM OK to Adjust: _____

Bottle lot numbers: Q80809-2W, 0368S5

Other Comments:

* No dissolved location bottle for 021-GW-MW401B-090820 & 021-GW-MW405-090820

PC Secondary Review: [illegible] 8/24/09

*significant air bubbles are greater than 5-6 mm

H:\SMODOCS\Cooler Receipt 2.doc

CHAINS OF CUSTODY

INTERNAL CHAINS

Columbia Analytical Services — CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

SR #

CAS Contact

www.caslab.com One Mustard St., Suite 250 • Rochester, NY 14609-0859(585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 PAGE 1 OF 9

Project Name: Carus	Project Number:
Project Manager: Deb Patton	Report CC: Julia Caprio
Company/Address: GeoSyntec Consultants	
2240 Sutherland Ave, Suite 107	
Knoxville, TN 391919	
Phone #: 865-330-0037	FAX#:
Sampler's Signature:	Sampler's Printed Name: Scot Gross

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

PRESERVATIVE: 2

NUMBER OF CONTAINERS

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	GC/MS VOA's ☐ 8260 ☐ 624 ☐ CLP	GC/MS SVOA's ☐ 8270 ☐ 625 ☐ CLP	GC VOA's ☐ 8021 ☐ 601/602	PESTICIDES ☐ 8081 ☐ 608 ☐ CLP	PCB's ☐ 8082 ☐ 608 ☐ CLP	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	REMARKS/ ALTERNATE DESCRIPTION
~~LRS412S-R-NF-1~~ LRS412S-R-NF-1		~~9/1/09~~ 10/1/09	0906	AQ						X		Date 10/1/09
LRS412S-R-NF-2		10/1/09	0907									
LRS412S-R-NF-3			0908									
LRS412S-R-F-1			0906									
LRS412S-R-F-2			0907									
LRS412S-R-F-3			0908									
LRS413S-R-NF-1			0909									
LRS413S-R-NF-2			0910									
LRS413S-R-NF-3			0911									
LRS413S-R-F-1			0909									

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other

SPECIAL INSTRUCTIONS/COMMENTS
Metals

Carus list of metals

☐ See QAPP

TURNAROUND REQUIREMENTS
___ RUSH (SURCHARGES APPLY)
___ 24 hr ___ 48 hr ___ 5 day
X STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
___ I. Results Only
___ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
___ III. Results + QC and Calibration Summaries
X IV. Data Validation Report with I
___ V. Specialized Forms / Custom
Edata ___ Yes ___

INVOICE INFORMATION
PO#
BILL TO: GeoSyntec Cons.

R0905773
GeoSyntec Consultants
Carus Chemicals

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature:	Signature: Mark R Peters	Signature:	Signature:	Signature:	Signature:
Printed Name: Scot Gross	Printed Name: Mark R. Peters	Printed Name:	Printed Name:	Printed Name:	Printed Name:
Firm: TestAmerica	Firm: CAS	Firm:	Firm:	Firm:	Firm:
Date/Time: 10-7-09 14:00	Date/Time: 10/8/09 1000	Date/Time:	Date/Time:	Date/Time:	Date/Time:

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

Columbia Analytical Services — CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

www.casiab.com — One Mustard St., Suite 250 • Rochester, NY 14609-0859(585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 — PAGE 2 OF 9

SR #

CAS Contact

Project Name: Carus	Project Number: —
Project Manager: Deb Patton	Report QC: Julia Caprio
Company/Address: GeoSyntec Consultants 2240 Sutherland Ave Suite 107 Knoxville TN 37919	
Phone #: 865-330-0037	FAX#: —
Sampler's Signature:	Sampler's Printed Name: Scot Goss

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

PRESERVATIVE: 2

NUMBER OF CONTAINERS

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	METALS, TOTAL (List in comments below)	REMARKS/ ALTERNATE DESCRIPTION
LRS413S-R-F-2		10/1/09	0910	AQ	X	
LRS413S-R-F-3			0911			
LRS414S-R-NF-1			0911			
LRS414S-R-NF-2			0912			
LRS414S-R-NF-3			0913			
LRS414S-R-F-1			0911			
LRS414S-R-F-2			0912			
LRS414S-R-F-3			0913			
LRS412S-S-NF-1			0917			
LRS412S-S-NF-2			0918			

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other ____

GC/MS VOA's ☐ 8260 ☐ 624 ☐ CLP
GC/MS SVOA's ☐ 8270 ☐ 625 ☐ CLP
GC VOA's ☐ 8021 ☐ 601/602
PESTICIDES ☐ 8081 ☐ 608 ☐ CLP
PCB's ☐ 8082 ☐ 608 ☐ CLP
METALS, TOTAL (List in comments below)
METALS, DISSOLVED (List in comments below)

SPECIAL INSTRUCTIONS/COMMENTS
Metals
Carus list of metals

See QAPP ☐

TURNAROUND REQUIREMENTS
____ RUSH (SURCHARGES APPLY)
____ 24 hr ____ 48 hr ____ 5 day
X STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
____ I. Results Only
____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III. Results + QC and Calibration Summaries
X IV. Data Validation Report wit'
____ V. Specialized Forms / Custo
Edata ____ Yes ____

INVOICE INFORMATION
PO#
BILL TO: GeoSyntec Cons

R0905773
GeoSyntec Consultants
Carus Chemicals

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature:	Signature:	Signature:	Signature:	Signature:	Signature:
Printed Name: Scot Goss	Printed Name: Mark R. Peters	Printed Name:	Printed Name:	Printed Name:	Printed Name:
Firm: TestAmerica	Firm: CAS	Firm:	Firm:	Firm:	Firm:
Date/Time: 10-7-09 14:00	Date/Time: 10/8/09 1400	Date/Time:	Date/Time:	Date/Time:	Date/Time:

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

Cooler Receipt And Preservation Check Form

Project/Client Geosyntec Submission Number R09-5773

Cooler received on 10/8/09 by: MRP COURIER: CAS UPS (FEDEX) VELOCITY CLIENT

1.	Were custody seals on outside of cooler?	(YES)	NO		
2.	Were custody papers properly filled out (ink, signed, etc.)?	YES	NO		
3.	Did all bottles arrive in good condition (unbroken)?	YES	NO		
4.	Did any VOA vials have significant* air bubbles?	YES	(NO)	N/A	
5.	Were Ice or Ice packs present?	(YES)	(NO)	no ice	
6.	Where did the bottles originate?	(CAS/ROC)	CLIENT		
7.	Temperature of cooler(s) upon receipt:	13.6°	14.4°		
	Is the temperature within 0° - 6° C?:	Yes	Yes	Yes	Yes	Yes
	If No, Explain Below	(No)	(No)	No	No	No

Date/Time Temperatures Taken: 10/8/09 @ 11:02

Thermometer ID: 161 / IR GUN#2 / (IR GUN#3) Reading From: (Temp Blank) / Sample Bottle

If out of Temperature, note packing/ice condition, Client Approval to Run Samples: ok per analysis

PC Secondary Review: [signature]

Cooler Breakdown: Date: 10/8/09 by: MRP

1.	Were all bottle labels complete (*i.e.* analysis, preservation, etc.)?	(YES)	NO
2.	Did all bottle labels and tags agree with custody papers?	(YES)	NO
3.	Were correct containers used for the tests indicated?	(YES)	NO
4.	Air Samples: Cassettes / Tubes Intact Canisters Pressurized Tedlar® Bags Inflated		(N/A)

Explain any discrepancies: _____

pH	Reagent	YES	NO	Lot Received	Exp
≥12	NaOH				
≤2	HNO_3	✓		Client (*)	
≤2	H_2SO_4				
Residual Chlorine (-)	For TCN and Phenol			If present, contact PM to add ascorbic acid	
	$Na_2S_2O_3$	-	-		
	Zn Aceta	-	-		
	HCl	*	*		

Sample ID	Vol. Added	Lot Added	Final pH

*Not to be tested before analysis – pH tested and recorded by VOAs or GenChem on a separate worksheet

Yes = All samples OK

No = Samples were preserved at lab as listed

PM OK to Adjust: _____

Bottle lot numbers: _____

Other Comments: (*)

PC Secondary Review: [signature]

*significant air bubbles are greater than 5-6 mm

CHAINS OF CUSTODY

INTERNAL CHAINS

Columbia Analytical Services — CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

SR #

CAS Contact

www.caslab.com One Mustard St., Suite 250 • Rochester, NY 14609-0859(585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475

Project Name: Carus	Project Number: —
Project Manager: Deb Patton	Report CC: Julia Caprio
Company/Address: GeoSyntec Consultants 2240 Sutherland Ave, Suite 107 Knoxville TN 37919	
Phone#: 865-330-0037	FAX#:
Sampler's Signature:	Sampler's Printed Name: Scot Goss

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

PRESERVATIVE: 2

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's 8260 624 CLP	GC/MS SVOA's 8270 625 CLP	GC VOA's 8021 601/602	PESTICIDES 8081 608 CLP	PCB's 8082 608 CLP	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	REMARKS/ ALTERNATE DESCRIPTION
LRS4125-S-NF-3		10/1/09	0919	AQ							X		
~~LRS4~~ LRS4125-S-F-1			0917										
LRS4125-S-F-2			0918										
LRS4125-S-F-3			0919										
LRS4135-S-NF-1			0919										
LRS4135-S-NF-2			0920										
LRS4135-S-NF-3			0921										
LRS4135-S-F-1			0919										
LRS4135-S-F-2			0920										
LRS4135-S-F-3			0921										

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other _____

SPECIAL INSTRUCTIONS/COMMENTS
Metals
Carus list of metals

See QAPP ☐

TURNAROUND REQUIREMENTS
___ RUSH (SURCHARGES APPLY)
___ 24 hr ___ 48 hr ___ 5 day
X STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
___ I. Results Only
___ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
___ III. Results + QC and Calibration Summaries
X IV. Data Validation Report with Raw
___ V. Specialized Forms / Custom Rep
Edata ___ Yes ___ No

INVOICE INFORMATION
PO#
BILL TO: GeoSyntec Cons.

R0905776
GeoSyntec Consultants
Carus Chemicals

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature:	Signature: Mark R. Peters	Signature	Signature	Signature	Signature
Printed Name: Scot Goss	Printed Name: Mark R. Peters	Printed Name	Printed Name	Printed Name	Printed Name
Firm: Test America	Firm: CAS	Firm	Firm	Firm	Firm
Date/Time: 10-7-09 14:00	Date/Time: 10/8/09 1000	Date/Time	Date/Time	Date/Time	Date/Time

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

Appendix G-4-1a: Data Validation Reports, COCs, Analytical Lab Reports
Final Remedial Investigation Report
Matthiessen & Hegeler Zinc Site

Columbia Analytical Services™ CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

www.caslab.com One Mustard St., Suite 250 • Rochester, NY 14609-0859(585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 PAGE 4 OF 9

SR #

CAS Contact

Project Name: Carus	Project Number:
Project Manager: Deb Patton	Report CC: Julia Caprio
Company/Address: Geosyntec Consultants 2240 Sutherland Ave, Suite 107 Knoxville TN 37919	
Phone #: 865-330-0037	FAX#:
Sampler's Signature:	Sampler's Printed Name: Scott Gross

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

PRESERVATIVE: 2

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's ☐ 8260 ☐ 624 ☐ CLP	GC/MS SVOA's ☐ 8270 ☐ 625 ☐ CLP	GC VOA's ☐ 8021 ☐ 601/602	PESTICIDES ☐ 8081 ☐ 608 ☐ CLP	PCB's ☐ 8082 ☐ 608 ☐ CLP	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	REMARKS/ ALTERNATE DESCRIPTION
LRS4145-S-NF-1		10/1/09	0922	AQ							X		
LRS4145-S-NF-2			0923										
LRS4145-S-NF-3			0923										
LRS4145-S-F-1			0922										
LRS4145-S-F-2			0923										
LRS4145-S-F-3			0923										
SLP4155-R-NF-1		10/2/09	0850										
SLP4155-R-NF-2			0851										
SLP4155-R-NF-3			0852										
SLP4155-R-F-1			0850										

Preservative Key
0. NONE
1. HCl
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other _____

SPECIAL INSTRUCTIONS/COMMENTS
Metals
Carus list of metals

See QAPP ☐

TURNAROUND REQUIREMENTS
____ RUSH (SURCHARGES APPLY)
____ 24 hr ____ 48 hr ____ 5 day
X STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
____ I. Results Only
____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III. Results + QC and Calibration Summaries
X IV. Data Validation Report
____ V. Specialized Forms / Cus
Edata ____ Yes ____

INVOICE INFORMATION
PO#
BILL TO: Geosyntec Consultants

R0905776
GeoSyntec Consultants
Carus Chemicals

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature:	Signature:	Signature:	Signature:	Signature:	Signature:
Printed Name: Test America	Printed Name: Mark R. Peters	Printed Name:	Printed Name:	Printed Name:	Printed Name:
Firm:	Firm: CAS	Firm:	Firm:	Firm:	Firm:
Date/Time: 10-7-09 14:00	Date/Time: 10/8/09 1200	Date/Time:	Date/Time:	Date/Time:	Date/Time:

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

Cooler Receipt And Preservation Check Form

Project/Client Geosyntec Submission Number R0905776.

Cooler received on 10/8/09 by: MRP COURIER: CAS UPS FEDEX VELOCITY CLIENT

1. Were custody seals on outside of cooler? YES NO
2. Were custody papers properly filled out (ink, signed, etc.)? YES NO
3. Did all bottles arrive in good condition (unbroken)? YES NO
4. Did any VOA vials have significant* air bubbles? YES MRP NO N/A
5. Were ~~Ice~~ MRP or Ice packs present? YES NO no ice
6. Where did the bottles originate? CAS/ROC CLIENT
7. Temperature of cooler(s) upon receipt: 13.6° 14.4° ____ ____ ____

Is the temperature within 0° - 6° C?: Yes Yes Yes Yes Yes

If No, Explain Below No No No No No

Date/Time Temperatures Taken: 10/8/09 @ 11:02

Thermometer ID: 161 / IR GUN#2 / IR GUN#3 Reading From: Temp Blank / Sample Bottle

If out of Temperature, note packing/ice condition, Client Approval to Run Samples: OK per analysis

PC Secondary Review: [signature]

Cooler Breakdown: Date : 10/8/09 by: MRP

1. Were all bottle labels complete (*i.e.* analysis, preservation, etc.)? YES NO
2. Did all bottle labels and tags agree with custody papers? YES NO
3. Were correct containers used for the tests indicated? YES NO
4. Air Samples: Cassettes / Tubes Intact Canisters Pressurized Tedlar® Bags Inflated N/A

Explain any discrepancies: ____

pH	Reagent	YES	NO	Lot Received	Exp	Sample ID	Vol. Added	Lot Added	Final pH
≥12	NaOH								
≤2	HNO_3								
≤2	H_2SO_4								
Residual Chlorine (-)	For TCN and Phenol			If present, contact PM to add ascorbic acid					
	$Na_2S_2O_3$	-	-						
	Zn Aceta	-	-						
	HCl	*	*						

*Not to be tested before analysis – pH tested and recorded by VOAs or GenChem on a separate worksheet

Yes = All samples OK

No = Samples were preserved at lab as listed

PM OK to Adjust: ____

Bottle lot numbers: ____

Other Comments:

PC Secondary Review: [signature]

*significant air bubbles are greater than 5-6 mm

H:\SMODOCS\Cooler Receipt 2.doc

CHAINS OF CUSTODY

INTERNAL CHAINS

Columbia Analytical Services — CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

www.caslab.com — One Mustard St., Suite 250 • Rochester, NY 14609-0859(585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 — PAGE 5 OF 9

SR #

CAS Contact

Project Name: Carus	Project Number: —
Project Manager: Deb Patton	Report CC: Julia Caprio
Company/Address: GeoSyntec Consultants 2240 Sutherland Ave Suite 107 Knoxville TN 37919	
Phone #: 865-330-0037	FAX#: —
Sampler's Signature:	Sampler's Printed Name: Scot Goss

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

PRESERVATIVE: 2

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's ☐8260 ☐624 ☐CLP	GC/MS SVOA's ☐8270 ☐625 ☐CLP	GC VOA's ☐8021 ☐601/602	PESTICIDES ☐8081 ☐608 ☐CLP	PCB's ☐8082 ☐608 ☐CLP	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	REMARKS/ ALTERNATE DESCRIPTION
SRL SLP4155-R-F-2		10/2/09	0851	AQ							X		
SLP4155-R-F-3			0852										
SLP4165-R-NF-1			0853										
SLP4165-R-NF-2			0854										
SLP4165-R-NF-3			0854										
SLP4165-R-F-1			0853										
SLP4165-R-F-2			0854										
SLP4165-R-F-3			0854										
SLP4175-R-NF-1			0855										
SLP4175-R-NF-2			0856										

Preservative Key: 0. NONE; 1. HCL; 2. HNO_3; 3. H_2SO_4; 4. NaOH; 5. Zn. Acetate; 6. MeOH; 7. $NaHSO_4$; 8. Other ____

SPECIAL INSTRUCTIONS/COMMENTS

Metals

Carus list of metals

See QAPP ☐

TURNAROUND REQUIREMENTS

____ RUSH (SURCHARGES APPLY)

____ 24 hr ____ 48 hr ____ 5 day

X STANDARD

REQUESTED FAX DATE

REQUESTED REPORT DATE

REPORT REQUIREMENTS

____ I. Results Only

____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)

____ III. Results + QC and Calibration Summaries

X IV. Data Validation Report wit

____ V. Specialized Forms / Custo

Edata ____ Yes ____

INVOICE INFORMATION

PO#

BILL TO: Geosyntec Cons.

R0905777

GeoSyntec Consultants
Carus Chemicals

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature:	Signature: Mark R Peters	Signature	Signature	Signature	Signature
Printed Name: Scot Goss	Printed Name: Mark R Peters	Printed Name	Printed Name	Printed Name	Printed Name
Firm: Test America	Firm: CAS	Firm	Firm	Firm	Firm
Date/Time: 10-7-09 14:00	Date/Time: 10/8/09 1000	Date/Time	Date/Time	Date/Time	Date/Time

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

Columbia Analytical Services

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

SR #

CAS Contact

www.caslab.com

One Mustard St., Suite 250 • Rochester, NY 14609-0859(585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 PAGE 6 OF 9

Project Name: Carus	Project Number:
Project Manager: Deb Patton	Report CC: Julia Capris
Company/Address: Geosyntec Consultants	
2240 Sutherland Ave, Suite 107	
Knoxville TN 37919	
Phone#: 865-330-0037	FAX#:
Sampler's Signature:	Sampler's Printed Name: Scot Gross

ANALYSIS REQUESTED *(Include Method Number and Container Preservative)*

PRESERVATIVE: 2

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's ☐ 8260 ☐ 624 ☐ CLP	GC/MS SVOA's ☐ 8270 ☐ 625 ☐ CLP	GC VOA's ☐ 8021 ☐ 601/602	PESTICIDES ☐ 8081 ☐ 608 ☐ CLP	PCB's ☐ 8082 ☐ 608 ☐ CLP	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	REMARKS/ ALTERNATE DESCRIPTION
SLP4175-R-NF-3		10/2/09	0857	A-Q							X		
SLP4175-R-F-1			0855										
SLP4175-R-F-2			0856										
SLP4175-R-F-3			0857										
SLP4155-S-NF-1			0901										
SLP4155-S-NF-2			0902										
SLP4155-S-NF-3			0902										
SLP4155-S-F-1			0901										
SLP4155-S-F-2			0902										
SLP4155-S-F-3			0902										

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other _____

SPECIAL INSTRUCTIONS/COMMENTS
Metals
Carus list of metals

See QAPP ☐

TURNAROUND REQUIREMENTS
____ RUSH (SURCHARGES APPLY)
____ 24 hr ____ 48 hr ____ 5 day
X STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
____ I. Results Only
____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III. Results + QC and Calibration Summaries
X IV. Data Validation Report wit
____ V. Specialized Forms / Custo
Edata ____ Yes ____

INVOICE INFORMATION
PO#
BILL TO: Geosyntec Cons

R0905777
GeoSyntec Consultants
Carus Chemicals

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature:	Signature: Mark R. Peters	Signature:	Signature:	Signature:	Signature:
Printed Name: Scot Gross	Printed Name: Mark R. Peters	Printed Name:	Printed Name:	Printed Name:	Printed Name:
Firm: TestAmerica	Firm: CAS	Firm:	Firm:	Firm:	Firm:
Date/Time: 10-7-09 14:00	Date/Time: 10/8/09 1000	Date/Time:	Date/Time:	Date/Time:	Date/Time:

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

Cooler Receipt And Preservation Check Form

Project/Client Geosyntec Submission Number R0905777

Cooler received on 10/8/09 by: MRP COURIER: CAS UPS (FEDEX) VELOCITY CLIENT

1.	Were custody seals on outside of cooler?	(YES) NO				
2.	Were custody papers properly filled out (ink, signed, etc.)?	(YES) NO				
3.	Did all bottles arrive in good condition (unbroken)?	(YES) NO				
4.	Did any VOA vials have significant* air bubbles?	YES (NO) N/A				
5.	Were Ice or Ice packs present?	(YES) NO				
6.	Where did the bottles originate?	(CAS/ROC) CLIENT				
7.	Temperature of cooler(s) upon receipt:	13.6°	14.4°			
	Is the temperature within 0° - 6° C?:	Yes	Yes	Yes	Yes	Yes
	If No, Explain Below	(No)	(No)	No	No	No

Date/Time Temperatures Taken: 10/8/09 @ 11:02

Thermometer ID: 161 / IR GUN#2 / (IR GUN#3) Reading From: (Temp Blanks) / Sample Bottle

If out of Temperature, note packing/ice condition, Client Approval to Run Samples: per analyses

PC Secondary Review: [signature]

Cooler Breakdown: Date: 10/8/09 by: MRP

1.	Were all bottle labels complete (*i.e.* analysis, preservation, etc.)?	(YES)	NO
2.	Did all bottle labels and tags agree with custody papers?	(YES)	NO
3.	Were correct containers used for the tests indicated?	(YES)	NO
4.	Air Samples: Cassettes / Tubes Intact Canisters Pressurized Tedlar® Bags Inflated		(N/A)

Explain any discrepancies:

pH	Reagent	YES	NO	Lot Received	Exp
≥12	NaOH		✓		
≤2	HNO_3	✓		BDB2695C	9/10
≤2	H_2SO_4				
Residual Chlorine (-)	For TCN and Phenol			If present, contact PM to add ascorbic acid	
	$Na_2S_2O_3$	-	-		
	Zn Aceta	-	-		
	HCl	*	*		

Sample ID	Vol. Added	Lot Added	Final pH

*Not to be tested before analysis – pH tested and recorded by VOAs or GenChem on a separate worksheet

Yes = All samples OK

No = Samples were preserved at lab as listed

PM OK to Adjust: _____

Bottle lot numbers:

Other Comments:

PC Secondary Review: [signature]

*significant air bubbles are greater than 5-6 mm

CHAINS OF CUSTODY

INTERNAL CHAINS

Columbia Analytical Services™ CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

www.caslab.com One Mustard St., Suite 250 • Rochester, NY 14609-0859(585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 PAGE 7 OF 9

SR #

CAS Contact

Project Name: Carus	Project Number: —
Project Manager: Deb Pelton	Report CC: Julie Caprio
Company/Address: Geosyntec Consultants	
Same as previous	
Phone #: previous	FAX#: —
Sampler's Signature:	Sampler's Printed Name: Scot Goss

ANALYSIS REQUESTED *(Include Method Number and Container Preservative)*

PRESERVATIVE: 2

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other ____

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's ☐ 8260 ☐ 624 ☐ CLP	GC/MS SVOA's ☐ 8270 ☐ 625 ☐ CLP	GC VOA's ☐ 8021 ☐ 601/602	PESTICIDES ☐ 8081 ☐ 608 ☐ CLP	PCB's ☐ 8082 ☐ 608 ☐ CLP	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	REMARKS/ ALTERNATE DESCRIPTION
SLP4165-S-NF-1		10/2/09	0903	AQ							X		
SLP4165-S-NF-2			0904										
SLP4165-S-NF-R3			0905										
SLP4165-S-F-1			0903										
SLP4165-S-F-2			0904										
SLP4165-S-F-3			0905										
SLP4175-S-NF-1			0916										
SLP4175-S-NF-2			0917										
SLP4175-S-NF-3			0918										
SLP4175-S-F-1			0916										

SPECIAL INSTRUCTIONS/COMMENTS
Metals
Carus list of metals

See QAPP ☐

TURNAROUND REQUIREMENTS
____ RUSH (SURCHARGES APPLY)
____ 24 hr ____ 48 hr ____ 5 day
✓ STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
____ I. Results Only
____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III. Results + QC and Calibration Summaries
✓ IV. Data Validation Report with F
____ V. Specialized Forms / Custom I
Edata ____ Yes ____

INVOICE INFORMATION
PO#
BILL TO: Geosyntec Cons

R0905779
GeoSyntec Consultants
Carus Chemicals

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature:	Signature: Mark R Peters	Signature:	Signature:	Signature:	Signature:
Printed Name: Scot Goss	Printed Name: Mark R Peters	Printed Name:	Printed Name:	Printed Name:	Printed Name:
Firm: Test America	Firm: CAS	Firm:	Firm:	Firm:	Firm:
Date/Time: 10-7-09 14:00	Date/Time: 10/8/09 1000	Date/Time:	Date/Time:	Date/Time:	Date/Time:

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

Columbia Analytical Services — CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

SR #

CAS Contact

www.caslab.com One Mustard St., Suite 250 • Rochester, NY 14609-0859(585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 PAGE 8 OF 9

Project Name: Carus	Project Number: —
Project Manager: Bob Patton	Report CC: Julia Caprio
Company/Address: GeoSyntec Consultants	
80 Pruvors	
Phone #	FAX#
Sampler's Signature	Sampler's Printed Name: Scot Gross

ANALYSIS REQUESTED *(Include Method Number and Container Preservative)*

PRESERVATIVE: 2

NUMBER OF CONTAINERS

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	GC/MS VOA's ☐ 8260 ☐ 624 ☐ CLP	GC/MS SVOA's ☐ 8270 ☐ 625 ☐ CLP	GC VOA's ☐ 8021 ☐ 601/602	PESTICIDES ☐ 8081 ☐ 608 ☐ CLP	PCB's ☐ 8082 ☐ 608 ☐ CLP	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	REMARKS/ ALTERNATE DESCRIPTION
SLP4175-S-F-2		10/2/09	0917	AQ						X		
SLP4175-S-F-3		↓	0918									
River Water-NF-1		10/1/09	0903									
River Water-NF-2		↓	0904									
River Water-NF-3		10/2/09	0849									
River Water-F-1		10/1/09	0903									
River Water-F-2		↓	0904									
River Water-F-3		10/2/09	0849									
SPLP-NF-D-1		10/1/09	1055									
SPLP-F-D-1		↓	1055	↓						↓		

Preservative Key
0. NONE
1. HCl
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other ____

SPECIAL INSTRUCTIONS/COMMENTS
Metals
Carus list of metals

See QAPP ☐

TURNAROUND REQUIREMENTS
____ RUSH (SURCHARGES APPLY)
____ 24 hr ____ 48 hr ____ 5 day
X STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
____ I. Results Only
____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III. Results + QC and Calibration Summaries
X IV. Data Validation Report with Raw D
____ V. Specialized Forms / Custom Repo
Edata ____ Yes ____ No

INVOICE INFORMATION
PO#
BILL TO: GeoSyntec Cons.

R0905779
GeoSyntec Consultants
Carus Chemicals

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature: Scot Gross	Signature: Mark R Peters	Signature	Signature	Signature	Signature
Printed Name: Test America	Printed Name: Mark R Peters	Printed Name	Printed Name	Printed Name	Printed Name
Firm	Firm: CAS	Firm	Firm	Firm	Firm
Date/Time: 10-7-09 14:00	Date/Time: 10/8/09 1000	Date/Time	Date/Time	Date/Time	Date/Time

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

Appendix G-4-1a: Data Validation Reports, COCs, Analytical Lab Reports
Matthiessen & Hegeler Zinc Site
Final Remedial Investigation Report

Columbia Analytical Services™ CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

SR #

CAS Contact

www.caslab.com One Mustard St., Suite 250 • Rochester, NY 14609-0859(585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 PAGE 9 OF 9

Project Name: Carus	Project Number:
Project Manager: Deb Patton	Report CC: Julia Capria
Company/Address: Geosyntec Consultants Previous	
Phone #	FAX#
Sampler's Signature:	Sampler's Printed Name: Scot Gross

ANALYSIS REQUESTED *(Include Method Number and Container Preservative)*

PRESERVATIVE: 2

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's ☐ 8260 ☐ 624 ☐ CLP	GC/MS SVOA's ☐ 8270 ☐ 625 ☐ CLP	GC VOA's ☐ 8021 ☐ 601/602	PESTICIDES ☐ 8081 ☐ 608 ☐ CLP	PCB's ☐ 8082 ☐ 608 ☐ CLP	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	REMARKS/ ALTERNATE DESCRIPTION
SPLP-NF-0-2		10/2/09	0900	AQ							X		Archive
River Water Nonf. Hered		10/1/09	1055	↓							↓		
River Water F. Hered		↓	1055	↓							↓		

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other _____

MW 10-7-09

SPECIAL INSTRUCTIONS/COMMENTS
Metals
Carus list of metals

See QAPP ☐

TURNAROUND REQUIREMENTS
____ RUSH (SURCHARGES APPLY)
____ 24 hr ____ 48 hr ____ 5 day
X STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
____ I. Results Only
____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III. Results + QC and Calibration Summaries
X IV. Data Validation Report with Raw Data
____ V. Specialized Forms / Custom Report
Edata ____ Yes ____ No

INVOICE INFORMATION
PO#
BILL TO: Geosyntec Cons
SUBMISSION #: R9-5779

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature:	Signature: Mark R. Peters	Signature	Signature	Signature	Signature
Printed Name: Scot Gross	Printed Name: Mark R. Peters	Printed Name	Printed Name	Printed Name	Printed Name
Firm: TestAmerica	Firm: CAS	Firm	Firm	Firm	Firm
Date/Time: 10.7.09 14:00	Date/Time: 10/8/09 1000	Date/Time	Date/Time	Date/Time	Date/Time

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

Cooler Receipt And Preservation Check Form

Project/Client Geosyntec Submission Number R0905779

Cooler received on 10/8/09 by: MRP COURIER: CAS UPS FEDEX VELOCITY CLIENT

1.	Were custody seals on outside of cooler?	YES	NO			
2.	Were custody papers properly filled out (ink, signed, etc.)?	YES	NO			
3.	Did all bottles arrive in good condition (unbroken)?	YES	NO			
4.	Did any VOA vials have significant* air bubbles?	YES	NO	N/A		
5.	Were Ice or Ice packs present?	YES	NO	no ice		
6.	Where did the bottles originate?	CAS/ROC	CLIENT			
7.	Temperature of cooler(s) upon receipt:	13.6°	14.4°			
	Is the temperature within 0° - 6° C?:	Yes	Yes	Yes	Yes	Yes
	If No, Explain Below	No	No	No	No	No

Date/Time Temperatures Taken: 10/8/09 @ 11:02

Thermometer ID: 161 / IR GUN#2 / IR GUN#3 Reading From: Temp Blank / Sample Bottle

If out of Temperature, note packing/ice condition, Client Approval to Run Samples: ok per analysis

PC Secondary Review: Dawn

Cooler Breakdown: Date: 10/8/09 by: MRP

1.	Were all bottle labels complete (*i.e.* analysis, preservation, etc.)?	YES	NO
2.	Did all bottle labels and tags agree with custody papers?	YES	NO
3.	Were correct containers used for the tests indicated?	YES	NO
4.	Air Samples: Cassettes / Tubes Intact Canisters Pressurized Tedlar® Bags Inflated		N/A

Explain any discrepancies:

pH	Reagent	YES	NO	Lot Received	Exp	Sample ID	Vol. Added	Lot Added	Final pH
≥12	NaOH								
≤2	HNO_3								
≤2	H_2SO_4								
Residual Chlorine (-)	For TCN and Phenol			If present, contact PM to add ascorbic acid					
	$Na_2S_2O_3$	-	-						
	Zn Aceta	-	-						
	HCl	*	*						

*Not to be tested before analysis – pH tested and recorded by VOAs or GenChem on a separate worksheet

Yes = All samples OK

No = Samples were preserved at lab as listed

PM OK to Adjust: _____

Bottle lot numbers:

Other Comments:

PC Secondary Review: Dawn

*significant air bubbles are greater than 5-6 mm

Columbia Analytical Services inc.

ACKNOWLEDGEMENT OF RECEIPT OF SAMPLES

Date: October 19, 2007

Client: Geosyntec-IL

Attention: Ms. Nandra Weeks

Fax No.: (904)388-8163

From: Deb Patton

Receipt Date: 10/19/07

Project: CARUS CHEMICALS FR1347

Submission #: R2740363

Number of pages (including cover sheet): 26

Samples were received at our facility in good condition. Please contact Deb Patton at (585) 288-5380 if you have any questions regarding this information. Thank you for choosing Columbia Analytical Services for your analytical needs.

3.4.5° Cooler Temperature
✓ Vials intact
✓ Vials free from air bubbles
✓ Bottles intact
✓ Custody Seal intact

Comments:_____

Columbia Analytical Services, Inc.
1 Mustard St.
Suite 250
Rochester, NY 14609
(585) 288-5380
(585) 288-8475 fax

Printed: 10/19/07 12:54

COLUMBIA ANALYTICAL SERVICES/ANALYTICAL REQUEST

LAB SAM JOB #: CERT FEE?:N
CAS JOB:R2740363 PROJECT NAME:CARUS CHEMICALS FR1347
CLIENT ID: Geosyntec-IL CLIENT NAME:Geosyntec-IL
PHONE #: (904)388-8821 CONTACT:Geosyntec-IL 1 Ms. Nandra Weeks
ADDRESS: 2258 Riverside Ave.
CITY:Jacksonville STATE:Fl ZIP:32204
COPIES TO:

CLIENT REP: Deb Patton EST. INV. AMT: $200.00
CLIENT P.O. NUMBER: CONTRACT NUMBER:
QUOTATION #:6 SURCHARGE: 0
TURNAROUND REQUIRED:21 DAY TURN AROUND (REGULAR) PROMISED DATE: 11/02/07
REPORT TYPE:ASPB QC:NA
SAMPLED BY: CLIENT TRANSFER METHOD: FEDEX
SPECIAL JOB NOTES:
JOB TEMPERATURE 3°,4°,5°
LABEL NOTES: METALS TO IDL

ORDER # : 1047225 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB308-26.5-27.5
ORDER # STATUS: N PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1038 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME	
F2654	2686	AG.SPLP	SPLP SILVER BY 6010B
2654	2885	AL.SPLP	SPLP ALUMINUM BY ICP 6010B
2654	2678	AS.SPLP	SPLP ARSENIC BY 6010B
2654	2679	BA.SPLP	SPLP BARIUM BY 6010B
2654	3316	BE.SPLP	SPLP BERYLLIUM BY 6010B
2654	3317	CA.SPLP	SPLP CALCIUM BY 6010B
2654	2680	CD.SPLP	SPLP CADMIUM BY 6010B
2654	2887	CO.SPLP	SPLP COBALT BY ICP 6010B
2654	2681	CR.SPLP	SPLP CHROMIUM BY 6010B
2654	2888	CU.SPLP	SPLP COPPER BY ICP 6010B
2654	2889	FE.SPLP	SPLP IRON BY ICP 6010B
2654	2683	HG.SPLP	SPLP MERCURY BY 7470A
2654	2896	K.SPLP	SPLP POTASSIUM BY ICP 6010B
2654	3318	MG.SPLP	SPLP MAGNESIUM BY 6010B
2654	2891	MN.SPLP	SPLP MANGANESE BY ICP 6010B
2654	2910	NA.SPLP	SPLP SODIUM BY ICP 6010B
2654	2684	NI.SPLP	SPLP NICKEL BY 6010B
2654	2682	PB.SPLP	SPLP LEAD BY 6010B
2654	2894	SB.SPLP6	SPLP ANTIMONY BY ICP 6010B
2654	2685	SE.SPLP	SPLP SELENIUM BY 6010B
2654	3319	TL.SPLP6	SPLP THALLIUM BY 6010B
2654	3320	V.SPLP	SPLP VANADIUM BY 6010B
2654	2895	ZN.SPLP	SPLP ZINC BY ICP 6010B
2654	2498	1312	SYNTHETIC PRECIPITATION LEACHING PROC.
	4560	9045. PH (SMO)	

ORDER # : 1047226 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB308-26.5-27.5
ORDER # STATUS: A PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1037 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME	
	2153	160.3M	PERCENT SOLIDS
	2382	AG.6010	SILVER BY ICP 6010B

ORDER # : 1047226 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB308-26.5-27.5
ORDER # STATUS: A PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1037 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME	
	2343	AL.6010	ALUMINUM BY ICP 6010B
	4106	AS.6020	ARSENIC BY ICP/MS 6020
	4109	BA.6020	BARIUM BY ICP/MS 6020
	4108	BE.6020	BERYLLIUM BY ICP/MS 6020
	2358	CA.6010	CALCIUM BY ICP 6010B
	4128	CD.6020	CADMIUM BY ICP/MS 6020
	4132	CO.6020	COBALT BY ICP/MS 6020
	4110	CR.6020	CHROMIUM BY ICP/MS 6020
	4111	CU.6020	COPPER BY ICP/MS 6020
	2366	FE.6010	IRON BY ICP 6010B
	2417	HG.7470	MERCURY BY COLD VAPOR METHOD 7470A/7471A
	2380	K.6010	POTASSIUM BY ICP 6010B/200.7
	2371	MG.6010	MAGNESIUM BY ICP 6010B
	2373	MN.6010	MANGANESE BY ICP 6010B
	2385	NA.6010	SODIUM BY ICP 6010B
	4118	NI.6020	NICKEL BY ICP/MS 6020
	4112	PB.6020	LEAD BY ICP/MS 6020
	2345	SB.6010	ANTIMONY BY ICP 6010B
	4114	SE.6020	SELENIUM BY ICP/MS 6020
	4127	TL.6020	THALLIUM BY ICP/MS 6020
	4130	V.6020	VANADIUM BY ICP/MS 6020
	2389	ZN.6010	ZINC BY ICP 6010B

ORDER # : 1047227 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB308-36.5-37.5
ORDER # STATUS: A PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1033 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME	
	2153	160.3M	PERCENT SOLIDS
	2382	AG.6010	SILVER BY ICP 6010B
	2343	AL.6010	ALUMINUM BY ICP 6010B
	4106	AS.6020	ARSENIC BY ICP/MS 6020
	4109	BA.6020	BARIUM BY ICP/MS 6020
	4108	BE.6020	BERYLLIUM BY ICP/MS 6020
	2358	CA.6010	CALCIUM BY ICP 6010B
	4128	CD.6020	CADMIUM BY ICP/MS 6020
	4132	CO.6020	COBALT BY ICP/MS 6020
	4110	CR.6020	CHROMIUM BY ICP/MS 6020
	4111	CU.6020	COPPER BY ICP/MS 6020
	2366	FE.6010	IRON BY ICP 6010B
	2417	HG.7470	MERCURY BY COLD VAPOR METHOD 7470A/7471A
	2380	K.6010	POTASSIUM BY ICP 6010B/200.7
	2371	MG.6010	MAGNESIUM BY ICP 6010B
	2373	MN.6010	MANGANESE BY ICP 6010B
	2385	NA.6010	SODIUM BY ICP 6010B
	4118	NI.6020	NICKEL BY ICP/MS 6020
	4112	PB.6020	LEAD BY ICP/MS 6020
	2345	SB.6010	ANTIMONY BY ICP 6010B
	4114	SE.6020	SELENIUM BY ICP/MS 6020
	4127	TL.6020	THALLIUM BY ICP/MS 6020
	4130	V.6020	VANADIUM BY ICP/MS 6020
	2389	ZN.6010	ZINC BY ICP 6010B

ORDER # : 1047228 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB308-0-1
ORDER # STATUS: A PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 0941 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	2358	CA.6010 CALCIUM BY ICP 6010B
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A
	2380	K.6010 POTASSIUM BY ICP 6010B/200.7
	2371	MG.6010 MAGNESIUM BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	2385	NA.6010 SODIUM BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B

ORDER # : 1047229 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB309-0-1
ORDER # STATUS: A PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 14-14 LOG DATE: 10/19/07 **QC:** QC

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	2358	CA.6010 CALCIUM BY ICP 6010B
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A
	2380	K.6010 POTASSIUM BY ICP 6010B/200.7
	2371	MG.6010 MAGNESIUM BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	2385	NA.6010 SODIUM BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B

ORDER # : 1047230 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB309-48-49
ORDER # STATUS: A PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1455 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	2358	CA.6010 CALCIUM BY ICP 6010B
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A
	2380	K.6010 POTASSIUM BY ICP 6010B/200.7
	2371	MG.6010 MAGNESIUM BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	2385	NA.6010 SODIUM BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B

ORDER # : 1047231 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB305-0-1
ORDER # STATUS: A PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/18/07 TIME: 0950 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	2358	CA.6010 CALCIUM BY ICP 6010B
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A
	2380	K.6010 POTASSIUM BY ICP 6010B/200.7
	2371	MG.6010 MAGNESIUM BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	2385	NA.6010 SODIUM BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B

ORDER # : 1047234 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB309-28.25-29.25
ORDER # STATUS: A PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1434 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	2358	CA.6010 CALCIUM BY ICP 6010B
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A
	2380	K.6010 POTASSIUM BY ICP 6010B/200.7
	2371	MG.6010 MAGNESIUM BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	2385	NA.6010 SODIUM BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B

ORDER # : 1047236 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB309-18.25-19.25
ORDER # STATUS: A PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1420 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	2358	CA.6010 CALCIUM BY ICP 6010B
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A
	2380	K.6010 POTASSIUM BY ICP 6010B/200.7
	2371	MG.6010 MAGNESIUM BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	2385	NA.6010 SODIUM BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B

ORDER # : 1047239 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB406-0-1
ORDER # STATUS: A PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1804 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	2358	CA.6010 CALCIUM BY ICP 6010B
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A
	2380	K.6010 POTASSIUM BY ICP 6010B/200.7
	2371	MG.6010 MAGNESIUM BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	2385	NA.6010 SODIUM BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B

ORDER # : 1047242 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB305-90-91
ORDER # STATUS: A PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/18/07 TIME: 1350 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	2358	CA.6010 CALCIUM BY ICP 6010B
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A
	2380	K.6010 POTASSIUM BY ICP 6010B/200.7
	2371	MG.6010 MAGNESIUM BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	2385	NA.6010 SODIUM BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B

ORDER # : 1047243 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB305-89-90
ORDER # STATUS: A PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/18/07 TIME: 1318 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME	
	2153	160.3M	PERCENT SOLIDS
	2382	AG.6010	SILVER BY ICP 6010B
	2343	AL.6010	ALUMINUM BY ICP 6010B
	4106	AS.6020	ARSENIC BY ICP/MS 6020
	4109	BA.6020	BARIUM BY ICP/MS 6020
	4108	BE.6020	BERYLLIUM BY ICP/MS 6020
	2358	CA.6010	CALCIUM BY ICP 6010B
	4128	CD.6020	CADMIUM BY ICP/MS 6020
	4132	CO.6020	COBALT BY ICP/MS 6020
	4110	CR.6020	CHROMIUM BY ICP/MS 6020
	4111	CU.6020	COPPER BY ICP/MS 6020
	2366	FE.6010	IRON BY ICP 6010B
	2417	HG.7470	MERCURY BY COLD VAPOR METHOD 7470A/7471A
	2380	K.6010	POTASSIUM BY ICP 6010B/200.7
	2371	MG.6010	MAGNESIUM BY ICP 6010B
	2373	MN.6010	MANGANESE BY ICP 6010B
	2385	NA.6010	SODIUM BY ICP 6010B
	4118	NI.6020	NICKEL BY ICP/MS 6020
	4112	PB.6020	LEAD BY ICP/MS 6020
	2345	SB.6010	ANTIMONY BY ICP 6010B
	4114	SE.6020	SELENIUM BY ICP/MS 6020
	4127	TL.6020	THALLIUM BY ICP/MS 6020
	4130	V.6020	VANADIUM BY ICP/MS 6020
	2389	ZN.6010	ZINC BY ICP 6010B

ORDER # : 1047244 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB308-36.5-37.5
ORDER # STATUS: N PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1031 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME	
	2153	160.3M	PERCENT SOLIDS
	2950	9012.TOT	TOTAL CYANIDE BY SW-846 9012A

ORDER # : 1047245 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB309-48-49
ORDER # STATUS: N PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1458 LOG DATE: 10/19/07 **QC:** QC

PROFILE NO.	TEST NO.	TEST NAME	
	2153	160.3M	PERCENT SOLIDS
	2950	9012.TOT	TOTAL CYANIDE BY SW-846 9012A

ORDER # : 1047246 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB406-0-1
ORDER # STATUS: N PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1838 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME	
	2153	160.3M	PERCENT SOLIDS
	2950	9012.TOT	TOTAL CYANIDE BY SW-846 9012A

ORDER # : 1047250 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB308-36.5-37.5
ORDER # STATUS: N PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1032 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	4418	8270C.OL4Q OLM 4.2 LIST BY 8270C FULL QC LIST

ORDER # : 1047251 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB309-48-49
ORDER # STATUS: N PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1502- LOG DATE: 10/19/07 **QC:** QC

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	4418	8270C.OL4Q OLM 4.2 LIST BY 8270C FULL QC LIST

ORDER # : 1047252 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB406-0-1
ORDER # STATUS: N PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1848 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	4418	8270C.OL4Q OLM 4.2 LIST BY 8270C FULL QC LIST

ORDER # : 1047253 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB308-36.5-37.5
ORDER # STATUS: N PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1030 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	4414	8260B.OZPQ OLM 4.2 LIST BY 8260B - LL FULL QC

ORDER # : 1047254 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB309-48-49
ORDER # STATUS: N PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1520- LOG DATE: 10/19/07 **QC:** QC

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	4414	8260B.OZPQ OLM 4.2 LIST BY 8260B - LL FULL QC

ORDER # : 1047255 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB406-0-1
ORDER # STATUS: N PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1841 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	4414	8260B.OZPQ OLM 4.2 LIST BY 8260B - LL FULL QC

ORDER # : 1047261 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB309-28.5-29.5
ORDER # STATUS: N PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1431- LOG DATE: 10/19/07 **QC:** QC

PROFILE NO.	TEST NO.	TEST NAME
F2654	2686	AG.SPLP SPLP SILVER BY 6010B
2654	2885	AL.SPLP SPLP ALUMINUM BY ICP 6010B
2654	2678	AS.SPLP SPLP ARSENIC BY 6010B
2654	2679	BA.SPLP SPLP BARIUM BY 6010B
2654	3316	BE.SPLP SPLP BERYLLIUM BY 6010B
2654	3317	CA.SPLP SPLP CALCIUM BY 6010B

ORDER # : 1047261 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB309-28.5-29.5
ORDER # STATUS: N PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1431- LOG DATE: 10/19/07 **QC:** QC

PROFILE NO.	TEST NO.	TEST NAME
2654	2680	CD.SPLP SPLP CADMIUM BY 6010B
2654	2887	CO.SPLP SPLP COBALT BY ICP 6010B
2654	2681	CR.SPLP SPLP CHROMIUM BY 6010B
2654	2888	CU.SPLP SPLP COPPER BY ICP 6010B
2654	2889	FE.SPLP SPLP IRON BY ICP 6010B
2654	2683	HG.SPLP SPLP MERCURY BY 7470A
2654	2896	K.SPLP SPLP POTASSIUM BY ICP 6010B
2654	3318	MG.SPLP SPLP MAGNESIUM BY 6010B
2654	2891	MN.SPLP SPLP MANGANESE BY ICP 6010B
2654	2910	NA.SPLP SPLP SODIUM BY ICP 6010B
2654	2684	NI.SPLP SPLP NICKEL BY 6010B
2654	2682	PB.SPLP SPLP LEAD BY 6010B
2654	2894	SB.SPLP6 SPLP ANTIMONY BY ICP 6010B
2654	2685	SE.SPLP SPLP SELENIUM BY 6010B
2654	3319	TL.SPLP6 SPLP THALLIUM BY 6010B
2654	3320	V.SPLP SPLP VANADIUM BY 6010B
2654	2895	ZN.SPLP SPLP ZINC BY ICP 6010B
2654	2498	1312 SYNTHETIC PRECIPITATION LEACHING PROC.
	4560	9045, PH (SMO)

ORDER # : 1047267 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB309-0-1
ORDER # STATUS: N PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1415- LOG DATE: 10/19/07 **QC:** QC

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2787	8081A. ORGANOCHLORINE PESTICIDES ONLY
	3273	8082.PC82 PCB'S BY 8082

ORDER # : 1047269 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB305-0-1
ORDER # STATUS: N PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/18/07 TIME: 0949 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2787	8081A. ORGANOCHLORINE PESTICIDES ONLY
	3273	8082.PC82 PCB'S BY 8082

ORDER # : 1047271 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB406-0-1
ORDER # STATUS: N PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1821 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2787	8081A. ORGANOCHLORINE PESTICIDES ONLY
	3273	8082.PC82 PCB'S BY 8082

ORDER # : 1047277 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW401-B
ORDER # STATUS: N PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1634 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	4418	8270C.OL4Q OLM 4.2 LIST BY 8270C FULL QC LIST

ORDER # : 1047278 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW401
ORDER # STATUS: N PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1123 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME	
F2654	2686	AG.SPLP	SPLP SILVER BY 6010B
2654	2885	AL.SPLP	SPLP ALUMINUM BY ICP 6010B
2654	2678	AS.SPLP	SPLP ARSENIC BY 6010B
2654	2679	BA.SPLP	SPLP BARIUM BY 6010B
2654	3316	BE.SPLP	SPLP BERYLLIUM BY 6010B
2654	3317	CA.SPLP	SPLP CALCIUM BY 6010B
2654	2680	CD.SPLP	SPLP CADMIUM BY 6010B
2654	2887	CO.SPLP	SPLP COBALT BY ICP 6010B
2654	2681	CR.SPLP	SPLP CHROMIUM BY 6010B
2654	2888	CU.SPLP	SPLP COPPER BY ICP 6010B
2654	2889	FE.SPLP	SPLP IRON BY ICP 6010B
2654	2683	HG.SPLP	SPLP MERCURY BY 7470A
2654	2896	K.SPLP	SPLP POTASSIUM BY ICP 6010B
2654	3318	MG.SPLP	SPLP MAGNESIUM BY 6010B
2654	2891	MN.SPLP	SPLP MANGANESE BY ICP 6010B
2654	2910	NA.SPLP	SPLP SODIUM BY ICP 6010B
2654	2684	NI.SPLP	SPLP NICKEL BY 6010B
2654	2682	PB.SPLP	SPLP LEAD BY 6010B
2654	2894	SB.SPLP6	SPLP ANTIMONY BY ICP 6010B
2654	2685	SE.SPLP	SPLP SELENIUM BY 6010B
2654	3319	TL.SPLP6	SPLP THALLIUM BY 6010B
2654	3320	V.SPLP	SPLP VANADIUM BY 6010B
2654	2895	ZN.SPLP	SPLP ZINC BY ICP 6010B
2654	2498	1312	SYNTHETIC PRECIPITATION LEACHING PROC.

ORDER # : 1047279 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW401-B
ORDER # STATUS: N PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1639 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME	
	2787	8081A.	ORGANOCHLORINE PESTICIDES ONLY
	3273	8082.PC82	PCB'S BY 8082

ORDER # : 1047280 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW401-B
ORDER # STATUS: N PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1630 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME	
F2654	2686	AG.SPLP	SPLP SILVER BY 6010B
2654	2885	AL.SPLP	SPLP ALUMINUM BY ICP 6010B
2654	2678	AS.SPLP	SPLP ARSENIC BY 6010B
2654	2679	BA.SPLP	SPLP BARIUM BY 6010B
2654	3316	BE.SPLP	SPLP BERYLLIUM BY 6010B
2654	3317	CA.SPLP	SPLP CALCIUM BY 6010B
2654	2680	CD.SPLP	SPLP CADMIUM BY 6010B
2654	2887	CO.SPLP	SPLP COBALT BY ICP 6010B
2654	2681	CR.SPLP	SPLP CHROMIUM BY 6010B
2654	2888	CU.SPLP	SPLP COPPER BY ICP 6010B
2654	2889	FE.SPLP	SPLP IRON BY ICP 6010B
2654	2683	HG.SPLP	SPLP MERCURY BY 7470A
2654	2896	K.SPLP	SPLP POTASSIUM BY ICP 6010B
2654	3318	MG.SPLP	SPLP MAGNESIUM BY 6010B
2654	2891	MN.SPLP	SPLP MANGANESE BY ICP 6010B
2654	2910	NA.SPLP	SPLP SODIUM BY ICP 6010B

ORDER # : 1047280 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW401-B
ORDER # STATUS: N PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1630 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME	
2654	2684	NI.SPLP	SPLP NICKEL BY 6010B
2654	2682	PB.SPLP	SPLP LEAD BY 6010B
2654	2894	SB.SPLP6	SPLP ANTIMONY BY ICP 6010B
2654	2685	SE.SPLP	SPLP SELENIUM BY 6010B
2654	3319	TL.SPLP6	SPLP THALLIUM BY 6010B
2654	3320	V.SPLP	SPLP VANADIUM BY 6010B
2654	2895	ZN.SPLP	SPLP ZINC BY ICP 6010B
2654	2498	1312	SYNTHETIC PRECIPITATION LEACHING PROC.
	543	150.1	PH (SMO)

ORDER # : 1047281 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW401
ORDER # STATUS: N PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1124 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME	
F2654	2686	AG.SPLP	SPLP SILVER BY 6010B
2654	2885	AL.SPLP	SPLP ALUMINUM BY ICP 6010B
2654	2678	AS.SPLP	SPLP ARSENIC BY 6010B
2654	2679	BA.SPLP	SPLP BARIUM BY 6010B
2654	3316	BE.SPLP	SPLP BERYLLIUM BY 6010B
2654	3317	CA.SPLP	SPLP CALCIUM BY 6010B
2654	2680	CD.SPLP	SPLP CADMIUM BY 6010B
2654	2887	CO.SPLP	SPLP COBALT BY ICP 6010B
2654	2681	CR.SPLP	SPLP CHROMIUM BY 6010B
2654	2888	CU.SPLP	SPLP COPPER BY ICP 6010B
2654	2889	FE.SPLP	SPLP IRON BY ICP 6010B
2654	2683	HG.SPLP	SPLP MERCURY BY 7470A
2654	2896	K.SPLP	SPLP POTASSIUM BY ICP 6010B
2654	3318	MG.SPLP	SPLP MAGNESIUM BY 6010B
2654	2891	MN.SPLP	SPLP MANGANESE BY ICP 6010B
2654	2910	NA.SPLP	SPLP SODIUM BY ICP 6010B
2654	2684	NI.SPLP	SPLP NICKEL BY 6010B
2654	2682	PB.SPLP	SPLP LEAD BY 6010B
2654	2894	SB.SPLP6	SPLP ANTIMONY BY ICP 6010B
2654	2685	SE.SPLP	SPLP SELENIUM BY 6010B
2654	3319	TL.SPLP6	SPLP THALLIUM BY 6010B
2654	3320	V.SPLP	SPLP VANADIUM BY 6010B
2654	2895	ZN.SPLP	SPLP ZINC BY ICP 6010B
2654	2498	1312	SYNTHETIC PRECIPITATION LEACHING PROC.
	543	150.1	PH (SMO)

ORDER # : 1047282 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW401-B
ORDER # STATUS: N PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1632 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME	
	2950	9012.TOT	TOTAL CYANIDE BY SW-846 9012A

ORDER # : 1047283 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW405
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1111 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME	
	4414	8260B.OZPQ	OLM 4.2 LIST BY 8260B - LL FULL QC

ORDER # : 1047284 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW401-B
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1640 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	4414	8260B.OZPQ OLM 4.2 LIST BY 8260B - LL FULL QC

ORDER # : 1047285 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW401
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1112 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	4414	8260B.OZPQ OLM 4.2 LIST BY 8260B - LL FULL QC

ORDER # : 1047286 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW405-B
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1831 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	2358	CA.6010 CALCIUM BY ICP 6010B
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A
	2380	K.6010 POTASSIUM BY ICP 6010B/200.7
	2371	MG.6010 MAGNESIUM BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	2385	NA.6010 SODIUM BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B

ORDER # : 1047287 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW405
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1112 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	2358	CA.6010 CALCIUM BY ICP 6010B
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B

ORDER # : 1047287 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW405
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1112 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A
	2380	K.6010 POTASSIUM BY ICP 6010B/200.7
	2371	MG.6010 MAGNESIUM BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	2385	NA.6010 SODIUM BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B

ORDER # : 1047288 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW401-B
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1632 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	2358	CA.6010 CALCIUM BY ICP 6010B
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A
	2380	K.6010 POTASSIUM BY ICP 6010B/200.7
	2371	MG.6010 MAGNESIUM BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	2385	NA.6010 SODIUM BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B

ORDER # : 1047289 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW401
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1113 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	2358	CA.6010 CALCIUM BY ICP 6010B
	4128	CD.6020 CADMIUM BY ICP/MS 6020

ORDER # : 1047289 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW401
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1113 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A
	2380	K.6010 POTASSIUM BY ICP 6010B/200.7
	2371	MG.6010 MAGNESIUM BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	2385	NA.6010 SODIUM BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B

ORDER # : 1047290 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW405
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/18/07 TIME: 1322 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	2358	CA.6010 CALCIUM BY ICP 6010B
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A
	2380	K.6010 POTASSIUM BY ICP 6010B/200.7
	2371	MG.6010 MAGNESIUM BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	2385	NA.6010 SODIUM BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B

ORDER # : 1047291 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW401
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/18/07 TIME: 1327 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020

ORDER # : 1047291 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW401
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/18/07 TIME: 1327 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME	
	4109	BA.6020	BARIUM BY ICP/MS 6020
	4108	BE.6020	BERYLLIUM BY ICP/MS 6020
	2358	CA.6010	CALCIUM BY ICP 6010B
	4128	CD.6020	CADMIUM BY ICP/MS 6020
	4132	CO.6020	COBALT BY ICP/MS 6020
	4110	CR.6020	CHROMIUM BY ICP/MS 6020
	4111	CU.6020	COPPER BY ICP/MS 6020
	2366	FE.6010	IRON BY ICP 6010B
	2417	HG.7470	MERCURY BY COLD VAPOR METHOD 7470A/7471A
	2380	K.6010	POTASSIUM BY ICP 6010B/200.7
	2371	MG.6010	MAGNESIUM BY ICP 6010B
	2373	MN.6010	MANGANESE BY ICP 6010B
	2385	NA.6010	SODIUM BY ICP 6010B
	4118	NI.6020	NICKEL BY ICP/MS 6020
	4112	PB.6020	LEAD BY ICP/MS 6020
	2345	SB.6010	ANTIMONY BY ICP 6010B
	4114	SE.6020	SELENIUM BY ICP/MS 6020
	4127	TL.6020	THALLIUM BY ICP/MS 6020
	4130	V.6020	VANADIUM BY ICP/MS 6020
	2389	ZN.6010	ZINC BY ICP 6010B

ORDER # : 1047292 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB406-0-1
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1831 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME	
F2654	2686	AG.SPLP	SPLP SILVER BY 6010B
2654	2885	AL.SPLP	SPLP ALUMINUM BY ICP 6010B
2654	2678	AS.SPLP	SPLP ARSENIC BY 6010B
2654	2679	BA.SPLP	SPLP BARIUM BY 6010B
2654	3316	BE.SPLP	SPLP BERYLLIUM BY 6010B
2654	3317	CA.SPLP	SPLP CALCIUM BY 6010B
2654	2680	CD.SPLP	SPLP CADMIUM BY 6010B
2654	2887	CO.SPLP	SPLP COBALT BY ICP 6010B
2654	2681	CR.SPLP	SPLP CHROMIUM BY 6010B
2654	2888	CU.SPLP	SPLP COPPER BY ICP 6010B
2654	2889	FE.SPLP	SPLP IRON BY ICP 6010B
2654	2683	HG.SPLP	SPLP MERCURY BY 7470A
2654	2896	K.SPLP	SPLP POTASSIUM BY ICP 6010B
2654	3318	MG.SPLP	SPLP MAGNESIUM BY 6010B
2654	2891	MN.SPLP	SPLP MANGANESE BY ICP 6010B
2654	2910	NA.SPLP	SPLP SODIUM BY ICP 6010B
2654	2684	NI.SPLP	SPLP NICKEL BY 6010B
2654	2682	PB.SPLP	SPLP LEAD BY 6010B
2654	2894	SB.SPLP6	SPLP ANTIMONY BY ICP 6010B
2654	2685	SE.SPLP	SPLP SELENIUM BY 6010B
2654	3319	TL.SPLP6	SPLP THALLIUM BY 6010B
2654	3320	V.SPLP	SPLP VANADIUM BY 6010B
2654	2895	ZN.SPLP	SPLP ZINC BY ICP 6010B
2654	2498	1312	SYNTHETIC PRECIPITATION LEACHING PROC.
	4560	9045. PH (SMO)	

ORDER # : 1047293 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW405-B
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1602 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	4414	8260B.OZPQ OLM 4.2 LIST BY 8260B - LL FULL QC

ORDER # : 1047294 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW405
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/18/07 TIME: 1324 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	4414	8260B.OZPQ OLM 4.2 LIST BY 8260B - LL FULL QC

ORDER # : 1047295 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW401
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/17/07 TIME: 1632 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	2950	9012.TOT TOTAL CYANIDE BY SW-846 9012A

ORDER # : 1047296 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW401
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/18/07 TIME: 1331 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME	
F2654	2686	AG.SPLP	SPLP SILVER BY 6010B
2654	2885	AL.SPLP	SPLP ALUMINUM BY ICP 6010B
2654	2678	AS.SPLP	SPLP ARSENIC BY 6010B
2654	2679	BA.SPLP	SPLP BARIUM BY 6010B
2654	3316	BE.SPLP	SPLP BERYLLIUM BY 6010B
2654	3317	CA.SPLP	SPLP CALCIUM BY 6010B
2654	2680	CD.SPLP	SPLP CADMIUM BY 6010B
2654	2887	CO.SPLP	SPLP COBALT BY ICP 6010B
2654	2681	CR.SPLP	SPLP CHROMIUM BY 6010B
2654	2888	CU.SPLP	SPLP COPPER BY ICP 6010B
2654	2889	FE.SPLP	SPLP IRON BY ICP 6010B
2654	2683	HG.SPLP	SPLP MERCURY BY 7470A
2654	2896	K.SPLP	SPLP POTASSIUM BY ICP 6010B
2654	3318	MG.SPLP	SPLP MAGNESIUM BY 6010B
2654	2891	MN.SPLP	SPLP MANGANESE BY ICP 6010B
2654	2910	NA.SPLP	SPLP SODIUM BY ICP 6010B
2654	2684	NI.SPLP	SPLP NICKEL BY 6010B
2654	2682	PB.SPLP	SPLP LEAD BY 6010B
2654	2894	SB.SPLP6	SPLP ANTIMONY BY ICP 6010B
2654	2685	SE.SPLP	SPLP SELENIUM BY 6010B
2654	3319	TL.SPLP6	SPLP THALLIUM BY 6010B
2654	3320	V.SPLP	SPLP VANADIUM BY 6010B
2654	2895	ZN.SPLP	SPLP ZINC BY ICP 6010B
2654	2498	1312	SYNTHETIC PRECIPITATION LEACHING PROC.
	543	150.1	PH (SMO)

ORDER # : 1047297 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW401
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/18/07 TIME: 1330 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME	
	2787	8081A.	ORGANOCHLORINE PESTICIDES ONLY
	3273	8082.PC82	PCB'S BY 8082

ORDER # : 1047298 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB305-90-91

ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N

DATE RECEIVED: 10/19/07 SAMPLE DATE: 10/18/07 TIME: 1310 LOG DATE: 10/19/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME	
F2654	2686	AG.SPLP	SPLP SILVER BY 6010B
2654	2885	AL.SPLP	SPLP ALUMINUM BY ICP 6010B
2654	2678	AS.SPLP	SPLP ARSENIC BY 6010B
2654	2679	BA.SPLP	SPLP BARIUM BY 6010B
2654	3316	BE.SPLP	SPLP BERYLLIUM BY 6010B
2654	3317	CA.SPLP	SPLP CALCIUM BY 6010B
2654	2680	CD.SPLP	SPLP CADMIUM BY 6010B
2654	2887	CO.SPLP	SPLP COBALT BY ICP 6010B
2654	2681	CR.SPLP	SPLP CHROMIUM BY 6010B
2654	2888	CU.SPLP	SPLP COPPER BY ICP 6010B
2654	2889	FE.SPLP	SPLP IRON BY ICP 6010B
2654	2683	HG.SPLP	SPLP MERCURY BY 7470A
2654	2896	K.SPLP	SPLP POTASSIUM BY ICP 6010B
2654	3318	MG.SPLP	SPLP MAGNESIUM BY 6010B
2654	2891	MN.SPLP	SPLP MANGANESE BY ICP 6010B
2654	2910	NA.SPLP	SPLP SODIUM BY ICP 6010B
2654	2684	NI.SPLP	SPLP NICKEL BY 6010B
2654	2682	PB.SPLP	SPLP LEAD BY 6010B
2654	2894	SB.SPLP6	SPLP ANTIMONY BY ICP 6010B
2654	2685	SE.SPLP	SPLP SELENIUM BY 6010B
2654	3319	TL.SPLP6	SPLP THALLIUM BY 6010B
2654	3320	V.SPLP	SPLP VANADIUM BY 6010B
2654	2895	ZN.SPLP	SPLP ZINC BY ICP 6010B
2654	2498	1312	SYNTHETIC PRECIPITATION LEACHING PROC.
	4560	9045. PH (SMO)	

Cooler Receipt And Preservation Check Form

Project/Client Geosyntec Submission Number R2740363

Cooler received on 10-19-07 by: KE **COURIER:** CAS UPS (FEDEX) VELOCITY CLIENT

1.	Were custody seals on outside of cooler?	(YES)	NO			
2.	Were custody papers properly filled out (ink, signed, etc.)?	(YES)	NO			
3.	Did all bottles arrive in good condition (unbroken)?	(YES)	NO			
4.	Did any VOA vials have significant air bubbles?	YES	(NO)	N/A		
5.	Were **Ice** or **Ice packs** present?	(YES)	NO			
6.	Where did the bottles originate?	CAS/ROC, CLIENT				
7.	Temperature of cooler(s) upon receipt:	3°	4°	5°	4°	3°
	Is the temperature within 0° - 6° C?:	(Yes)	(Yes)	(Yes)	(Yes)	(Yes)
	If No, Explain Below	No	No	No	No	No

Date/Time Temperatures Taken: 10-19-07 @ 10:08

Thermometer ID: 161 or (IR GUN) Reading From: Temp Blank or (Sample Bottle)

If out of Temperature, Client Approval to Run Samples _____

PC Secondary Review: Dawn

Cooler Breakdown: Date : _____ by: _____

1.	Were all bottle labels complete (*i.e.* analysis, preservation, etc.)?	YES	NO
2.	Did all bottle labels and tags agree with custody papers?	YES	NO
3.	Were correct containers used for the tests indicated?	YES	NO
4.	Air Samples: Cassettes / Tubes Intact Canisters Pressurized Tedlar® Bags Inflated		N/A

Explain any discrepancies: _____

		YES	NO	Sample I.D.	Reagent	Vol. Added	Final pH
pH	Reagent						
≥12	NaOH						
≤2	HNO_3						
≤2	H_2SO_4						
Residual Chlorine (+/-)	for TCN & Phenol						

YES = All samples OK NO = Samples were preserved at lab as listed PC OK to adjust pH _____

VOC Vial pH Verification (Tested after Analysis) Following Samples Exhibited pH > 2		

Other Comments:

PC Secondary Review: _____

Columbia Analytical Services INC.
An Employee - Owned Company
www.caslab.com

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

One Mustard St., Suite 250 • Rochester, NY 14609-0859 • (585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 PAGE 1 OF 7

SR #
CAS Contact

Project Name: Carus Chemical
Project Number: FR1347
Project Manager: Nandra Weeks
Report CC: Joey McKinnon
Company/Address: Geosyntec
2258 Riverside Avenue
Jacksonville, Florida 32204
Phone #: 904-388-8821
FAX#: 904-388-8163
Sampler's Signature: Elena Evans
Sampler's Printed Name: Elena Evans

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

PRESERVATIVE: 0 | 0 | 0 | 0 | 0

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's ☐ 8260 ☐ 624 ☐ CLP (MeOH, DI+SD)	GC/MS SVOA's ☐ 8270 ☐ 625 ☐ CLP	GC VOA's ☐ 8021 ☐ 601/602	PESTICIDES ☐ 8081 ☐ 608 ☐ CLP	PCB's ☐ 8082 ☐ 608 ☐ CLP	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	SPLP	pH	Cyanide	% Solids				REMARKS/ ALTERNATE DESCRIPTION
OU1-SS-SB308-26.5-27.5	1047225	10/17	10:38	Soil	1								X	X						
OU1-SS-SB308-26.5-27.5	1047224	10/17	10:37	Soil	1						X					X				
OU1-SS-SB308-36.5-37.5	244	10/17	10:31	Soil	1										X	X	pH			
OU1-SS-SB308-36.5-37.5	250	10/17	10:32	Soil	1		X													
OU1-SS-SB308-36.5-37.5	1047227 add pH	10/17	10:33	Soil	1						X									
OU1-SS-SB308-36.5-37.5	253	10/17	10:30	Soil	3	X														
OU1-SS-SB308-0-1	1047228 add pH	10/17	9:41	Soil	1						X									
~~OU1-SS-SB308~~ EE																				
OU1-SW-MW401-B	277	10/17	16:34	water	1		X													1-liter amber
OU1-SW-MW401	278	10/17	11:23	water	1								X							1-liter amber

SPECIAL INSTRUCTIONS/COMMENTS
Metals ← project specified metals list

See QAPP ☐

TURNAROUND REQUIREMENTS
___ RUSH (SURCHARGES APPLY)
___ 24 hr ___ 48 hr ___ 5 day
X STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
___ I. Results Only
___ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
___ III. Results + QC and Calibration Summaries
___ IV. Data Validation Report with Raw Data
X V. Speicalized Forms / Custom Report
Edata X Yes ___ No

INVOICE INFORMATION
PO# FR1347
BILL TO: Jill Johnson
Geosyntec
SUBMISSION #: 40363

SAMPLE RECEIPT: CONDITION/COOLER TEMP: ___ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature: Elena Evans	Signature: [signature]	Signature	Signature	Signature	Signature
Printed Name: Geosyntec	Printed Name: Gregory O. Esmerian	Printed Name	Printed Name	Printed Name	Printed Name
Firm: 10/18 5:30	Firm: CAS	Firm	Firm	Firm	Firm
Date/Time	Date/Time: 10-19-07 9:50	Date/Time	Date/Time	Date/Time	Date/Time

SCOC-1102-08

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

Columbia Analytical Services, INC.
An Employee - Owned Company
www.casiab.com

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

One Mustard St., Suite 250 • Rochester, NY 14609-0859 • (585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 PAGE 2 OF 7

SR #

CAS Contact

Project Name: Carus Chemical	Project Number: FR1347
Project Manager: Nundra Weeks	Report CC: Joey McKinnon
Company/Address: Geosyntec, 2258 Riverside Avenue, Jacksonville Florida 32204	
Phone #: 904-388-8821	FAX#: 904-388-8163
Sampler's Signature: Elena Evans	Sampler's Printed Name: Elena Evans

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

PRESERVATIVE: 0 0 0 0

Preservative Key: 0. NONE; 1. HCL; 2. HNO_3; 3. H_2SO_4; 4. NaOH; 5. Zn. Acetate; 6. MeOH; 7. $NaHSO_4$; 8. Other

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's ☒8260 ☐624 ☐CLP MeOH, DI+SB	GC/MS SVOA's ☒8270 ☐625 ☐CLP	GC VOA's ☐8021 ☐601/602	PESTICIDES ☒8081 ☐608 ☐CLP	PCB's ☒8082 ☐608 ☐CLP	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	SPLP	pH	Cyanide (NaOH)	REMARKS/ ALTERNATE DESCRIPTION
OU1-SS-SB309-28.5-29.25	261	10/17	14:32	Soil	1								X	X		
OU1-SS-SB309-28.25-29.25 MSD		10/17	14:31	Soil	1								X	X		MSD
OU1-SS-SB309-28.25-29.25 MS		10/17	14:32	Soil	1								X	X		MS
OU1-SS-SB309-48-49	254	10/17	15:20	Soil	3	X										
OU1-SS-SB309-48-49 MS		10/17	15:20	Soil	3	X										MS
OU1-SS-SB309-48-49 MSD		10/17	15:32	Soil	3	X										MSD
OU1-SW-MW401-B	279	10/17	16:39	Water	1			X	X							1 liter amber
OU1-SW-MW402-B	280	10/17	16:30	Water	1								X	X		1 liter amber
OU1-SW-MW401	281	10/17	11:24	Water	1								X	X		1 liter amber
OU1-SW-MW401-B	282	10/17	16:32	Water	1										X	

SPECIAL INSTRUCTIONS/COMMENTS
Metals – project specified metals list

See QAPP ☐

TURNAROUND REQUIREMENTS
____ RUSH (SURCHARGES APPLY)
____ 24 hr ____ 48 hr ____ 5 day
X STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
____ I. Results Only
____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III. Results + QC and Calibration Summaries
____ IV. Data Validation Report with Raw Data
X V. Speicalized Forms / Custom Report
Edata X Yes ____ No

INVOICE INFORMATION
PO# FR1347
BILL TO: Jill Johnson
Geosyntec
SUBMISSION #:

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
651-341-9717					
Signature: Elena Evans	Signature: Gregory O. Esmen(av)	Signature	Signature	Signature	Signature
Printed Name: Elena Evans	Printed Name: Gregory O. Esmen(av)	Printed Name	Printed Name	Printed Name	Printed Name
Firm: Geosyntec	Firm: CAS	Firm	Firm	Firm	Firm
Date/Time: 10/18 5:30	Date/Time: 10-19-07 9:50	Date/Time	Date/Time	Date/Time	Date/Time

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

Appendix G-4-1a: Data Validation Reports, COCs, Analytical Lab Reports
Matthiessen & Hegeler Zinc Site
Final Remedial Investigation Report

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

Columbia Analytical Services, INC.
An Employee - Owned Company
www.caslab.com
One Mustard St., Suite 250 • Rochester, NY 14609-0859 • (585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475

SR #

CAS Contact

Project Name: Carus Chemical	Project Number: FR1347
Project Manager: Nandra Weeks	Report CC: Jacy McKinnon
Company/Address: Geosyntec	
2258 Riverside Avenue	
Jacksonville Florida 32204	
Phone #: 904-388-8821	FAX#: 904-388-8163
Sampler's Signature:	Sampler's Printed Name: Elena Evans

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

PRESERVATIVE: 0 | 0 | 0 | 0

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's ☐ 8260 ☐ 624 ☐ CLP	GC/MS SVOA's ☐ 8270 ☐ 625 ☐ CLP	GC VOA's ☐ 8021 ☐ 601/602	PESTICIDES ☐ 8081 ☐ 608 ☐ CLP	PCB's ☐ 8082 ☐ 608 ☐ CLP	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	REMARKS/ ALTERNATE DESCRIPTION
OU1-SS-SB309-0-1	1647229	10/17	14:00	Soil	1						X		
OU1-SS-SB309-0-1MS		10/17	14:02	Soil	1						X		MS
OU1-SS-SB309-0-1MSD		10/17	14:03	Soil	1						X		MSD
OU1-SS-SB 309-0-1	-267	10/17	14:15	Soil	1				X	X			
OU1-SS-SB309-0-1 MS		10/17	14:17	Soil	1				X	X			MS
OU1-SS-SB309-0-1 MSD		10/17	14:20	Soil	1				X	X			MSD
OU1-SSSB309-48-49	-251	10/17	15:03	Soil	1		X						
OU1-SS-SB309-48-49 MS		10/17	15:02	Soil	1		X						MS
OU1-SS-SB309-48-49 MSD		10/17	15:04	Soil	1		X						MSD
OU1-SS-SB309-48-49	1647230	10/17	14:55	Soil	1						X		

SPECIAL INSTRUCTIONS/COMMENTS
Metals – project specified metals list

See QAPP ☐

TURNAROUND REQUIREMENTS
RUSH (SURCHARGES APPLY)
___ 24 hr ___ 48 hr ___ 5 day
X STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
___ I. Results Only
___ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
___ III. Results + QC and Calibration Summaries
___ IV. Data Validation Report with Raw Data
X V. Speicalized Forms / Custom Report
Edata X Yes ___ No

INVOICE INFORMATION
PO# FR1347
BILL TO: Jill Johnson
Geosyntec
SUBMISSION #:

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature:	Signature:	Signature:	Signature:	Signature:	Signature:
Printed Name: Elena Evans	Printed Name: Gregory O. Esmerian	Printed Name:	Printed Name:	Printed Name:	Printed Name:
Firm: Geosyntec	Firm: CAS	Firm:	Firm:	Firm:	Firm:
Date/Time: 10/18 5:30	Date/Time: 10-19-07 9:50	Date/Time:	Date/Time:	Date/Time:	Date/Time:

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

Columbia Analytical Services, INC.
An Employee - Owned Company
www.caslab.com

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

One Mustard St., Suite 250 • Rochester, NY 14609-0859 • (585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 PAGE 4 OF 7

SR #

CAS Contact

Project Name: Carus Chemical	Project Number: FR1347
Project Manager: Sandra Weeks	Report CC: Joey McKinnon
Company/Address: Geosyntec 2258 Riverside Avenue Jacksonville Florida 32204	
Phone #: 904-388-8821	FAX#: 904-388-8163
Sampler's Signature: Elena Evans	Sampler's Printed Name: Elena Evans

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's ☐ 8260 ☐ 624 ☐ CLP	GC/MS SVOA's ☐ 8270 ☐ 625 ☐ CLP	GC VOA's ☐ 8021 ☐ 601/602	PESTICIDES ☐ 8081 ☐ 608 ☐ CLP	PCB's ☐ 8082 ☐ 608 ☐ CLP	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	cyanide	%solids	REMARKS/ ALTERNATE DESCRIPTION
PRESERVATIVE								0		0	0	0		0	0	
OU1-SS-SB305-0-1	269	10/18	9:49	Soil	1			X	X						
OU1-SS-SB305-0-1	1047231 04 pH	10/18	9:50	Soil	1						X				
OU1-SS-SB309-48-49	245	10/17	14:58	Soil	1								X	X	
OU1-SS-SB309-48-49 MS		10/17	14:56	Soil	1								X	X	Matrix Spike
OU1-SS-SB309-48-49 MSD		10/17	14:57	Soil	1								X	X	MSD
OU1-SS-SB309-28.25-29.25	1047234	10/17	14:34	Soil	1						X				
OU1-SS-SB309-18.25-19.25	1047236	10/17	14:20	Soil	1						X				
OU1-SS-SB406-0-1	252	10/17	18:48	Soil	1		X								
OU1-SS-SB406-0-1	1047230	10/17	18:04	Soil	1						X				
OU1-SS-SB406-0-1	271	10/17	18:21	Soil	1			X	X						

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other

SPECIAL INSTRUCTIONS/COMMENTS
Metals - project specified metals list

See QAPP ☐

TURNAROUND REQUIREMENTS
____ RUSH (SURCHARGES APPLY)
____ 24 hr ____ 48 hr ____ 5 day
X STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
____ I. Results Only
____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III. Results + QC and Calibration Summaries
____ IV. Data Validation Report with Raw Data
X V. Specialized Forms / Custom Report
Edata X Yes ____ No

INVOICE INFORMATION
PO# FR1347
BILL TO: Jill Johnson Geosyntec
SUBMISSION #:

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature: Elena Evans	Signature: Gregory D. Esmerian	Signature	Signature	Signature	Signature
Printed Name: Geosyntec	Printed Name:	Printed Name	Printed Name	Printed Name	Printed Name
Firm: 10/18 5:30	Firm: CAS	Firm	Firm	Firm	Firm
Date/Time: 651-341-9717	Date/Time: 10-19-07 9:50	Date/Time	Date/Time	Date/Time	Date/Time

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

Columbia Analytical Services, Inc.
An Employee - Owned Company
www.caslab.com

One Mustard St., Suite 250 • Rochester, NY 14609-0859 • (585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475

PAGE 5 OF 7

SR #

CAS Contact

Project Name: Carus Chemical	Project Number: FR1347
Project Manager: Nandra Weeks	Report CC: Joey McKinnon
Company/Address: Geosyntec 2258 Riverside Avenue Jacksonville Florida 3220	
Phone #: 904-388-8821	FAX#: 904-388-8163
Sampler's Signature: Elena Evans	Sampler's Printed Name: Elena Evans

ANALYSIS REQUESTED *(Include Method Number and Container Preservative)*

PRESERVATIVE: 0 0 0 6

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's ☐8260 ☐624 ☐CLP HCl	GC/MS SVOA's ☐8270 ☐625 ☐CLP	GC VOA's ☐8021 ☐601/602	PESTICIDES ☐8081 ☐608 ☐CLP	PCB's ☐8082 ☐608 ☐CLP	METALS, TOTAL HNO3 (List in comments below)	METALS, DISSOLVED (List in comments below)	Cyanide	% solids	SPLP	pH	REMARKS/ ALTERNATE DESCRIPTION
OU1-SS-SB406-0-1	246	10/17	18:38	Soil	1								X	X			
OU1-SS-SB406-0-1	247	10/17	18:31	Soil	1										X	X	
OU1-SW-MW405-B	284	10/17	16:00	Water	1						X						
OU1-SW-MW405	287	10/17	11:12	Water	1						X						
OU1-SW-MW401-B	288	10/17	16:32	Water	1						X						
OU1-SW-MW401	289	10/17	11:13	Water	1						X						
OU1-SW-MW405	283	10/17	11:11	Water	3	X											
OU1-SW-MW401-B	284	10/17	16:40	Water	3	X											
OU1-SW-MW401	285	10/17	11:12	Water	3	X											
OU1-SS-SB406-0-1	255	10/17	18:41	Soil	3	X											

SPECIAL INSTRUCTIONS/COMMENTS
Metals - project specified metals

See QAPP ☐

TURNAROUND REQUIREMENTS
____ **RUSH** (SURCHARGES APPLY)
____ 24 hr ____ 48 hr ____ 5 day
____ **STANDARD**
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
____ I. Results Only
____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III. Results + QC and Calibration Summaries
____ IV. Data Validation Report with Raw Data
X V. Speicalized Forms / Custom Report
Edata X Yes ____ No

INVOICE INFORMATION
PO# FR1347
BILL TO: Jill Johnson
Geosyntec
SUBMISSION #:

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature: Elena Evans	Signature:	Signature	Signature	Signature	Signature
Printed Name: Geosyntec	Printed Name: Gregory O. Emerian	Printed Name	Printed Name	Printed Name	Printed Name
Firm: 10/18 5:30	Firm: CAS	Firm	Firm	Firm	Firm
Date/Time: 651-341-9717	Date/Time: 10-19-07 9:50	Date/Time	Date/Time	Date/Time	Date/Time

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

Columbia Analytical Services, INC.
An Employee - Owned Company
www.caslab.com

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

One Mustard St., Suite 250 • Rochester, NY 14609-0859 • (585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 PAGE 6 OF 7

SR #

CAS Contact

Project Name: Carus Chemical	Project Number: FR1347
Project Manager: Nandra Weeks	Report CC: Tracy McKinnon
Company/Address: Geosyntec, 2258 Riverside Avenue, Jacksonville Florida 3220	
Phone #: 904-388-8821	FAX#: 904-388-8163
Sampler's Signature: Elena Evans	Sampler's Printed Name: Elena Evans

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

PRESERVATIVE

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's ☐8260 ☐624 ☐CLP	GC/MS SVOA's ☐8270 ☐625 ☐CLP	GC VOA's ☐8021 ☐601/602	PESTICIDES ☐8081 ☐608 ☐CLP	PCB's ☐8082 ☐608 ☐CLP	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	NH_3	Cyanide	SPLP	pH	REMARKS/ ALTERNATE DESCRIPTION
~~OU1-SW-MW402-A~~		10/18	18:25	Water	1												
OU1-SW-MW405-B	293	10/17	16:02	Water	3	X											
OU1-SW-MW401	295	10/17	16:32	Water	1								X				
OU1-SW-MW401	294	10/18	13:31	Water	1									X	X		
OU1-SW-MW401	297	10/18	13:30	Water	1				X	X							
OU1-SW-MW405	290	10/18	13:20	Water	1						X						
OU1-SW-MW-401	291	10/18	13:27	Water	1						X						
OU1-SW-MW-405	294	10/18	13:24	Water	3	X											
OU1-SS-SB305-90-91	104744Q	10/18	13:05	Soil	1						X						
OU1-SS-SB305-89-90	243Q	10/18	13:18	Soil	1						X						

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other _____

SPECIAL INSTRUCTIONS/COMMENTS
Metals - project specified metals

See QAPP ☐

TURNAROUND REQUIREMENTS
_____ RUSH (SURCHARGES APPLY)
_____ 24 hr _____ 48 hr _____ 5 day
_____ STANDARD
REQUESTED FAX DATE
_____
REQUESTED REPORT DATE
_____

REPORT REQUIREMENTS
_____ I. Results Only
_____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
_____ III. Results + QC and Calibration Summaries
_____ IV. Data Validation Report with Raw Data
_____ V. Speicalized Forms / Custom Report
Edata _____ Yes _____ No

INVOICE INFORMATION
PO# FR1347
BILL TO: Jill Johnson
Geosyntec
SUBMISSION #:

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature: Elena Evans	Signature: Gregory O. Esmerian	Signature	Signature	Signature	Signature
Printed Name: Geosyntec	Printed Name:	Printed Name	Printed Name	Printed Name	Printed Name
Firm: 10/18/07 5:30	Firm: CAS	Firm	Firm	Firm	Firm
Date/Time: 651-341-9717	Date/Time: 10-19-07 9:50	Date/Time	Date/Time	Date/Time	Date/Time

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

Appendix G-4-1a: Data Validation Reports, COCs, Analytical Lab Reports
Matthiessen & Hegeler Zinc Site
Final Remedial Investigation Report

Columbia Analytical Services INC.
An Employee - Owned Company
www.caslab.com

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

One Mustard St., Suite 250 • Rochester, NY 14609-0859 • (585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 PAGE 1 OF 1

SR #

CAS Contact

Project Name: Cars Chemical	Project Number: FR1347
Project Manager: Nandra Weeks	Report CC: Joey McKinnon
Company/Address: Geosyntec 2258 Riverside Avenue Jacksonville Florida 3220	
Phone #: 904-388-9821	FAX#: 904-388-8163
Sampler's Signature: Elena Evans	Sampler's Printed Name: Elena Evans

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

PRESERVATIVE: O

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's ☐ 8260 ☐ 624 ☐ CLP	GC/MS SVOA's ☐ 8270 ☐ 625 ☐ CLP	GC VOA's ☐ 8021 ☐ 601/602	PESTICIDES ☐ 8081 ☐ 608 ☐ CLP	PCB's ☐ 8082 ☐ 608 ☐ CLP	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	SPLP/pH	REMARKS/ ALTERNATE DESCRIPTION
EVI-SS-SB305-90-01	298	10/18	13:10	SOIL									X	

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other _____

SPECIAL INSTRUCTIONS/COMMENTS
Metals

See QAPP ☐

TURNAROUND REQUIREMENTS
_____ RUSH (SURCHARGES APPLY)
_____ 24 hr _____ 48 hr _____ 5 day
X STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
_____ I. Results Only
_____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
_____ III. Results + QC and Calibration Summaries
_____ IV. Data Validation Report with Raw Data
X V. Speicalized Forms / Custom Report
Edata X Yes _____ No

INVOICE INFORMATION
PO# FR1347
BILL TO: Jill Johnson
Geosyntec
SUBMISSION #:

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature: Elena Evans	Signature: Gregory O. Esmerian	Signature	Signature	Signature	Signature
Printed Name: Geosyntec	Printed Name: CAS	Printed Name	Printed Name	Printed Name	Printed Name
Firm: 10/18 5:30pm	Firm	Firm	Firm	Firm	Firm
Date/Time: 561-346-9717	Date/Time: 10-19-07 9:50	Date/Time	Date/Time	Date/Time	Date/Time

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

Columbia Analytical Services inc.

ACKNOWLEDGEMENT OF RECEIPT OF SAMPLES

Date: October 5, 2007

Client: Geosyntec-IL

Attention: Ms. Nandra Weeks

Fax No.: (904)388-8163

From: Deb Patton

Receipt Date: 10/05/07

Project: CARUS CHEMICALS FR1347

Submission #: R2740161

Number of pages (including cover sheet): 16

Samples were received at our facility in good condition. Please contact Deb Patton at (585) 288-5380 if you have any questions regarding this information. Thank you for choosing Columbia Analytical Services for your analytical needs.

* 8° Cooler Temperature
✓ Vials intact
✓ Vials free from air bubbles
✓ Bottles intact
✓ Custody Seal intact

Comments: * Cooler Temp ↑ outside 0-6°C guidelines!

Columbia Analytical Services, Inc.
1 Mustard St.
Suite 250
Rochester, NY 14609
(585) 288-5380
(585) 288-8475 fax

rinted: 10/05/07 13:08

COLUMBIA ANALYTICAL SERVICES/ANALYTICAL REQUEST

AB SAM JOB #: CERT FEE?:N
AS JOB:R2740161 PROJECT NAME:CARUS CHEMICALS FR1347
LIENT ID: Geosyntec-IL CLIENT NAME:Geosyntec-IL
HONE #: (904)388-8821 CONTACT:Geosyntec-IL 1 Ms. Nandra Weeks
DDRESS: 2258 Riverside Ave.
ITY:Jacksonville STATE:Fl ZIP:32204
OPIES TO:

LIENT REP: Deb Patton EST. INV. AMT: $1,000.00
LIENT P.O. NUMBER: FR1347 CONTRACT NUMBER:
UOTATION #:6 SURCHARGE: -1
URNAROUND REQUIRED:(RUSH/NOSURCHARGE) PROMISED DATE: 10/19/07
EPORT TYPE:ASPB QC:NA
AMPLED BY: CLIENT TRANSFER METHOD: FEDEX
PECIAL JOB NOTES:
OB TEMPERATURE 8°
ABEL NOTES: 2 WEEK DATA

RDER # : 1043069 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB316-2-4
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/05/07 SAMPLE DATE: 10/03/07 TIME: 1200 LOG DATE: 10/05/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2787	8081A. ORGANOCHLORINE PESTICIDES ONLY
	3273	8082.PC82 PCB'S BY 8082
	4414	8260B.OZPQ OLM 4.2 LIST BY 8260B - LL FULL QC
	4418	8270C.OL4Q OLM 4.2 LIST BY 8270C FULL QC LIST
	2950	9012.TOT TOTAL CYANIDE BY SW-846 9012A
	2343	AL.6010 ALUMINUM BY ICP 6010B
	2350	BA.6010 BARIUM BY ICP 6010B
	2353	BE.6010 BERYLLIUM BY ICP 6010B
	2355	CD.6010 CADMIUM BY ICP 6010B
	2358	CA.6010 CALCIUM BY ICP 6010B
	2361	CR.6010 CHROMIUM BY ICP 6010B
	2392	CO.6010 COBALT BY ICP 6010B
	2364	CU.6010 COPPER BY ICP 6010B
	2366	FE.6010 IRON BY ICP 6010B
	2371	MG.6010 MAGNESIUM BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	2378	NI.6010 NICKEL BY ICP 6010B
	2380	K.6010 POTASSIUM BY ICP 6010B/200.7
	2382	AG.6010 SILVER BY ICP 6010B
	2385	NA.6010 SODIUM BY ICP 6010B
	2391	V.6010 VANADIUM BY ICP 6010B
	2389	ZN.6010 ZINC BY ICP 6010B
	2465	AS.6010L ARSENIC BY ICP 6010B LOW LEVEL
	2381	SE.6010L SELENIUM BY ICP 6010B LOW LEVEL
	2388	TL.6010L THALLIUM BY ICP 6010B LOW LEVEL
	2466	PB.6010 LEAD BY ICP 6010B
	2345	SB.6010 ANTIMONY BY ICP 6010B
	3882	HG.7471 MERCURY BY COLD VAPOR METHOD 7471A

RDER # : 1043070 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB312-2-4
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/05/07 SAMPLE DATE: 10/03/07 TIME: 1615 LOG DATE: 10/05/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2787	8081A. ORGANOCHLORINE PESTICIDES ONLY
	3273	8082.PC82 PCB'S BY 8082
	4414	8260B.OZPQ OLM 4.2 LIST BY 8260B - LL FULL QC
	4418	8270C.OL4Q OLM 4.2 LIST BY 8270C FULL QC LIST
	2950	9012.TOT TOTAL CYANIDE BY SW-846 9012A
	2343	AL.6010 ALUMINUM BY ICP 6010B
	2350	BA.6010 BARIUM BY ICP 6010B
	2353	BE.6010 BERYLLIUM BY ICP 6010B
	2355	CD.6010 CADMIUM BY ICP 6010B
	2358	CA.6010 CALCIUM BY ICP 6010B
	2361	CR.6010 CHROMIUM BY ICP 6010B
	2392	CO.6010 COBALT BY ICP 6010B
	2364	CU.6010 COPPER BY ICP 6010B
	2366	FE.6010 IRON BY ICP 6010B
	2371	MG.6010 MAGNESIUM BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	2378	NI.6010 NICKEL BY ICP 6010B
	2380	K.6010 POTASSIUM BY ICP 6010B/200.7
	2382	AG.6010 SILVER BY ICP 6010B
	2385	NA.6010 SODIUM BY ICP 6010B
	2391	V.6010 VANADIUM BY ICP 6010B
	2389	ZN.6010 ZINC BY ICP 6010B
	2465	AS.6010L ARSENIC BY ICP 6010B LOW LEVEL
	2381	SE.6010L SELENIUM BY ICP 6010B LOW LEVEL
	2388	TL.6010L THALLIUM BY ICP 6010B LOW LEVEL
	2466	PB.6010 LEAD BY ICP 6010B
	2345	SB.6010 ANTIMONY BY ICP 6010B
	3882	HG.7471 MERCURY BY COLD VAPOR METHOD 7471A

RDER # : 1043071 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB311-0-1
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/05/07 SAMPLE DATE: 10/03/07 TIME: 1545 LOG DATE: 10/05/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2787	8081A. ORGANOCHLORINE PESTICIDES ONLY
	3273	8082.PC82 PCB'S BY 8082
	4414	8260B.OZPQ OLM 4.2 LIST BY 8260B - LL FULL QC
	4418	8270C.OL4Q OLM 4.2 LIST BY 8270C FULL QC LIST
	2950	9012.TOT TOTAL CYANIDE BY SW-846 9012A
	2343	AL.6010 ALUMINUM BY ICP 6010B
	2350	BA.6010 BARIUM BY ICP 6010B
	2353	BE.6010 BERYLLIUM BY ICP 6010B
	2355	CD.6010 CADMIUM BY ICP 6010B
	2358	CA.6010 CALCIUM BY ICP 6010B
	2361	CR.6010 CHROMIUM BY ICP 6010B
	2392	CO.6010 COBALT BY ICP 6010B
	2364	CU.6010 COPPER BY ICP 6010B
	2366	FE.6010 IRON BY ICP 6010B
	2371	MG.6010 MAGNESIUM BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	2378	NI.6010 NICKEL BY ICP 6010B
	2380	K.6010 POTASSIUM BY ICP 6010B/200.7

RDER # : 1043071 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB311-0-1
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/05/07 SAMPLE DATE: 10/03/07 TIME: 1545 LOG DATE: 10/05/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME
	2382	AG.6010 SILVER BY ICP 6010B
	2385	NA.6010 SODIUM BY ICP 6010B
	2391	V.6010 VANADIUM BY ICP 6010B
	2389	ZN.6010 ZINC BY ICP 6010B
	2465	AS.6010L ARSENIC BY ICP 6010B LOW LEVEL
	2381	SE.6010L SELENIUM BY ICP 6010B LOW LEVEL
	2388	TL.6010L THALLIUM BY ICP 6010B LOW LEVEL
	2466	PB.6010 LEAD BY ICP 6010B
	2345	SB.6010 ANTIMONY BY ICP 6010B
	3882	HG.7471 MERCURY BY COLD VAPOR METHOD 7471A

RDER # : 1043072 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB315-0-1
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/05/07 SAMPLE DATE: 10/03/07 TIME: 1715 LOG DATE: 10/05/07 **QC:** QC

ROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2787	8081A. ORGANOCHLORINE PESTICIDES ONLY
	3273	8082.PC82 PCB'S BY 8082
	4414	8260B.OZPQ OLM 4.2 LIST BY 8260B - LL FULL QC
	4418	8270C.OL4Q OLM 4.2 LIST BY 8270C FULL QC LIST
	2950	9012.TOT TOTAL CYANIDE BY SW-846 9012A
	2343	AL.6010 ALUMINUM BY ICP 6010B
	2350	BA.6010 BARIUM BY ICP 6010B
	2353	BE.6010 BERYLLIUM BY ICP 6010B
	2355	CD.6010 CADMIUM BY ICP 6010B
	2358	CA.6010 CALCIUM BY ICP 6010B
	2361	CR.6010 CHROMIUM BY ICP 6010B
	2392	CO.6010 COBALT BY ICP 6010B
	2364	CU.6010 COPPER BY ICP 6010B
	2366	FE.6010 IRON BY ICP 6010B
	2371	MG.6010 MAGNESIUM BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	2378	NI.6010 NICKEL BY ICP 6010B
	2380	K.6010 POTASSIUM BY ICP 6010B/200.7
	2382	AG.6010 SILVER BY ICP 6010B
	2385	NA.6010 SODIUM BY ICP 6010B
	2391	V.6010 VANADIUM BY ICP 6010B
	2389	ZN.6010 ZINC BY ICP 6010B
	2465	AS.6010L ARSENIC BY ICP 6010B LOW LEVEL
	2381	SE.6010L SELENIUM BY ICP 6010B LOW LEVEL
	2388	TL.6010L THALLIUM BY ICP 6010B LOW LEVEL
	2466	PB.6010 LEAD BY ICP 6010B
	2345	SB.6010 ANTIMONY BY ICP 6010B
	3882	HG.7471 MERCURY BY COLD VAPOR METHOD 7471A

)RDER # : 1043076 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB319-0-1
)RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
)ATE RECEIVED: 10/05/07 SAMPLE DATE: 10/03/07 TIME: 1415 LOG DATE: 10/05/07 **QC:** NA

?ROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2787	8081A. ORGANOCHLORINE PESTICIDES ONLY
	4414	8260B.OZPQ OLM 4.2 LIST BY 8260B - LL FULL QC

RDER # : 1043076 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB319-0-1
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/05/07 SAMPLE DATE: 10/03/07 TIME: 1415 LOG DATE: 10/05/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME
	4418	8270C.OL4Q OLM 4.2 LIST BY 8270C FULL QC LIST
	2950	9012.TOT TOTAL CYANIDE BY SW-846 9012A
	2343	AL.6010 ALUMINUM BY ICP 6010B
	2350	BA.6010 BARIUM BY ICP 6010B
	2353	BE.6010 BERYLLIUM BY ICP 6010B
	2355	CD.6010 CADMIUM BY ICP 6010B
	2358	CA.6010 CALCIUM BY ICP 6010B
	2361	CR.6010 CHROMIUM BY ICP 6010B
	2392	CO.6010 COBALT BY ICP 6010B
	2364	CU.6010 COPPER BY ICP 6010B
	2366	FE.6010 IRON BY ICP 6010B
	2371	MG.6010 MAGNESIUM BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	2378	NI.6010 NICKEL BY ICP 6010B
	2380	K.6010 POTASSIUM BY ICP 6010B/200.7
	2382	AG.6010 SILVER BY ICP 6010B
	2385	NA.6010 SODIUM BY ICP 6010B
	2391	V.6010 VANADIUM BY ICP 6010B
	2389	ZN.6010 ZINC BY ICP 6010B
	2465	AS.6010L ARSENIC BY ICP 6010B LOW LEVEL
	2381	SE.6010L SELENIUM BY ICP 6010B LOW LEVEL
	2388	TL.6010L THALLIUM BY ICP 6010B LOW LEVEL
	2466	PB.6010 LEAD BY ICP 6010B
	2345	SB.6010 ANTIMONY BY ICP 6010B
	3882	HG.7471 MERCURY BY COLD VAPOR METHOD 7471A

RDER # : 1043079 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB406
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/05/07 SAMPLE DATE: 10/03/07 TIME: 1720 LOG DATE: 10/05/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2787	8081A. ORGANOCHLORINE PESTICIDES ONLY
	3273	8082.PC82 PCB'S BY 8082
	4418	8270C.OL4Q OLM 4.2 LIST BY 8270C FULL QC LIST
	2950	9012.TOT TOTAL CYANIDE BY SW-846 9012A

RDER # : 1043080 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB406 VOA ONLY
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/05/07 SAMPLE DATE: 10/03/07 TIME: 1745 LOG DATE: 10/05/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME
	4414	8260B.OZPQ OLM 4.2 LIST BY 8260B - LL FULL QC

RDER # : 1043081 **MATRIX:** WATER COLLECTION SITE: OU1-GW-MW-402
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/05/07 SAMPLE DATE: 10/03/07 TIME: 1330 LOG DATE: 10/05/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME
	4414	8260B.OZPQ OLM 4.2 LIST BY 8260B - LL FULL QC

RDER # : 1043108 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB316-0-1
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/05/07 SAMPLE DATE: 10/03/07 TIME: 1200 LOG DATE: 10/05/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME	
370	2343	AL.6010	ALUMINUM BY ICP 6010B
370	2350	BA.6010	BARIUM BY ICP 6010B
370	2353	BE.6010	BERYLLIUM BY ICP 6010B
370	2355	CD.6010	CADMIUM BY ICP 6010B
370	2358	CA.6010	CALCIUM BY ICP 6010B
370	2361	CR.6010	CHROMIUM BY ICP 6010B
370	2392	CO.6010	COBALT BY ICP 6010B
370	2364	CU.6010	COPPER BY ICP 6010B
370	2366	FE.6010	IRON BY ICP 6010B
370	2371	MG.6010	MAGNESIUM BY ICP 6010B
370	2373	MN.6010	MANGANESE BY ICP 6010B
370	2378	NI.6010	NICKEL BY ICP 6010B
370	2380	K.6010	POTASSIUM BY ICP 6010B/200.7
370	2382	AG.6010	SILVER BY ICP 6010B
370	2385	NA.6010	SODIUM BY ICP 6010B
370	2391	V.6010	VANADIUM BY ICP 6010B
370	2389	ZN.6010	ZINC BY ICP 6010B
370	2465	AS.6010L	ARSENIC BY ICP 6010B LOW LEVEL
370	2381	SE.6010L	SELENIUM BY ICP 6010B LOW LEVEL
370	2388	TL.6010L	THALLIUM BY ICP 6010B LOW LEVEL
370	2466	PB.6010	LEAD BY ICP 6010B
370	2345	SB.6010	ANTIMONY BY ICP 6010B
370	3882	HG.7471	MERCURY BY COLD VAPOR METHOD 7471A
	2153	160.3M	PERCENT SOLIDS

RDER # : 1043109 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB312-0-1
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/05/07 SAMPLE DATE: 10/03/07 TIME: 1615 LOG DATE: 10/05/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME	
370	2343	AL.6010	ALUMINUM BY ICP 6010B
370	2350	BA.6010	BARIUM BY ICP 6010B
370	2353	BE.6010	BERYLLIUM BY ICP 6010B
370	2355	CD.6010	CADMIUM BY ICP 6010B
370	2358	CA.6010	CALCIUM BY ICP 6010B
370	2361	CR.6010	CHROMIUM BY ICP 6010B
370	2392	CO.6010	COBALT BY ICP 6010B
370	2364	CU.6010	COPPER BY ICP 6010B
370	2366	FE.6010	IRON BY ICP 6010B
370	2371	MG.6010	MAGNESIUM BY ICP 6010B
370	2373	MN.6010	MANGANESE BY ICP 6010B
370	2378	NI.6010	NICKEL BY ICP 6010B
370	2380	K.6010	POTASSIUM BY ICP 6010B/200.7
370	2382	AG.6010	SILVER BY ICP 6010B
370	2385	NA.6010	SODIUM BY ICP 6010B
370	2391	V.6010	VANADIUM BY ICP 6010B
370	2389	ZN.6010	ZINC BY ICP 6010B
370	2465	AS.6010L	ARSENIC BY ICP 6010B LOW LEVEL
370	2381	SE.6010L	SELENIUM BY ICP 6010B LOW LEVEL
370	2388	TL.6010L	THALLIUM BY ICP 6010B LOW LEVEL
370	2466	PB.6010	LEAD BY ICP 6010B
370	2345	SB.6010	ANTIMONY BY ICP 6010B
370	3882	HG.7471	MERCURY BY COLD VAPOR METHOD 7471A
	2153	160.3M	PERCENT SOLIDS

RDER # : 1043110 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB311-2-4
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/05/07 SAMPLE DATE: 10/03/07 TIME: 1545 LOG DATE: 10/05/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME	
370	2343	AL.6010	ALUMINUM BY ICP 6010B
370	2350	BA.6010	BARIUM BY ICP 6010B
370	2353	BE.6010	BERYLLIUM BY ICP 6010B
370	2355	CD.6010	CADMIUM BY ICP 6010B
370	2358	CA.6010	CALCIUM BY ICP 6010B
370	2361	CR.6010	CHROMIUM BY ICP 6010B
370	2392	CO.6010	COBALT BY ICP 6010B
370	2364	CU.6010	COPPER BY ICP 6010B
370	2366	FE.6010	IRON BY ICP 6010B
370	2371	MG.6010	MAGNESIUM BY ICP 6010B
370	2373	MN.6010	MANGANESE BY ICP 6010B
370	2378	NI.6010	NICKEL BY ICP 6010B
370	2380	K.6010	POTASSIUM BY ICP 6010B/200.7
370	2382	AG.6010	SILVER BY ICP 6010B
370	2385	NA.6010	SODIUM BY ICP 6010B
370	2391	V.6010	VANADIUM BY ICP 6010B
370	2389	ZN.6010	ZINC BY ICP 6010B
370	2465	AS.6010L	ARSENIC BY ICP 6010B LOW LEVEL
370	2381	SE.6010L	SELENIUM BY ICP 6010B LOW LEVEL
370	2388	TL.6010L	THALLIUM BY ICP 6010B LOW LEVEL
370	2466	PB.6010	LEAD BY ICP 6010B
370	2345	SB.6010	ANTIMONY BY ICP 6010B
370	3882	HG.7471	MERCURY BY COLD VAPOR METHOD 7471A
	2153	160.3M	PERCENT SOLIDS

RDER # : 1043111 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB313-2-4
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/05/07 SAMPLE DATE: 10/03/07 TIME: 1515 LOG DATE: 10/05/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME	
370	2343	AL.6010	ALUMINUM BY ICP 6010B
370	2350	BA.6010	BARIUM BY ICP 6010B
370	2353	BE.6010	BERYLLIUM BY ICP 6010B
370	2355	CD.6010	CADMIUM BY ICP 6010B
370	2358	CA.6010	CALCIUM BY ICP 6010B
370	2361	CR.6010	CHROMIUM BY ICP 6010B
370	2392	CO.6010	COBALT BY ICP 6010B
370	2364	CU.6010	COPPER BY ICP 6010B
370	2366	FE.6010	IRON BY ICP 6010B
370	2371	MG.6010	MAGNESIUM BY ICP 6010B
370	2373	MN.6010	MANGANESE BY ICP 6010B
370	2378	NI.6010	NICKEL BY ICP 6010B
370	2380	K.6010	POTASSIUM BY ICP 6010B/200.7
370	2382	AG.6010	SILVER BY ICP 6010B
370	2385	NA.6010	SODIUM BY ICP 6010B
370	2391	V.6010	VANADIUM BY ICP 6010B
370	2389	ZN.6010	ZINC BY ICP 6010B
370	2465	AS.6010L	ARSENIC BY ICP 6010B LOW LEVEL
370	2381	SE.6010L	SELENIUM BY ICP 6010B LOW LEVEL
370	2388	TL.6010L	THALLIUM BY ICP 6010B LOW LEVEL
370	2466	PB.6010	LEAD BY ICP 6010B
370	2345	SB.6010	ANTIMONY BY ICP 6010B
370	3882	HG.7471	MERCURY BY COLD VAPOR METHOD 7471A
	2153	160.3M	PERCENT SOLIDS

RDER # : 1043112 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB313-0-1
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/05/07 SAMPLE DATE: 10/03/07 TIME: 1615 LOG DATE: 10/05/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME	
370	2343	AL.6010	ALUMINUM BY ICP 6010B
370	2350	BA.6010	BARIUM BY ICP 6010B
370	2353	BE.6010	BERYLLIUM BY ICP 6010B
370	2355	CD.6010	CADMIUM BY ICP 6010B
370	2358	CA.6010	CALCIUM BY ICP 6010B
370	2361	CR.6010	CHROMIUM BY ICP 6010B
370	2392	CO.6010	COBALT BY ICP 6010B
370	2364	CU.6010	COPPER BY ICP 6010B
370	2366	FE.6010	IRON BY ICP 6010B
370	2371	MG.6010	MAGNESIUM BY ICP 6010B
370	2373	MN.6010	MANGANESE BY ICP 6010B
370	2378	NI.6010	NICKEL BY ICP 6010B
370	2380	K.6010	POTASSIUM BY ICP 6010B/200.7
370	2382	AG.6010	SILVER BY ICP 6010B
370	2385	NA.6010	SODIUM BY ICP 6010B
370	2391	V.6010	VANADIUM BY ICP 6010B
370	2389	ZN.6010	ZINC BY ICP 6010B
370	2465	AS.6010L	ARSENIC BY ICP 6010B LOW LEVEL
370	2381	SE.6010L	SELENIUM BY ICP 6010B LOW LEVEL
370	2388	TL.6010L	THALLIUM BY ICP 6010B LOW LEVEL
370	2466	PB.6010	LEAD BY ICP 6010B
370	2345	SB.6010	ANTIMONY BY ICP 6010B
370	3882	HG.7471	MERCURY BY COLD VAPOR METHOD 7471A
	2153	160.3M	PERCENT SOLIDS

RDER # : 1043113 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB317-0-1
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/05/07 SAMPLE DATE: 10/03/07 TIME: 1500 LOG DATE: 10/05/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME	
370	2343	AL.6010	ALUMINUM BY ICP 6010B
370	2350	BA.6010	BARIUM BY ICP 6010B
370	2353	BE.6010	BERYLLIUM BY ICP 6010B
370	2355	CD.6010	CADMIUM BY ICP 6010B
370	2358	CA.6010	CALCIUM BY ICP 6010B
370	2361	CR.6010	CHROMIUM BY ICP 6010B
370	2392	CO.6010	COBALT BY ICP 6010B
370	2364	CU.6010	COPPER BY ICP 6010B
370	2366	FE.6010	IRON BY ICP 6010B
370	2371	MG.6010	MAGNESIUM BY ICP 6010B
370	2373	MN.6010	MANGANESE BY ICP 6010B
370	2378	NI.6010	NICKEL BY ICP 6010B
370	2380	K.6010	POTASSIUM BY ICP 6010B/200.7
370	2382	AG.6010	SILVER BY ICP 6010B
370	2385	NA.6010	SODIUM BY ICP 6010B
370	2391	V.6010	VANADIUM BY ICP 6010B
370	2389	ZN.6010	ZINC BY ICP 6010B
370	2465	AS.6010L	ARSENIC BY ICP 6010B LOW LEVEL
370	2381	SE.6010L	SELENIUM BY ICP 6010B LOW LEVEL
370	2388	TL.6010L	THALLIUM BY ICP 6010B LOW LEVEL
370	2466	PB.6010	LEAD BY ICP 6010B
370	2345	SB.6010	ANTIMONY BY ICP 6010B
370	3882	HG.7471	MERCURY BY COLD VAPOR METHOD 7471A
	2153	160.3M	PERCENT SOLIDS

RDER # : 1043114 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB317-2-4
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/05/07 SAMPLE DATE: 10/03/07 TIME: 1500 LOG DATE: 10/05/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME	
370	2343	AL.6010	ALUMINUM BY ICP 6010B
370	2350	BA.6010	BARIUM BY ICP 6010B
370	2353	BE.6010	BERYLLIUM BY ICP 6010B
370	2355	CD.6010	CADMIUM BY ICP 6010B
370	2358	CA.6010	CALCIUM BY ICP 6010B
370	2361	CR.6010	CHROMIUM BY ICP 6010B
370	2392	CO.6010	COBALT BY ICP 6010B
370	2364	CU.6010	COPPER BY ICP 6010B
370	2366	FE.6010	IRON BY ICP 6010B
370	2371	MG.6010	MAGNESIUM BY ICP 6010B
370	2373	MN.6010	MANGANESE BY ICP 6010B
370	2378	NI.6010	NICKEL BY ICP 6010B
370	2380	K.6010	POTASSIUM BY ICP 6010B/200.7
370	2382	AG.6010	SILVER BY ICP 6010B
370	2385	NA.6010	SODIUM BY ICP 6010B
370	2391	V.6010	VANADIUM BY ICP 6010B
370	2389	ZN.6010	ZINC BY ICP 6010B
370	2465	AS.6010L	ARSENIC BY ICP 6010B LOW LEVEL
370	2381	SE.6010L	SELENIUM BY ICP 6010B LOW LEVEL
370	2388	TL.6010L	THALLIUM BY ICP 6010B LOW LEVEL
370	2466	PB.6010	LEAD BY ICP 6010B
370	2345	SB.6010	ANTIMONY BY ICP 6010B
370	3882	HG.7471	MERCURY BY COLD VAPOR METHOD 7471A
	2153	160.3M	PERCENT SOLIDS

RDER # : 1043115 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB314-2-4
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/05/07 SAMPLE DATE: 10/03/07 TIME: 1645 LOG DATE: 10/05/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME	
370	2343	AL.6010	ALUMINUM BY ICP 6010B
370	2350	BA.6010	BARIUM BY ICP 6010B
370	2353	BE.6010	BERYLLIUM BY ICP 6010B
370	2355	CD.6010	CADMIUM BY ICP 6010B
370	2358	CA.6010	CALCIUM BY ICP 6010B
370	2361	CR.6010	CHROMIUM BY ICP 6010B
370	2392	CO.6010	COBALT BY ICP 6010B
370	2364	CU.6010	COPPER BY ICP 6010B
370	2366	FE.6010	IRON BY ICP 6010B
370	2371	MG.6010	MAGNESIUM BY ICP 6010B
370	2373	MN.6010	MANGANESE BY ICP 6010B
370	2378	NI.6010	NICKEL BY ICP 6010B
370	2380	K.6010	POTASSIUM BY ICP 6010B/200.7
370	2382	AG.6010	SILVER BY ICP 6010B
370	2385	NA.6010	SODIUM BY ICP 6010B
370	2391	V.6010	VANADIUM BY ICP 6010B
370	2389	ZN.6010	ZINC BY ICP 6010B
370	2465	AS.6010L	ARSENIC BY ICP 6010B LOW LEVEL
370	2381	SE.6010L	SELENIUM BY ICP 6010B LOW LEVEL
370	2388	TL.6010L	THALLIUM BY ICP 6010B LOW LEVEL
370	2466	PB.6010	LEAD BY ICP 6010B
370	2345	SB.6010	ANTIMONY BY ICP 6010B
370	3882	HG.7471	MERCURY BY COLD VAPOR METHOD 7471A
	2153	160.3M	PERCENT SOLIDS

ORDER # : 1043116 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB314-0-1
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/05/07 SAMPLE DATE: 10/03/07 TIME: 1645 LOG DATE: 10/05/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME	
370	2343	AL.6010	ALUMINUM BY ICP 6010B
370	2350	BA.6010	BARIUM BY ICP 6010B
370	2353	BE.6010	BERYLLIUM BY ICP 6010B
370	2355	CD.6010	CADMIUM BY ICP 6010B
370	2358	CA.6010	CALCIUM BY ICP 6010B
370	2361	CR.6010	CHROMIUM BY ICP 6010B
370	2392	CO.6010	COBALT BY ICP 6010B
370	2364	CU.6010	COPPER BY ICP 6010B
370	2366	FE.6010	IRON BY ICP 6010B
370	2371	MG.6010	MAGNESIUM BY ICP 6010B
370	2373	MN.6010	MANGANESE BY ICP 6010B
370	2378	NI.6010	NICKEL BY ICP 6010B
370	2380	K.6010	POTASSIUM BY ICP 6010B/200.7
370	2382	AG.6010	SILVER BY ICP 6010B
370	2385	NA.6010	SODIUM BY ICP 6010B
370	2391	V.6010	VANADIUM BY ICP 6010B
370	2389	ZN.6010	ZINC BY ICP 6010B
370	2465	AS.6010L	ARSENIC BY ICP 6010B LOW LEVEL
370	2381	SE.6010L	SELENIUM BY ICP 6010B LOW LEVEL
370	2388	TL.6010L	THALLIUM BY ICP 6010B LOW LEVEL
370	2466	PB.6010	LEAD BY ICP 6010B
370	2345	SB.6010	ANTIMONY BY ICP 6010B
370	3882	HG.7471	MERCURY BY COLD VAPOR METHOD 7471A
	2153	160.3M	PERCENT SOLIDS

RDER # : 1043117 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB318-0-1
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/05/07 SAMPLE DATE: 10/03/07 TIME: 1320 LOG DATE: 10/05/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME	
370	2343	AL.6010	ALUMINUM BY ICP 6010B
370	2350	BA.6010	BARIUM BY ICP 6010B
370	2353	BE.6010	BERYLLIUM BY ICP 6010B
370	2355	CD.6010	CADMIUM BY ICP 6010B
370	2358	CA.6010	CALCIUM BY ICP 6010B
370	2361	CR.6010	CHROMIUM BY ICP 6010B
370	2392	CO.6010	COBALT BY ICP 6010B
370	2364	CU.6010	COPPER BY ICP 6010B
370	2366	FE.6010	IRON BY ICP 6010B
370	2371	MG.6010	MAGNESIUM BY ICP 6010B
370	2373	MN.6010	MANGANESE BY ICP 6010B
370	2378	NI.6010	NICKEL BY ICP 6010B
370	2380	K.6010	POTASSIUM BY ICP 6010B/200.7
370	2382	AG.6010	SILVER BY ICP 6010B
370	2385	NA.6010	SODIUM BY ICP 6010B
370	2391	V.6010	VANADIUM BY ICP 6010B
370	2389	ZN.6010	ZINC BY ICP 6010B
370	2465	AS.6010L	ARSENIC BY ICP 6010B LOW LEVEL
370	2381	SE.6010L	SELENIUM BY ICP 6010B LOW LEVEL
370	2388	TL.6010L	THALLIUM BY ICP 6010B LOW LEVEL
370	2466	PB.6010	LEAD BY ICP 6010B
370	2345	SB.6010	ANTIMONY BY ICP 6010B
370	3882	HG.7471	MERCURY BY COLD VAPOR METHOD 7471A
	2153	160.3M	PERCENT SOLIDS

RDER # : 1043118 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB318-2-4
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/05/07 SAMPLE DATE: 10/03/07 TIME: 1320 LOG DATE: 10/05/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME	
370	2343	AL.6010	ALUMINUM BY ICP 6010B
370	2350	BA.6010	BARIUM BY ICP 6010B
370	2353	BE.6010	BERYLLIUM BY ICP 6010B
370	2355	CD.6010	CADMIUM BY ICP 6010B
370	2358	CA.6010	CALCIUM BY ICP 6010B
370	2361	CR.6010	CHROMIUM BY ICP 6010B
370	2392	CO.6010	COBALT BY ICP 6010B
370	2364	CU.6010	COPPER BY ICP 6010B
370	2366	FE.6010	IRON BY ICP 6010B
370	2371	MG.6010	MAGNESIUM BY ICP 6010B
370	2373	MN.6010	MANGANESE BY ICP 6010B
370	2378	NI.6010	NICKEL BY ICP 6010B
370	2380	K.6010	POTASSIUM BY ICP 6010B/200.7
370	2382	AG.6010	SILVER BY ICP 6010B
370	2385	NA.6010	SODIUM BY ICP 6010B
370	2391	V.6010	VANADIUM BY ICP 6010B
370	2389	ZN.6010	ZINC BY ICP 6010B
370	2465	AS.6010L	ARSENIC BY ICP 6010B LOW LEVEL
370	2381	SE.6010L	SELENIUM BY ICP 6010B LOW LEVEL
370	2388	TL.6010L	THALLIUM BY ICP 6010B LOW LEVEL
370	2466	PB.6010	LEAD BY ICP 6010B
370	2345	SB.6010	ANTIMONY BY ICP 6010B
370	3882	HG.7471	MERCURY BY COLD VAPOR METHOD 7471A
	2153	160.3M	PERCENT SOLIDS

)RDER # : 1043119 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB406 METALS
)RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
)ATE RECEIVED: 10/05/07 SAMPLE DATE: 10/03/07 TIME: 1715 LOG DATE: 10/05/07 **QC:** NA

)ROFILE NO.	TEST NO.	TEST NAME	
)370	2343	AL.6010	ALUMINUM BY ICP 6010B
370	2350	BA.6010	BARIUM BY ICP 6010B
370	2353	BE.6010	BERYLLIUM BY ICP 6010B
370	2355	CD.6010	CADMIUM BY ICP 6010B
370	2358	CA.6010	CALCIUM BY ICP 6010B
370	2361	CR.6010	CHROMIUM BY ICP 6010B
370	2392	CO.6010	COBALT BY ICP 6010B
370	2364	CU.6010	COPPER BY ICP 6010B
370	2366	FE.6010	IRON BY ICP 6010B
370	2371	MG.6010	MAGNESIUM BY ICP 6010B
370	2373	MN.6010	MANGANESE BY ICP 6010B
370	2378	NI.6010	NICKEL BY ICP 6010B
370	2380	K.6010	POTASSIUM BY ICP 6010B/200.7
370	2382	AG.6010	SILVER BY ICP 6010B
370	2385	NA.6010	SODIUM BY ICP 6010B
370	2391	V.6010	VANADIUM BY ICP 6010B
370	2389	ZN.6010	ZINC BY ICP 6010B
370	2465	AS.6010L	ARSENIC BY ICP 6010B LOW LEVEL
370	2381	SE.6010L	SELENIUM BY ICP 6010B LOW LEVEL
370	2388	TL.6010L	THALLIUM BY ICP 6010B LOW LEVEL
370	2466	PB.6010	LEAD BY ICP 6010B
370	2345	SB.6010	ANTIMONY BY ICP 6010B
370	3882	HG.7471	MERCURY BY COLD VAPOR METHOD 7471A
	2153	160.3M	PERCENT SOLIDS

DER # : 1043120 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB315-2-4
DER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
TE RECEIVED: 10/05/07 SAMPLE DATE: 10/03/07 TIME: 1715 LOG DATE: 10/05/07 **QC:** QC

OFILE NO.	TEST NO.	TEST NAME	
370	2343	AL.6010	ALUMINUM BY ICP 6010B
370	2350	BA.6010	BARIUM BY ICP 6010B
370	2353	BE.6010	BERYLLIUM BY ICP 6010B
370	2355	CD.6010	CADMIUM BY ICP 6010B
370	2358	CA.6010	CALCIUM BY ICP 6010B
370	2361	CR.6010	CHROMIUM BY ICP 6010B
370	2392	CO.6010	COBALT BY ICP 6010B
370	2364	CU.6010	COPPER BY ICP 6010B
370	2366	FE.6010	IRON BY ICP 6010B
370	2371	MG.6010	MAGNESIUM BY ICP 6010B
370	2373	MN.6010	MANGANESE BY ICP 6010B
370	2378	NI.6010	NICKEL BY ICP 6010B
370	2380	K.6010	POTASSIUM BY ICP 6010B/200.7
370	2382	AG.6010	SILVER BY ICP 6010B
370	2385	NA.6010	SODIUM BY ICP 6010B
370	2391	V.6010	VANADIUM BY ICP 6010B
370	2389	ZN.6010	ZINC BY ICP 6010B
370	2465	AS.6010L	ARSENIC BY ICP 6010B LOW LEVEL
370	2381	SE.6010L	SELENIUM BY ICP 6010B LOW LEVEL
370	2388	TL.6010L	THALLIUM BY ICP 6010B LOW LEVEL
370	2466	PB.6010	LEAD BY ICP 6010B
370	2345	SB.6010	ANTIMONY BY ICP 6010B
370	3882	HG.7471	MERCURY BY COLD VAPOR METHOD 7471A
	2153	160.3M	PERCENT SOLIDS

Cooler Receipt And Preservation Check Form

Project/Client Geosyntec Submission Number R2740161.

Cooler received on 10/5/07 by: KM **COURIER:** CAS UPS FEDEX VELOCITY CLIENT

1.	Were custody seals on outside of cooler?	YES	NO			
2.	Were custody papers properly filled out (ink, signed, etc.)?	YES	NO			
3.	Did all bottles arrive in good condition (unbroken)?	YES	NO			
4.	Did any VOA vials have significant air bubbles?	YES	NO	N/A		
5.	Were **Ice** or **Ice packs** present? ice only on bottom	YES	NO			
6.	Where did the bottles originate?	CAS/ROC, CLIENT				
7.	Temperature of cooler(s) upon receipt:	8°C				
	Is the temperature within 0° - 6° C?:	Yes	Yes	Yes	Yes	Yes
	If No, Explain Below	No	No	No	No	No

Date/Time Temperatures Taken: 10/5/07 1020

Thermometer ID: 161 or IR GUN Reading From: Temp Blank or Sample Bottle

If out of Temperature, Client Approval to Run Samples _____

PC Secondary Review: JPatten

Cooler Breakdown: Date : 10/5/07 by: RG

1.	Were all bottle labels complete (*i.e.* analysis, preservation, etc.)?	YES	NO
2.	Did all bottle labels and tags agree with custody papers?	YES	NO
3.	Were correct containers used for the tests indicated?	YES	NO
4.	Air Samples: Cassettes / Tubes Intact Canisters Pressurized Tedlar® Bags Inflated		N/A

Explain any discrepancies: _____

		YES	NO	Sample I.D.	Reagent	Vol. Added	Final pH
pH	Reagent						
≥12	NaOH						
≤2	HNO_3						
≤2	H_2SO_4						
Residual Chlorine (+/-)	for TCN & Phenol						

YES = All samples OK NO = Samples were preserved at lab as listed PC OK to adjust pH _____

VOC Vial pH Verification (Tested after Analysis) Following Samples Exhibited pH > 2		

Other Comments:

PC Secondary Review: _____

Columbia Analytical Services, Inc.
An Employee - Owned Company
www.caslab.com

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

One Mustard St., Suite 250 • Rochester, NY 14609-0859 • (585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 PAGE 1 OF 3

SR #

CAS Contact

Project Name: Carus Chemicals	Project Number: FR1347
Project Manager: Nandra Weeks	Report CC:
Company/Address: Geosyntec	
2258 Riverside Avenue	
Jacksonville, FL 32204	
Phone #: 904-388-8821	FAX#: 904-388-8163
Sampler's Signature:	Sampler's Printed Name: Brad Bodine

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

PRESERVATIVE: Methanol/Sodium bisulfate

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's 8260 CLP	GC/MS SVOA's 8270 625 CLP	GC VOA's 8021 601/602	PESTICIDES 8081 608 CLP	PCB's 8082 608 CLP	METALS, TOTAL TAL CLP	METALS, DISSOLVED (List in comments below)	Cyanide	% Solids	REMARKS/ ALTERNATE DESCRIPTION
OU1-SS-SB316-2-4	1043009	10/3	1200	Soil	7	X	X		X	X	X		X	X	3 VOAs (40mL) 4-407
OU1-SS-SB316-0-1	1043108	10/3	1200	"	1						X				1-407
OU1-SS-SB312-2-4	1043010	10/3	1615	"	7	X	X		X	X	X		X	X	3VOAs 4-407
OU1-SS-SB312-0-1	1043109	10/3	1615	"	1						X				1-407
OU1-SS-SB314-0-1	1043011	10/3	1545	"	7	X	X		X	X	X		X	X	3VOA (40mL) 4-402
OU1-SS-SB314-2-4	1043110	10/3	1545	"							X				1-407
OU1-SS-SB319-0-1	1043076	10/3	1415	"	7	X	X		X		X		X	X	3VOA 4-407
OU1-SS-SB313-2-4	1043111	10/3	1515	"							X				1-407
OU1-SS-SB313-0-1	1043112	10/3	1615	"							X				1-407
OU1-SS-SB317-0-1	1043113	10/3	1500	"							X				1-407

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other

SPECIAL INSTRUCTIONS/COMMENTS
Metals

See QAPP ☐

TURNAROUND REQUIREMENTS
____ RUSH (SURCHARGES APPLY)
____ 24 hr ____ 48 hr ____ 5 day
X STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
____ I. Results Only
____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III. Results + QC and Calibration Summaries
____ IV. Data Validation Report with Raw Data
X V. Speicalized Forms / Custom Report
Edata X Yes ____ No

INVOICE INFORMATION
PO# FR 1347
BILL TO: N. Weeks / Geosyntec
2258 Riverside Ave
Jacksonville, FL 32204
SUBMISSION #: R27 40161

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature: Brad Bodine	Signature: Kelley M. Cook / K. Cook	Signature	Signature	Signature	Signature
Printed Name: Brad Bodine	Printed Name:	Printed Name	Printed Name	Printed Name	Printed Name
Firm: Geosyntec	Firm: 10/5/07	Firm	Firm	Firm	Firm
Date/Time: 10/4/07 0830	Date/Time:	Date/Time	Date/Time	Date/Time	Date/Time

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

Columbia Analytical Services, Inc.
An Employee - Owned Company
www.caslab.com

One Mustard St., Suite 250 • Rochester, NY 14609-0859 • (585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 PAGE 2 OF 3

SR #

CAS Contact

Project Name: Carus Chemicals	Project Number: FR1347
Project Manager: Nadia Weeks	Report CC:
Company/Address: Geosyntec 2258 Riverside Avenue Jacksonville, FL 32204	
Phone #: 904-388-8821	FAX#: 904-388-8163
Sampler's Signature: Brad Bodine	Sampler's Printed Name: Brad Bodine

ANALYSIS REQUESTED *(Include Method Number and Container Preservative)*

PRESERVATIVE: Methanol / Sodium bisulfate

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's 8260 ☐ 624 ☐ CLP	GC/MS SVOA's ☐ 8270 ☐ 625 ☐ CLP	GC VOA's ☐ 8021 ☐ 601/602	PESTICIDES 8081 ☐ 608 ☐ CLP	PCB's 8082 ☐ 608 ☐ CLP	METALS, TOTAL (List in comments below) TAL	METALS, DISSOLVED (List in comments below)	Cyanide	% Solids	REMARKS/ ALTERNATE DESCRIPTION
OU1-SS-SB317-2-4	1043114	10/3	1500	Soil	1						X				1-4oz
OU1-SS-SB314-2-4	115	10/3	1645	"	1						X				1-4oz
OU1-SS-SB314-0-1	116	10/3	1645	"	1						X				1-4oz
OU1-SS-SB318-0-1	117	10/3	1320	"	1						X				1-4oz
OU1-SS-SB318-2-4	118	10/3	1320	"	1		SB				X				1-4oz
OU1-SS-SB406	119	10/3	1715	"	21	BB					X				1-8oz
OU1-SS-SB406	1043079	10/3	1720	"	23		X		X	X			X	X	3-8oz
OU1-SS-SB406	080	10/3	1745	"	3	X									3 VOAs
OU1-SS-SB315-2-4	1043120	10/3	1715	"	1		BB				X				1-4oz
OU1-SS-SB315-0-1	1043078	10/3	1715	"	7	X	X		X	X	X		X	X	3 VOAs 4-4oz

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other _____

SPECIAL INSTRUCTIONS/COMMENTS
Metals

See QAPP ☐

TURNAROUND REQUIREMENTS
_____ RUSH (SURCHARGES APPLY)
_____ 24 hr _____ 48 hr _____ 5 day
X STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
_____ I. Results Only
_____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
_____ III. Results + QC and Calibration Summaries
_____ IV. Data Validation Report with Raw Data
X V. Speicalized Forms / Custom Report
Edata X Yes _____ No

INVOICE INFORMATION
PO# FR 1347
BILL TO: N. Weeks / Geosyntec
2258 Riverside Ave.
Jacksonville, FL 32204
SUBMISSION #: R0740161

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature: Brad Bodine	Signature: Nancy M. Cook / K. Cook	Signature	Signature	Signature	Signature
Printed Name: Brad Bodine	Printed Name: CAS	Printed Name	Printed Name	Printed Name	Printed Name
Firm: Geosyntec	Firm: 105798O	Firm	Firm	Firm	Firm
Date/Time: 10/4/07 0830	Date/Time	Date/Time	Date/Time	Date/Time	Date/Time

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

Appendix G-4-1a: Data Validation Reports, COCs, Analytical Lab Reports
Matthiessen & Hegeler Zinc Site
Final Remedial Investigation Report

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

Columbia Analytical Services, Inc.
An Employee - Owned Company
www.caslab.com

One Mustard St., Suite 250 • Rochester, NY 14609-0859 • (585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 PAGE 3 OF 3

SR #

CAS Contact

Project Name: Conv Chemicals	Project Number: FR1347
Project Manager: Nandra Weeks	Report CC:
Company/Address: Geosyntec 2258 Riverside Avenue Jacksonville, FL 32204	
Phone #: 904-388-8821	FAX#: 904-388-8163
Sampler's Signature: Brad Bodine	Sampler's Printed Name: Brad Bodine

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

PRESERVATIVE: Methanol / Sodium bisulfate

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's ☒ 8260 ☐ 624 ☐ CLP	GC/MS SVOA's ☐ 8270 ☐ 625 ☐ CLP	GC VOA's ☐ 8021 ☐ 601/602	PESTICIDES ☒ 8081 ☐ 608 ☐ CLP	PCB's ☒ 8082 ☐ 608 ☐ CLP	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	Cyanide	% Solids						REMARKS/ ALTERNATE DESCRIPTION
OU1-SS-SB315-0-1		10/3	1715	Soil	6	X	X		X	X			X	X						Matrix Spike
OU1-SS-SB315-0-1		10/3	1715	Soil	6	X	X		X	X			X	X						Matrix Spike Duplicate
OU1-SS-SB315-2-4		10/3	1715	"	1						X									Matrix Spike
OU1-SS-SB315-2-4		10/3	1715	"	1						X									Matrix Spike duplicate
OU1-GW-MW-402	1043081	10/3	1330	GW	3	X														

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other _____

SPECIAL INSTRUCTIONS/COMMENTS
Metals

See QAPP ☐

TURNAROUND REQUIREMENTS
_____ RUSH (SURCHARGES APPLY)
_____ 24 hr _____ 48 hr _____ 5 day
X STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
_____ I. Results Only
_____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
_____ III. Results + QC and Calibration Summaries
_____ IV. Data Validation Report with Raw Data
X V. Speicalized Forms / Custom Report
Edata X Yes _____ No

INVOICE INFORMATION
PO# FR1347
BILL TO: N. Weeks / Geosyntec
2258 Riverside Ave
Jacksonville, FL 32204
SUBMISSION #: 43161

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature: Brad Bodine	Signature: Molly M. Cook	Signature	Signature	Signature	Signature
Printed Name: Brad Bodine	Printed Name: Molly M. Cook	Printed Name	Printed Name	Printed Name	Printed Name
Firm: Geosyntec	Firm: CAS	Firm	Firm	Firm	Firm
Date/Time: 10/4/07 0830	Date/Time: 10/5/07 9:30	Date/Time	Date/Time	Date/Time	Date/Time

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

Columbia Analytical Services inc.

ACKNOWLEDGEMENT OF RECEIPT OF SAMPLES

Date: October 11, 2007

Client: Geosyntec-IL

Attention: Ms. Nandra Weeks

Fax No.: (904)388-8163

From: Deb Patton

Receipt Date: 10/11/07

Project: CARUS CHEMICAL FR 1347

Submission #: R2740248

Number of pages (including cover sheet): 13

Samples were received at our facility in good condition. Please contact Deb Patton at (585) 288-5380 if you have any questions regarding this information. Thank you for choosing Columbia Analytical Services for your analytical needs.

3° Cooler Temperature
NA Vials intact
NA Vials free from air bubbles
✓ Bottles intact
✓ Custody Seal intact

Comments:_____

Columbia Analytical Services, Inc.
1 Mustard St.
Suite 250
Rochester, NY 14609
(585) 288-5380
(585) 288-8475 fax

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

Columbia Analytical Services INC.
An Employee - Owned Company
www.caslab.com

One Mustard St., Suite 250 • Rochester, NY 14609-0859 • (585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 PAGE 3 OF 3

SR #

CAS Contact

Project Name: Carus Chemical | Project Number: FR1347

Project Manager: Nandra Weeks | Report CC: Joey McKinnon

Company/Address: 2258 Riverside Avenue, Jacksonville, Florida 32204

Phone #: 904-388-8821 | FAX#:

Sampler's Signature: Elena Evans | Sampler's Printed Name: Elena Evans

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

PRESERVATIVE: 0 | 0 | 0

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's 8260 ☐ 624 ☐ CLP MeOH SB#21	GC/MS SVOA's 8270 ☐ 625 ☐ CLP	GC VOA's 8021 ☐ 601/602	PESTICIDES 8081 ☐ 608 ☐ CLP	PCB's 8082 ☐ 608 ☐ CLP	METALS, TOTAL 6010B/6020 ☐ CLP (List in comments below)	METALS, DISSOLVED (List in comments below)	% solids, Cyanides								REMARKS/ ALTERNATE DESCRIPTION
OU1-SS-SB304-0-1	✓	10/10	14:28	Soil	1						X										
OU1-SS-SB304-58-59	✓	10/10	16:20	Soil	1						X										
OU1-SS-SB304-59-60	✓	10/10	16:32	Soil	1						X										
OU1-SS-SB304-59-60	✓	10/10	16:35	Soil	1								X								
OU1-SS-SB304-59-60	✓	10/10	16:38	Soil	1		X														
OU1-SS-SB304-59-60	✓	10/10	16:30	Soil	1	X															
OU1-SS-SB304-59-60	✓	10/10	16:25	Soil	1	X															
OU1-SS-SB304-59-60	✓	10/10	16:28	Soil	1	X															
OU1-SS-SB402	✓	10/10	1020	BW	3	X															

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other _____

SPECIAL INSTRUCTIONS/COMMENTS
Metals - project specific metals list

See QAPP ☐

TURNAROUND REQUIREMENTS
____ RUSH (SURCHARGES APPLY)
____ 24 hr ____ 48 hr ____ 5 day
X STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
____ I. Results Only
____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III. Results + QC and Calibration Summaries
____ IV. Data Validation Report with Raw Data
X V. Specialized Forms / Custom Report
Edata ____ Yes ____ No

INVOICE INFORMATION
PO# FR1347
BILL TO: Jill Johnson
SUBMISSION #:

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature	Signature	Signature	Signature	Signature: Elena Evans	Signature: Amy Hentschke
Printed Name	Printed Name	Printed Name	Printed Name	Printed Name: Geosyntec	Printed Name: CAS
Firm	Firm	Firm	Firm	Firm: 10/10 6pm	Firm: 10/11/07 9:57
Date/Time	Date/Time	Date/Time	Date/Time	Date/Time: 651-341-9747	Date/Time

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

Columbia Analytical Services, Inc.
An Employee - Owned Company
www.casleb.com

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

One Mustard St., Suite 250 • Rochester, NY 14609-0859 • (585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475

SR #

CAS Contact

Project Name: Carus Chemical	Project Number: FR 1347
Project Manager: Nandra Weeks	Report CC: Joey McKinnon
Company/Address: 2258 Riverside Avenue, Jacksonville, Florida 32204	
Phone #: 904-388-8821	FAX#
Sampler's Signature: Elena Evans	Sampler's Printed Name: Elena Evans

ANALYSIS REQUESTED *(Include Method Number and Container Preservative)*

PRESERVATIVE: 0 | 0 | 0 | 0 | 0

Preservative Key: 0. NONE; 1. HCL; 2. HNO_3; 3. H_2SO_4; 4. NaOH; 5. Zn. Acetate; 6. MeOH; 7. $NaHSO_4$; 8. Other _____

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's 8260 ☐ 624 ☐ CLP	GC/MS SVOA's 8270 ☐ 625 ☐ CLP	GC VOA's 8021 ☐ 601/602	PESTICIDES 8081 ☐ 608 ☐ CLP	PCB's 8082 ☐ 608 ☐ CLP	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	% Solids, Cyanide	SPLP	REMARKS/ ALTERNATE DESCRIPTION
OU1-SS-SB301-0-1	✓	10/9	19:07	Soil	1						X				
OU1-SS-SB301-0-1	✓	10/9	14:30	Soil	1				X	X					
OU1-SS-SB301-0-1	✓	10/9	14:32	Soil	1			X							
OU1-SS-SB301-0-1	✓	10/9	14:28	Soil	1							X			
OU1-SS-SB301-0-1	✓	10/9	14:18	Soil	1	X									
OU1-SS-SB301-0-1		10/9	14:17	Soil	1	X									
OU1-SS-SB301-0-1		10/9	14:19	Soil	1	X									
OU1-SS-SB301-40-50	✓	10/9	16:16	Soil	1						X				
OU1-SS-SB301-40-41	✓	10/9	16:19	Soil	1						X				
OU1-SS-SB304-0-1	✓	10/10	14:25	Soil	1								X		pH

QC

SPECIAL INSTRUCTIONS/COMMENTS
Metals – project specified metals list

See QAPP ☐

TURNAROUND REQUIREMENTS
____ RUSH (SURCHARGES APPLY)
____ 24 hr ____ 48 hr ____ 5 day
____ STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
____ I. Results Only
____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III. Results + QC and Calibration Summaries
____ IV. Data Validation Report with Raw Data
____ V. Specialized Forms / Custom Report
Edata ____ Yes ____ No

INVOICE INFORMATION
PO# FR 1347
BILL TO: Jill Johnson
SUBMISSION #:

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature	Signature	Signature	Signature
Printed Name	Printed Name	Printed Name	Printed Name
Firm	Firm	Firm	Firm
Date/Time	Date/Time	Date/Time	Date/Time

RELINQUISHED BY	RECEIVED BY
Signature: Elena Evans	Signature: Amy Hentschke
Printed Name: Elena Evans	Printed Name: Amy Hentschke
Firm: Geosyntec	Firm: CAS
Date/Time: 10/10 6pm	Date/Time: 10/11/07 9:50
651-341-9717	

SCOC-1102-08

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

Columbia Analytical Services, Inc.
An Employee - Owned Company
www.caslab.com

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

One Mustard St., Suite 250 • Rochester, NY 14609-0859 • (585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 PAGE 1 OF 3

SR #

CAS Contact

Project Name	~~MEH~~ Carus Chemical
Project Number	FR 1347
Project Manager	Nandra Weeks
Report CC	Joey McKinnon
Company/Address	2258 Riverside Avenue Jacksonville, Florida 32204
Phone #	904-388-8821
FAX#	
Sampler's Signature	Elena Evans
Sampler's Printed Name	Elena Evans

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

PRESERVATIVE: 6, 0, 0, 0, 0

	CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's ☒ 8260 ☐ 624 ☐ CLP	GC/MS SVOA's ☐ 8270 ☐ 625 ☐ CLP	GC VOA's ☐ 8021 ☐ 601/602	PESTICIDES ☐ 8081 ☐ 608 ☐ CLP	PCB's ☐ 8082 ☐ 608 ☐ CLP	METALS, TOTAL 6010/6020 (List in comments below)	METALS, DISSOLVED (List in comments below)	Cyanide, % solids	SPLP	REMARKS/ ALTERNATE DESCRIPTION
X	OU1-SS-SB302-0-1	✓	10/9	10:33	Soil	1						X				
X	OU1-SS-SB302-10.5-11.5	✓	10/9	11:50	Soil	1						X				
X	OU1-SS-SB302-10.5-11.5	✓	10/9	11:57	Soil	1		X								
X	OU1-SS-SB302-10.5-11.5	✓	10/9	11:54	Soil	1								X		
X	OU1-SS-SB302-10.5-11.5	✓	10/9	11:52	Soil	1									X	pH
X	OU1-SS-SB302-10.5-11.5	✓	10/9	11:37	Soil	1	X									
X	OU1-SS-SB302-10.5-11.5		10/9	11:36	Soil	1	X									
X	OU1-SS-SB302-10.5-11.5		10/9	11:35	Soil	1	X									
X	OU1-SS-SB302-12-13	✓	10/9	11:45	Soil	1						X				
X	OU1-SS-SB301-0-1	✓	10/9	14:40	Soil										X	pH

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other _____

SPECIAL INSTRUCTIONS/COMMENTS
Metals – project specific metal list

See QAPP ☐

TURNAROUND REQUIREMENTS
____ RUSH (SURCHARGES APPLY)
____ 24 hr ____ 48 hr ____ 5 day
____ STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
____ I. Results Only
____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III. Results + QC and Calibration Summaries
____ IV. Data Validation Report with Raw Data
____ V. Specialized Forms / Custom Report
Edata ____ Yes ____ No

INVOICE INFORMATION
PO# FR1347
BILL TO: Jill Johnson
SUBMISSION #: 40248

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature	Signature	Signature	Signature
Printed Name	Printed Name	Printed Name	Printed Name
Firm	Firm	Firm	Firm
Date/Time	Date/Time	Date/Time	Date/Time

RELINQUISHED BY	RECEIVED BY
Signature: Elena Evans	Signature: Amy Hentschke
Printed Name: Geosyntec	Printed Name: CAS
Firm: 10/10 6 pm	Firm: 10/11/07 9:50
Date/Time: 651-341-9717	Date/Time

SCOC-1102-06

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

Cooler Receipt And Preservation Check Form

Project/Client GeoSyntec Submission Number R2740248

Cooler received on 10/11/07 by: AWH **COURIER:** CAS UPS (FEDEX) VELOCITY CLIENT

1.	Were custody seals on outside of cooler?	(YES)	NO			
2.	Were custody papers properly filled out (ink, signed, etc.)?	(YES)	NO			
3.	Did all bottles arrive in good condition (unbroken)?	(YES)	NO			
4.	Did any VOA vials have significant air bubbles?	YES	NO	(N/A)		
5.	Were **Ice** or **Ice packs** present?	(YES)	NO			
6.	Where did the bottles originate?	(CAS/ROC,)	CLIENT			
7.	Temperature of cooler(s) upon receipt:	3°				
	Is the temperature within 0° - 6° C?:	(Yes)	Yes	Yes	Yes	Yes
	If No, Explain Below	No	No	No	No	No

Date/Time Temperatures Taken: 10/10/07 10:37

Thermometer ID: 161 or (IR GUN) Reading From: Temp Blank or (Sample Bottle)

If out of Temperature, Client Approval to Run Samples _____

PC Secondary Review: Jane

Cooler Breakdown: Date: _____ by: _____

1.	Were all bottle labels complete (*i.e.* analysis, preservation, etc.)?	YES	NO
2.	Did all bottle labels and tags agree with custody papers?	YES	NO
3.	Were correct containers used for the tests indicated?	YES	NO
4.	Air Samples: Cassettes / Tubes Intact Canisters Pressurized Tedlar® Bags Inflated		N/A

Explain any discrepancies: _____

		YES	NO	Sample I.D.	Reagent	Vol. Added	Final pH
pH	Reagent						
≥12	NaOH						
≤2	HNO_3						
≤2	H_2SO_4						
Residual Chlorine (+/-)	for TCN & Phenol						

YES = All samples OK NO = Samples were preserved at lab as listed PC OK to adjust pH _____

VOC Vial pH Verification (Tested after Analysis) Following Samples Exhibited pH > 2		

Other Comments:

PC Secondary Review: _____

Printed: 10/11/07 13:58

COLUMBIA ANALYTICAL SERVICES/ANALYTICAL REQUEST

LAB SAM JOB #: CERT FEE?:N
CAS JOB:R2740248 PROJECT NAME:CARUS CHEMICAL FR 1347
CLIENT ID: Geosyntec-IL CLIENT NAME:Geosyntec-IL
PHONE #: (904)388-8821 CONTACT:Geosyntec-IL 1 Ms. Nandra Weeks
ADDRESS: 2258 Riverside Ave.
CITY:Jacksonville STATE:Fl ZIP:32204
COPIES TO:

CLIENT REP: Deb Patton EST. INV. AMT: $200.00
CLIENT P.O. NUMBER: CONTRACT NUMBER:
QUOTATION #:6 SURCHARGE: -1
TURNAROUND REQUIRED:(RUSH/NOSURCHARGE) PROMISED DATE: 10/25/07
REPORT TYPE:ASPB QC:RUN
SAMPLED BY: CLIENT TRANSFER METHOD: FEDEX
SPECIAL JOB NOTES:
JOB TEMPERATURE 3°
LABEL NOTES: 2 WEEK RUSH

ORDER # : 1044839 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB302-0-1
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/11/07 SAMPLE DATE: 10/09/07 TIME: 1033 LOG DATE: 10/11/07 **QC:** RUN

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A

ORDER # : 1044840 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB302-10.5-11.5
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/11/07 SAMPLE DATE: 10/09/07 TIME: 1150 LOG DATE: 10/11/07 **QC:** RUN

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	4128	CD.6020 CADMIUM BY ICP/MS 6020

)RDER # : 1044840 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB302-10.5-11.5
)RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
)ATE RECEIVED: 10/11/07 SAMPLE DATE: 10/09/07 TIME: 1150 LOG DATE: 10/11/07 **QC:** RUN

)ROFILE NO.	TEST NO.	TEST NAME
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A

)RDER # : 1044841 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB302-12-13
)RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
)ATE RECEIVED: 10/11/07 SAMPLE DATE: 10/09/07 TIME: 1145 LOG DATE: 10/11/07 **QC:** RUN

)ROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A

RDER # : 1044842 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB301-0-1
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/11/07 SAMPLE DATE: 10/09/07 TIME: 1407 LOG DATE: 10/11/07 **QC:** RUN

ROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020

ORDER # : 1044842 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB301-0-1
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/11/07 SAMPLE DATE: 10/09/07 TIME: 1407 LOG DATE: 10/11/07 **QC:** RUN

PROFILE NO.	TEST NO.	TEST NAME
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A

ORDER # : 1044843 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB301-44-50
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/11/07 SAMPLE DATE: 10/09/07 TIME: 1616 LOG DATE: 10/11/07 **QC:** RUN

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A

ORDER # : 1044844 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB301-40-41
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/11/07 SAMPLE DATE: 10/09/07 TIME: 1619 LOG DATE: 10/11/07 **QC:** RUN

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B

RDER # : 1044844 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB301-40-41
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/11/07 SAMPLE DATE: 10/09/07 TIME: 1619 LOG DATE: 10/11/07 **QC:** RUN

ROFILE NO.	TEST NO.	TEST NAME
	2373	MN.6010 MANGANESE BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A

RDER # : 1044846 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB304-0-1
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/11/07 SAMPLE DATE: ~~10/09/07~~ 10/10/07 TIME: 1428 LOG DATE: 10/11/07 **QC:** RUN

ROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A

RDER # : 1044848 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB304-58-59
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/11/07 SAMPLE DATE: ~~10/09/07~~ 10/10/07 TIME: 1620 LOG DATE: 10/11/07 **QC:** RUN

ROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020

RDER # : 1044848 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB304-58-59
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/11/07 SAMPLE DATE: 10/09/07 TIME: 1620 LOG DATE: 10/11/07 **QC:** RUN

ROFILE NO.	TEST NO.	TEST NAME
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A

RDER # : 1044849 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB304-59-60
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/11/07 SAMPLE DATE: 10/09/07 TIME: 1632 LOG DATE: 10/11/07 **QC:** RUN

ROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A

RDER # : 1044860 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB302-10.5-11.5
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/11/07 SAMPLE DATE: 10/09/07 TIME: 1157 LOG DATE: 10/11/07 **QC:** RUN

ROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	4418	8270C.OL4Q OLM 4.2 LIST BY 8270C FULL QC LIST

RDER # : 1044861 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB301-0-1
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/11/07 SAMPLE DATE: 10/09/07 TIME: 1432 LOG DATE: 10/11/07 **QC:** RUN

ROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	4418	8270C.OL4Q OLM 4.2 LIST BY 8270C FULL QC LIST

ORDER # : 1044862 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB304-59-60
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/11/07 SAMPLE DATE: ~~10/09/07~~ 10/10/07 TIME: 1638 LOG DATE: 10/11/07 **QC:** RUN

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	4418	8270C.OL4Q OLM 4.2 LIST BY 8270C FULL QC LIST

ORDER # : 1044863 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB302-10.5-11.5
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/11/07 SAMPLE DATE: 10/09/07 TIME: 1154 LOG DATE: 10/11/07 **QC:** RUN

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2950	9012.TOT TOTAL CYANIDE BY SW-846 9012A

ORDER # : 1044865 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB301-0-1
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/11/07 SAMPLE DATE: 10/09/07 TIME: 1428 LOG DATE: 10/11/07 **QC:** RUN

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2950	9012.TOT TOTAL CYANIDE BY SW-846 9012A

ORDER # : 1044866 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB304-59-60
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/11/07 SAMPLE DATE: ~~10/09/07~~ 10/10/07 TIME: 1635 LOG DATE: 10/11/07 **QC:** RUN

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2950	9012.TOT TOTAL CYANIDE BY SW-846 9012A

ORDER # : 1044868 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB302-10.5-11.5
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/11/07 SAMPLE DATE: 10/09/07 TIME: 1135- LOG DATE: 10/11/07 **QC:** RUN

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	4414	8260B.OZPQ OLM 4.2 LIST BY 8260B - LL FULL QC

ORDER # : 1044869 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB301-0-1
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/11/07 SAMPLE DATE: 10/09/07 TIME: 1417- LOG DATE: 10/11/07 **QC:** RUN

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	4414	8260B.OZPQ OLM 4.2 LIST BY 8260B - LL FULL QC

ORDER # : 1044870 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB304-59-60
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/11/07 SAMPLE DATE: ~~10/09/07~~ 10/10/07 TIME: 1625- LOG DATE: 10/11/07 **QC:** RUN

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	4414	8260B.OZPQ OLM 4.2 LIST BY 8260B - LL FULL QC

RDER # : 1044871 **MATRIX:** WATER COLLECTION SITE: OU1-SS-SB402
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/11/07 SAMPLE DATE: 10/09/07 TIME: 1020 LOG DATE: 10/11/07 **QC:** RUN

ROFILE NO.	TEST NO.	TEST NAME
	4414	8260B.OZPQ OLM 4.2 LIST BY 8260B - LL FULL QC

RDER # : 1044872 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB301-0-1
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/11/07 SAMPLE DATE: 10/09/07 TIME: 1430 LOG DATE: 10/11/07 **QC:** RUN

ROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2787	8081A. ORGANOCHLORINE PESTICIDES ONLY
	3273	8082.PC82 PCB'S BY 8082

RDER # : 1044873 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB302-10.5-11.5
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/11/07 SAMPLE DATE: 10/09/07 TIME: 1152 LOG DATE: 10/11/07 **QC:** RUN

ROFILE NO.	TEST NO.	TEST NAME
2654	2686	AG.SPLP SPLP SILVER BY 6010B
2654	2885	AL.SPLP SPLP ALUMINUM BY ICP 6010B
2654	2678	AS.SPLP SPLP ARSENIC BY 6010B
2654	2679	BA.SPLP SPLP BARIUM BY 6010B
2654	3316	BE.SPLP SPLP BERYLLIUM BY 6010B
2654	3317	CA.SPLP SPLP CALCIUM BY 6010B
2654	2680	CD.SPLP SPLP CADMIUM BY 6010B
2654	2887	CO.SPLP SPLP COBALT BY ICP 6010B
2654	2681	CR.SPLP SPLP CHROMIUM BY 6010B
2654	2888	CU.SPLP SPLP COPPER BY ICP 6010B
2654	2889	FE.SPLP SPLP IRON BY ICP 6010B
2654	2683	HG.SPLP SPLP MERCURY BY 7470A
2654	2896	K.SPLP SPLP POTASSIUM BY ICP 6010B
2654	3318	MG.SPLP SPLP MAGNESIUM BY 6010B
2654	2891	MN.SPLP SPLP MANGANESE BY ICP 6010B
2654	2910	NA.SPLP SPLP SODIUM BY ICP 6010B
2654	2684	NI.SPLP SPLP NICKEL BY 6010B
2654	2682	PB.SPLP SPLP LEAD BY 6010B
2654	2894	SB.SPLP6 SPLP ANTIMONY BY ICP 6010B
2654	2685	SE.SPLP SPLP SELENIUM BY 6010B
2654	3319	TL.SPLP6 SPLP THALLIUM BY 6010B
2654	3320	V.SPLP SPLP VANADIUM BY 6010B
2654	2895	ZN.SPLP SPLP ZINC BY ICP 6010B
2654	2498	1312 SYNTHETIC PRECIPITATION LEACHING PROC.
	2153	160.3M PERCENT SOLIDS
	4560	9045. PH (SMO)

RDER # : 1044874 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB301-0-1
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/11/07 SAMPLE DATE: 10/09/07 TIME: 1440 LOG DATE: 10/11/07 **QC:** RUN

ROFILE NO.	TEST NO.	TEST NAME
2654	2686	AG.SPLP SPLP SILVER BY 6010B
2654	2885	AL.SPLP SPLP ALUMINUM BY ICP 6010B
2654	2678	AS.SPLP SPLP ARSENIC BY 6010B
2654	2679	BA.SPLP SPLP BARIUM BY 6010B
2654	3316	BE.SPLP SPLP BERYLLIUM BY 6010B
2654	3317	CA.SPLP SPLP CALCIUM BY 6010B

ORDER # : 1044874 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB301-0-1
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/11/07 SAMPLE DATE: 10/09/07 TIME: 1440 LOG DATE: 10/11/07 **QC:** RUN

PROFILE NO.	TEST NO.	TEST NAME
2654	2680	CD.SPLP SPLP CADMIUM BY 6010B
2654	2887	CO.SPLP SPLP COBALT BY ICP 6010B
2654	2681	CR.SPLP SPLP CHROMIUM BY 6010B
2654	2888	CU.SPLP SPLP COPPER BY ICP 6010B
2654	2889	FE.SPLP SPLP IRON BY ICP 6010B
2654	2683	HG.SPLP SPLP MERCURY BY 7470A
2654	2896	K.SPLP SPLP POTASSIUM BY ICP 6010B
2654	3318	MG.SPLP SPLP MAGNESIUM BY 6010B
2654	2891	MN.SPLP SPLP MANGANESE BY ICP 6010B
2654	2910	NA.SPLP SPLP SODIUM BY ICP 6010B
2654	2684	NI.SPLP SPLP NICKEL BY 6010B
2654	2682	PB.SPLP SPLP LEAD BY 6010B
2654	2894	SB.SPLP6 SPLP ANTIMONY BY ICP 6010B
2654	2685	SE.SPLP SPLP SELENIUM BY 6010B
2654	3319	TL.SPLP6 SPLP THALLIUM BY 6010B
2654	3320	V.SPLP SPLP VANADIUM BY 6010B
2654	2895	ZN.SPLP SPLP ZINC BY ICP 6010B
2654	2498	1312 SYNTHETIC PRECIPITATION LEACHING PROC.
	2153	160.3M PERCENT SOLIDS
	4560	9045. PH (SMO)

ORDER # : 1044875 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB304-0-1
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/11/07 SAMPLE DATE: ~~10/09/07~~ 10/10/07 TIME: 1425 LOG DATE: 10/11/07 **QC:** RUN

PROFILE NO.	TEST NO.	TEST NAME
2654	2686	AG.SPLP SPLP SILVER BY 6010B
2654	2885	AL.SPLP SPLP ALUMINUM BY ICP 6010B
2654	2678	AS.SPLP SPLP ARSENIC BY 6010B
2654	2679	BA.SPLP SPLP BARIUM BY 6010B
2654	3316	BE.SPLP SPLP BERYLLIUM BY 6010B
2654	3317	CA.SPLP SPLP CALCIUM BY 6010B
2654	2680	CD.SPLP SPLP CADMIUM BY 6010B
2654	2887	CO.SPLP SPLP COBALT BY ICP 6010B
2654	2681	CR.SPLP SPLP CHROMIUM BY 6010B
2654	2888	CU.SPLP SPLP COPPER BY ICP 6010B
2654	2889	FE.SPLP SPLP IRON BY ICP 6010B
2654	2683	HG.SPLP SPLP MERCURY BY 7470A
2654	2896	K.SPLP SPLP POTASSIUM BY ICP 6010B
2654	3318	MG.SPLP SPLP MAGNESIUM BY 6010B
2654	2891	MN.SPLP SPLP MANGANESE BY ICP 6010B
2654	2910	NA.SPLP SPLP SODIUM BY ICP 6010B
2654	2684	NI.SPLP SPLP NICKEL BY 6010B
2654	2682	PB.SPLP SPLP LEAD BY 6010B
2654	2894	SB.SPLP6 SPLP ANTIMONY BY ICP 6010B
2654	2685	SE.SPLP SPLP SELENIUM BY 6010B
2654	3319	TL.SPLP6 SPLP THALLIUM BY 6010B
2654	3320	V.SPLP SPLP VANADIUM BY 6010B
2654	2895	ZN.SPLP SPLP ZINC BY ICP 6010B
2654	2498	1312 SYNTHETIC PRECIPITATION LEACHING PROC.
	2153	160.3M PERCENT SOLIDS
	4560	9045. PH (SMO)

Columbia Analytical Services inc.

ACKNOWLEDGEMENT OF RECEIPT OF SAMPLES

Date: October 12, 2007

Client: Geosyntec-IL

Attention: Ms. Nandra Weeks

Fax No.: (904)388-8163

From: Deb Patton

Receipt Date: 10/12/07

Project: CARUS CHEMICAL FR1347

Submission #: R2740269

Number of pages (including cover sheet): 5

Samples were received at our facility in good condition. Please contact Deb Patton at (585) 288-5380 if you have any questions regarding this information. Thank you for choosing Columbia Analytical Services for your analytical needs.

3° Cooler Temperature
✓ Vials intact
✓ Vials free from air bubbles
✓ Bottles intact
✓ Custody Seal intact

Comments: _____

Columbia Analytical Services, Inc.
1 Mustard St.
Suite 250
Rochester, NY 14609
(585) 288-5380
(585) 288-8475 fax

rinted: 10/12/07 11:33

COLUMBIA ANALYTICAL SERVICES/ANALYTICAL REQUEST

AB SAM JOB #: CERT FEE?:N
AS JOB:R2740269 PROJECT NAME:CARUS CHEMICAL FR1347
LIENT ID: Geosyntec-IL CLIENT NAME:Geosyntec-IL
HONE #: (904)388-8821 CONTACT:Geosyntec-IL 1 Ms. Nandra Weeks
DDRESS: 2258 Riverside Ave.
ITY:Jacksonville STATE:Fl ZIP:32204
OPIES TO:

LIENT REP: Deb Patton EST. INV. AMT: $200.00
LIENT P.O. NUMBER: CONTRACT NUMBER:
UOTATION #:6 SURCHARGE: 0
URNAROUND REQUIRED:21 DAY TURN AROUND (REGULAR) PROMISED DATE: 10/26/07
EPORT TYPE:ASPB QC:NA
AMPLED BY: CLIENT TRANSFER METHOD: FEDEX
PECIAL JOB NOTES:
OB TEMPERATURE 3°
ABEL NOTES:

RDER # : 1045269 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB303-0-1
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/12/07 SAMPLE DATE: 10/11/07 TIME: 1231 LOG DATE: 10/12/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A
	2373	MN.6010 MANGANESE BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B
	2153	160.3M PERCENT SOLIDS

RDER # : 1045270 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB303-85-86
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/12/07 SAMPLE DATE: 10/11/07 TIME: 1428 LOG DATE: 10/12/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020

RDER # : 1045270 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB303-85-86
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/12/07 SAMPLE DATE: 10/11/07 TIME: 1428 LOG DATE: 10/12/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A
	2373	MN.6010 MANGANESE BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B
	2153	160.3M PERCENT SOLIDS

RDER # : 1045271 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB303-89-90
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/12/07 SAMPLE DATE: 10/11/07 TIME: 1529 LOG DATE: 10/12/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A
	2373	MN.6010 MANGANESE BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B

RDER # : 1045272 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB303-108-109
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/12/07 SAMPLE DATE: 10/11/07 TIME: 1522 LOG DATE: 10/12/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B

RDER # : 1045272 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB303-108-109
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/12/07 SAMPLE DATE: 10/11/07 TIME: 1522 LOG DATE: 10/12/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME	
	2417	HG.7470	MERCURY BY COLD VAPOR METHOD 7470A/7471A
	2373	MN.6010	MANGANESE BY ICP 6010B
	4118	NI.6020	NICKEL BY ICP/MS 6020
	4112	PB.6020	LEAD BY ICP/MS 6020
	2345	SB.6010	ANTIMONY BY ICP 6010B
	4114	SE.6020	SELENIUM BY ICP/MS 6020
	4127	TL.6020	THALLIUM BY ICP/MS 6020
	4130	V.6020	VANADIUM BY ICP/MS 6020
	2389	ZN.6010	ZINC BY ICP 6010B
	2153	160.3M	PERCENT SOLIDS
	4560	9045. PH (SMO)	

RDER # : 1045274 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB303-0-1
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/12/07 SAMPLE DATE: 10/11/07 TIME: 1230 LOG DATE: 10/12/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME	
	2787	8081A.	ORGANOCHLORINE PESTICIDES ONLY
	3273	8082.PC82	PCB'S BY 8082

RDER # : 1045275 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB303-89-90
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/12/07 SAMPLE DATE: 10/11/07 TIME: 1530 LOG DATE: 10/12/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME	
2654	2686	AG.SPLP	SPLP SILVER BY 6010B
2654	2885	AL.SPLP	SPLP ALUMINUM BY ICP 6010B
2654	2678	AS.SPLP	SPLP ARSENIC BY 6010B
2654	2679	BA.SPLP	SPLP BARIUM BY 6010B
2654	3316	BE.SPLP	SPLP BERYLLIUM BY 6010B
2654	3317	CA.SPLP	SPLP CALCIUM BY 6010B
2654	2680	CD.SPLP	SPLP CADMIUM BY 6010B
2654	2887	CO.SPLP	SPLP COBALT BY ICP 6010B
2654	2681	CR.SPLP	SPLP CHROMIUM BY 6010B
2654	2888	CU.SPLP	SPLP COPPER BY ICP 6010B
2654	2889	FE.SPLP	SPLP IRON BY ICP 6010B
2654	2683	HG.SPLP	SPLP MERCURY BY 7470A
2654	2896	K.SPLP	SPLP POTASSIUM BY ICP 6010B
2654	3318	MG.SPLP	SPLP MAGNESIUM BY 6010B
2654	2891	MN.SPLP	SPLP MANGANESE BY ICP 6010B
2654	2910	NA.SPLP	SPLP SODIUM BY ICP 6010B
2654	2684	NI.SPLP	SPLP NICKEL BY 6010B
2654	2682	PB.SPLP	SPLP LEAD BY 6010B
2654	2894	SB.SPLP6	SPLP ANTIMONY BY ICP 6010B
2654	2685	SE.SPLP	SPLP SELENIUM BY 6010B
2654	3319	TL.SPLP6	SPLP THALLIUM BY 6010B
2654	3320	V.SPLP	SPLP VANADIUM BY 6010B
2654	2895	ZN.SPLP	SPLP ZINC BY ICP 6010B
2654	2498	1312	SYNTHETIC PRECIPITATION LEACHING PROC.

RDER # : 1045276 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB303-108-109
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/12/07 SAMPLE DATE: 10/11/07 TIME: 1520 LOG DATE: 10/12/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME	
2654	2686	AG.SPLP	SPLP SILVER BY 6010B
2654	2885	AL.SPLP	SPLP ALUMINUM BY ICP 6010B
2654	2678	AS.SPLP	SPLP ARSENIC BY 6010B
2654	2679	BA.SPLP	SPLP BARIUM BY 6010B
2654	3316	BE.SPLP	SPLP BERYLLIUM BY 6010B
2654	3317	CA.SPLP	SPLP CALCIUM BY 6010B
2654	2680	CD.SPLP	SPLP CADMIUM BY 6010B
2654	2887	CO.SPLP	SPLP COBALT BY ICP 6010B
2654	2681	CR.SPLP	SPLP CHROMIUM BY 6010B
2654	2888	CU.SPLP	SPLP COPPER BY ICP 6010B
2654	2889	FE.SPLP	SPLP IRON BY ICP 6010B
2654	2683	HG.SPLP	SPLP MERCURY BY 7470A
2654	2896	K.SPLP	SPLP POTASSIUM BY ICP 6010B
2654	3318	MG.SPLP	SPLP MAGNESIUM BY 6010B
2654	2891	MN.SPLP	SPLP MANGANESE BY ICP 6010B
2654	2910	NA.SPLP	SPLP SODIUM BY ICP 6010B
2654	2684	NI.SPLP	SPLP NICKEL BY 6010B
2654	2682	PB.SPLP	SPLP LEAD BY 6010B
2654	2894	SB.SPLP6	SPLP ANTIMONY BY ICP 6010B
2654	2685	SE.SPLP	SPLP SELENIUM BY 6010B
2654	3319	TL.SPLP6	SPLP THALLIUM BY 6010B
2654	3320	V.SPLP	SPLP VANADIUM BY 6010B
2654	2895	ZN.SPLP	SPLP ZINC BY ICP 6010B
2654	2498	1312	SYNTHETIC PRECIPITATION LEACHING PROC.

ORDER # : 1045277 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB303-89-90
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/12/07 SAMPLE DATE: 10/11/07 TIME: 1528 LOG DATE: 10/12/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME	
	4418	8270C.OL4Q	OLM 4.2 LIST BY 8270C FULL QC LIST

ORDER # : 1045278 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB303-89-90
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/12/07 SAMPLE DATE: 10/11/07 TIME: 1532 LOG DATE: 10/12/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME	
	2153	160.3M	PERCENT SOLIDS
	2950	9012.TOT	TOTAL CYANIDE BY SW-846 9012A
	4560	9045, PH (SMO)	

ORDER # : 1045279 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB303-89-90
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/12/07 SAMPLE DATE: 10/11/07 TIME: 1505 LOG DATE: 10/12/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME	
	4414	8260B.OZPQ	OLM 4.2 LIST BY 8260B - LL FULL QC

ORDER # : 1045285 **MATRIX:** WATER COLLECTION SITE: OU1-SS-SB402
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/12/07 SAMPLE DATE: 10/11/07 TIME: LOG DATE: 10/12/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME	
	4414	8260B.OZPQ	OLM 4.2 LIST BY 8260B - LL FULL QC

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

Columbia Analytical Services, Inc.
An Employee - Owned Company
www.caslab.com

One Mustard St., Suite 250 • Rochester, NY 14609-0859 • (585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 PAGE 1 OF 2

SR #

CAS Contact

Project Name: Carus Chemical	Project Number: FR1347
Project Manager: Nandra Weeks	Report CC: Joey McKinnon
Company/Address: 2258 Riverside Avenue, Jacksonville, Florida 32204	
Phone #: 904-388-8821	FAX#: 904-388-8163
Sampler's Signature:	Sampler's Printed Name: Elena Evans

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

PRESERVATIVE: 0 0 0 0 0 0

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other

	CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's MeOH, 5035 + DI ☐ 8260 ☐ 624 ☐ CLP	GC/MS SVOA's ☐ 8270 ☐ 625 ☐ CLP	GC VOA's ☐ 8021 ☐ 601/602	PESTICIDES ☐ 8081 ☐ 608 ☐ CLP	PCB's ☐ 8082 ☐ 608 ☐ CLP	METALS, TOTAL 6010 B/6020 ☐ CLP (List in comments below)	METALS, DISSOLVED (List in comments below)	SPLP	% Solids, Cyanide	pH	cl. Solid	REMARKS/ ALTERNATE DESCRIPTION
X	OV1-SS-SB303-0-1	X	10/11	12:31	Soil	1						X					✓	1045269
X	OV1-SS-SB303-0-1	X	10/11	12:30	Soil	1				X	X							274
X	OV1-SS-SB303-85-86	X	10/11	14:28	Soil	1						X					✓	1045270
X	OV1-SS-SB303-89-90	X	10/11	15:30	Soil	1								X				275
X	OV1-SS-SB303-89-90	X	10/11	15:28	Soil	1		X										277
X	OV1-SS-SB303-89-90	X	10/11	15:32	Soil	1									X			278
X	OV1-SS-SB303-89-90	✓	10/11	15:05	Soil	3	X											276
X	OV1-SS-SB303-89-90	X	10/11	15:29	Soil	1						X				X		1045271
X	OV1-SS-SB303-108-109	X	10/11	15:20	Soil	1								X				279
X	OV1-SS-SB303-108-109	X	10/11	15:22	Soil	1						X				X	✓	1045272

SPECIAL INSTRUCTIONS/COMMENTS
Metals – project specified metals list

See QAPP ☐

TURNAROUND REQUIREMENTS
____ RUSH (SURCHARGES APPLY)
____ 24 hr ____ 48 hr ____ 5 day
X STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
____ I. Results Only
____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III. Results + QC and Calibration Summaries
____ IV. Data Validation Report with Raw Data
X V. Speicalized Forms / Custom Report
Edata ____ Yes ____ No

INVOICE INFORMATION
PO# FR1347
BILL TO: Jill Johnson
Geosyntec
SUBMISSION #: 40260

SAMPLE RECEIPT: CONDITION/COOLER TEMP: ____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature: Elena Evans	Signature:	Signature:	Signature:	Signature:	Signature:
Printed Name: Geosyntec	Printed Name:	Printed Name:	Printed Name:	Printed Name:	Printed Name:
Firm: 10/11/07 1700	Firm: CAS	Firm:	Firm:	Firm:	Firm:
Date/Time: 651-341-9717	Date/Time: 10/12/07 0940	Date/Time:	Date/Time:	Date/Time:	Date/Time:

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1102-08

Columbia Analytical Services INC.
An Employee - Owned Company
www.caslab.com

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

One Mustard St., Suite 250 • Rochester, NY 14609-0859 • (585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 PAGE 2 OF 2

SR #

CAS Contact

Project Name: Carus Chemical	Project Number: FR1347
Project Manager: Nandra Weeks	Report CC: Joey McKinnon
Company/Address: Geosyntec 2258 Riverside Avenue Jacksonville, Florida 32204	
Phone #: 904-388-8821	FAX#: 904-388-8163
Sampler's Signature	Sampler's Printed Name

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

PRESERVATIVE: 1

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's ☐ 8260 ☐ 624 ☐ CLP	GC/MS SVOA's ☐ 8270 ☐ 625 ☐ CLP	GC VOA's ☐ 8021 ☐ 601/602	PESTICIDES ☐ 8081 ☐ 608 ☐ CLP	PCB's ☐ 8082 ☐ 608 ☐ CLP	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	REMARKS/ ALTERNATE DESCRIPTION
* OU1-SS-SB402	✓	10/11		BW	3	X							1045285

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other _____

SPECIAL INSTRUCTIONS/COMMENTS
Metals ~ project specified metals list

See QAPP ☐

TURNAROUND REQUIREMENTS
_____ RUSH (SURCHARGES APPLY)
_____ 24 hr _____ 48 hr _____ 5 day
X STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
_____ I. Results Only
_____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
_____ III. Results + QC and Calibration Summaries
_____ IV. Data Validation Report with Raw Data
X V. Specialized Forms / Custom Report
Edata _____ Yes _____ No

INVOICE INFORMATION
PO# FR1347
BILL TO: Jill Johnson
SUBMISSION #: 40269

SAMPLE RECEIPT: CONDITION/COOLER TEMP: 2 CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature	Signature	Signature	Signature	Signature	Signature
Printed Name: Elena Evans 651-341-8217	Printed Name	Printed Name	Printed Name	Printed Name	Printed Name
Firm: Geosyntec	Firm: CAS	Firm	Firm	Firm	Firm
Date/Time: 10/11/07 17:00	Date/Time: 10/12/07 0940	Date/Time	Date/Time	Date/Time	Date/Time

SCOC-1102-08

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

Cooler Receipt And Preservation Check Form

Project/Client GeoSyntec Submission Number R2740269.

Cooler received on 10/12/07 by: AL **COURIER:** CAS UPS FEDEX VELOCITY CLIENT

1. Were custody seals on outside of cooler? YES NO
2. Were custody papers properly filled out (ink, signed, etc.)? YES NO
3. Did all bottles arrive in good condition (unbroken)? YES NO
4. Did any VOA vials have significant air bubbles? YES NO N/A
5. Were **Ice** or **Ice packs** present? YES NO
6. Where did the bottles originate? CAS/ROC, CLIENT
7. Temperature of cooler(s) upon receipt: 3°

Is the temperature within 0° - 6° C?:	Yes	Yes	Yes	Yes	Yes
If No, Explain Below	No	No	No	No	No

Date/Time Temperatures Taken: 10/12/07 1005

Thermometer ID: 161 or IR GUN Reading From: Temp Blank or Sample Bottle

If out of Temperature, Client Approval to Run Samples

PC Secondary Review:

Cooler Breakdown: Date: 10/12/07 by: AL

1. Were all bottle labels complete (*i.e.* analysis, preservation, etc.)? YES NO
2. Did all bottle labels and tags agree with custody papers? YES NO
3. Were correct containers used for the tests indicated? YES NO
4. Air Samples: Cassettes / Tubes Intact Canisters Pressurized Tedlar® Bags Inflated N/A

Explain any discrepancies:

		YES	NO	Sample I.D.	Reagent	Vol. Added	Final pH
pH	Reagent						
≥12	NaOH						
≤2	HNO_3						
≤2	H_2SO_4						
Residual Chlorine (+/-)	for TCN & Phenol						

YES = All samples OK NO = Samples were preserved at lab as listed PC OK to adjust pH

VOC Vial pH Verification (Tested after Analysis) Following Samples Exhibited pH > 2		

Other Comments:

PC Secondary Review:

Columbia Analytical Services, inc.

ACKNOWLEDGEMENT OF RECEIPT OF SAMPLES

Date: October 18, 2007

Client: Geosyntec-IL

Attention: Ms. Nandra Weeks

Fax No.: (904)388-8163

From: Deb Patton

Receipt Date: 10/18/07

Project: CARUS CHEMICALS

Submission #: R2740355

Number of pages (including cover sheet): 10

Samples were received at our facility in good condition. Please contact Deb Patton at (585) 288-5380 if you have any questions regarding this information. Thank you for choosing Columbia Analytical Services for your analytical needs.

3° Cooler Temperature
✓ Vials intact
✓ Vials free from air bubbles
✓ Bottles intact
✓ Custody Seal intact

Comments:_____

Columbia Analytical Services, Inc.
1 Mustard St.
Suite 250
Rochester, NY 14609
(585) 288-5380
(585) 288-8475 fax

rinted: 10/18/07 11:59

COLUMBIA ANALYTICAL SERVICES/ANALYTICAL REQUEST

AB SAM JOB #: CERT FEE?:N
AS JOB:R2740355 PROJECT NAME:CARUS CHEMICALS
LIENT ID: Geosyntec-IL CLIENT NAME:Geosyntec-IL
HONE #: (904)388-8821 CONTACT:Geosyntec-IL 1 Ms. Nandra Weeks
DDRESS: 2258 Riverside Ave.
ITY:Jacksonville STATE:Fl ZIP:32204
OPIES TO:

LIENT REP: Deb Patton EST. INV. AMT: $200.00
LIENT P.O. NUMBER: CONTRACT NUMBER:
UOTATION #:6 SURCHARGE: -1
URNAROUND REQUIRED:(RUSH/NOSURCHARGE) PROMISED DATE: 11/01/07
EPORT TYPE:ASPB QC:NA
AMPLED BY: CLIENT TRANSFER METHOD: FEDEX
PECIAL JOB NOTES:
OB TEMPERATURE 3°
ABEL NOTES: METALS TO IDL

RDER # : 1046886 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW-401
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/18/07 SAMPLE DATE: 10/16/07 TIME: 1542 LOG DATE: 10/18/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME	
2654	2686	AG.SPLP	SPLP SILVER BY 6010B
2654	2885	AL.SPLP	SPLP ALUMINUM BY ICP 6010B
2654	2678	AS.SPLP	SPLP ARSENIC BY 6010B
2654	2679	BA.SPLP	SPLP BARIUM BY 6010B
2654	3316	BE.SPLP	SPLP BERYLLIUM BY 6010B
2654	3317	CA.SPLP	SPLP CALCIUM BY 6010B
2654	2680	CD.SPLP	SPLP CADMIUM BY 6010B
2654	2887	CO.SPLP	SPLP COBALT BY ICP 6010B
2654	2681	CR.SPLP	SPLP CHROMIUM BY 6010B
2654	2888	CU.SPLP	SPLP COPPER BY ICP 6010B
2654	2889	FE.SPLP	SPLP IRON BY ICP 6010B
2654	2683	HG.SPLP	SPLP MERCURY BY 7470A
2654	2896	K.SPLP	SPLP POTASSIUM BY ICP 6010B
2654	3318	MG.SPLP	SPLP MAGNESIUM BY 6010B
2654	2891	MN.SPLP	SPLP MANGANESE BY ICP 6010B
2654	2910	NA.SPLP	SPLP SODIUM BY ICP 6010B
2654	2684	NI.SPLP	SPLP NICKEL BY 6010B
2654	2682	PB.SPLP	SPLP LEAD BY 6010B
2654	2894	SB.SPLP6	SPLP ANTIMONY BY ICP 6010B
2654	2685	SE.SPLP	SPLP SELENIUM BY 6010B
2654	3319	TL.SPLP6	SPLP THALLIUM BY 6010B
2654	3320	V.SPLP	SPLP VANADIUM BY 6010B
2654	2895	ZN.SPLP	SPLP ZINC BY ICP 6010B
2654	2498	1312	SYNTHETIC PRECIPITATION LEACHING PROC.

ORDER # : 1046887 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW-401
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/18/07 SAMPLE DATE: 10/16/07 TIME: 1540 LOG DATE: 10/18/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	4418	8270C.OL4Q OLM 4.2 LIST BY 8270C FULL QC LIST

RDER # : 1046891 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW-401
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/18/07 SAMPLE DATE: 10/16/07 TIME: 1539 LOG DATE: 10/18/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME
	2950	9012.TOT TOTAL CYANIDE BY SW-846 9012A

RDER # : 1046894 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW-401
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/18/07 SAMPLE DATE: 10/16/07 TIME: 1544 LOG DATE: 10/18/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME
	4414	8260B.OZPQ OLM 4.2 LIST BY 8260B - LL FULL QC

RDER # : 1046895 **MATRIX:** WATER COLLECTION SITE: OU1-MW-402
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/18/07 SAMPLE DATE: 10/16/07 TIME: 1020 LOG DATE: 10/18/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME
	4414	8260B.OZPQ OLM 4.2 LIST BY 8260B - LL FULL QC

RDER # : 1046896 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW-405
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/18/07 SAMPLE DATE: 10/16/07 TIME: 1502 LOG DATE: 10/18/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME
	4414	8260B.OZPQ OLM 4.2 LIST BY 8260B - LL FULL QC

RDER # : 1046899 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW-401
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/18/07 SAMPLE DATE: 10/16/07 TIME: 1537 LOG DATE: 10/18/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	2358	CA.6010 CALCIUM BY ICP 6010B
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A
	2380	K.6010 POTASSIUM BY ICP 6010B/200.7
	2371	MG.6010 MAGNESIUM BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	2385	NA.6010 SODIUM BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B

RDER # : 1046900 **MATRIX:** WATER COLLECTION SITE: OU1-SW-MW-405
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/18/07 SAMPLE DATE: 10/16/07 TIME: 1500 LOG DATE: 10/18/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	2358	CA.6010 CALCIUM BY ICP 6010B
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A
	2380	K.6010 POTASSIUM BY ICP 6010B/200.7
	2371	MG.6010 MAGNESIUM BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	2385	NA.6010 SODIUM BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B

ORDER # : 1046903 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB-306-0-1
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/18/07 SAMPLE DATE: 10/16/07 TIME: 1100 LOG DATE: 10/18/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	4414	8260B.OZPQ OLM 4.2 LIST BY 8260B - LL FULL QC

ORDER # : 1046909 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB-306-0-1
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/18/07 SAMPLE DATE: 10/16/07 TIME: 1102 LOG DATE: 10/18/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	4418	8270C.OL4Q OLM 4.2 LIST BY 8270C FULL QC LIST

ORDER # : 1046910 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB-306-0-1
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/18/07 SAMPLE DATE: 10/16/07 TIME: 1103 LOG DATE: 10/18/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	2153	160.3M PERCENT SOLIDS
	2950	9012.TOT TOTAL CYANIDE BY SW-846 9012A

ORDER # : 1046915 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB-306-0-1
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/18/07 SAMPLE DATE: 10/16/07 TIME: 1104 LOG DATE: 10/18/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020

RDER # : 1046915 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB-306-0-1
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/18/07 SAMPLE DATE: 10/16/07 TIME: 1104 LOG DATE: 10/18/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	2358	CA.6010 CALCIUM BY ICP 6010B
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A
	2380	K.6010 POTASSIUM BY ICP 6010B/200.7
	2371	MG.6010 MAGNESIUM BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	2385	NA.6010 SODIUM BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B

)RDER # : 1046916 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB-306-67-68
)RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
)ATE RECEIVED: 10/18/07 SAMPLE DATE: 10/16/07 TIME: 1332 LOG DATE: 10/18/07 **QC:** NA

?ROFILE NO.	TEST NO.	TEST NAME
	2382	AG.6010 SILVER BY ICP 6010B
	2343	AL.6010 ALUMINUM BY ICP 6010B
	4106	AS.6020 ARSENIC BY ICP/MS 6020
	4109	BA.6020 BARIUM BY ICP/MS 6020
	4108	BE.6020 BERYLLIUM BY ICP/MS 6020
	2358	CA.6010 CALCIUM BY ICP 6010B
	4128	CD.6020 CADMIUM BY ICP/MS 6020
	4132	CO.6020 COBALT BY ICP/MS 6020
	4110	CR.6020 CHROMIUM BY ICP/MS 6020
	4111	CU.6020 COPPER BY ICP/MS 6020
	2366	FE.6010 IRON BY ICP 6010B
	2417	HG.7470 MERCURY BY COLD VAPOR METHOD 7470A/7471A
	2380	K.6010 POTASSIUM BY ICP 6010B/200.7
	2371	MG.6010 MAGNESIUM BY ICP 6010B
	2373	MN.6010 MANGANESE BY ICP 6010B
	2385	NA.6010 SODIUM BY ICP 6010B
	4118	NI.6020 NICKEL BY ICP/MS 6020
	4112	PB.6020 LEAD BY ICP/MS 6020
	2345	SB.6010 ANTIMONY BY ICP 6010B
	4114	SE.6020 SELENIUM BY ICP/MS 6020
	4127	TL.6020 THALLIUM BY ICP/MS 6020
	4130	V.6020 VANADIUM BY ICP/MS 6020
	2389	ZN.6010 ZINC BY ICP 6010B

RDER # : 1046917 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB-306-67-68
RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
ATE RECEIVED: 10/18/07 SAMPLE DATE: 10/16/07 TIME: 1330 LOG DATE: 10/18/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME	
2654	2686	AG.SPLP	SPLP SILVER BY 6010B
2654	2885	AL.SPLP	SPLP ALUMINUM BY ICP 6010B
2654	2678	AS.SPLP	SPLP ARSENIC BY 6010B
2654	2679	BA.SPLP	SPLP BARIUM BY 6010B
2654	3316	BE.SPLP	SPLP BERYLLIUM BY 6010B
2654	3317	CA.SPLP	SPLP CALCIUM BY 6010B
2654	2680	CD.SPLP	SPLP CADMIUM BY 6010B
2654	2887	CO.SPLP	SPLP COBALT BY ICP 6010B
2654	2681	CR.SPLP	SPLP CHROMIUM BY 6010B
2654	2888	CU.SPLP	SPLP COPPER BY ICP 6010B
2654	2889	FE.SPLP	SPLP IRON BY ICP 6010B
2654	2683	HG.SPLP	SPLP MERCURY BY 7470A
2654	2896	K.SPLP	SPLP POTASSIUM BY ICP 6010B
2654	3318	MG.SPLP	SPLP MAGNESIUM BY 6010B
2654	2891	MN.SPLP	SPLP MANGANESE BY ICP 6010B
2654	2910	NA.SPLP	SPLP SODIUM BY ICP 6010B
2654	2684	NI.SPLP	SPLP NICKEL BY 6010B
2654	2682	PB.SPLP	SPLP LEAD BY 6010B
2654	2894	SB.SPLP6	SPLP ANTIMONY BY ICP 6010B
2654	2685	SE.SPLP	SPLP SELENIUM BY 6010B
2654	3319	TL.SPLP6	SPLP THALLIUM BY 6010B
2654	3320	V.SPLP	SPLP VANADIUM BY 6010B
2654	2895	ZN.SPLP	SPLP ZINC BY ICP 6010B
2654	2498	1312	SYNTHETIC PRECIPITATION LEACHING PROC.
	2153	160.3M	PERCENT SOLIDS
	4560	9045. PH (SMO)	

ORDER # : 1046918 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB-306-66-67
ORDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N
DATE RECEIVED: 10/18/07 SAMPLE DATE: 10/16/07 TIME: 1335 LOG DATE: 10/18/07 **QC:** NA

PROFILE NO.	TEST NO.	TEST NAME	
	2382	AG.6010	SILVER BY ICP 6010B
	2343	AL.6010	ALUMINUM BY ICP 6010B
	4106	AS.6020	ARSENIC BY ICP/MS 6020
	4109	BA.6020	BARIUM BY ICP/MS 6020
	4108	BE.6020	BERYLLIUM BY ICP/MS 6020
	2358	CA.6010	CALCIUM BY ICP 6010B
	4128	CD.6020	CADMIUM BY ICP/MS 6020
	4132	CO.6020	COBALT BY ICP/MS 6020
	4110	CR.6020	CHROMIUM BY ICP/MS 6020
	4111	CU.6020	COPPER BY ICP/MS 6020
	2366	FE.6010	IRON BY ICP 6010B
	2417	HG.7470	MERCURY BY COLD VAPOR METHOD 7470A/7471A
	2380	K.6010	POTASSIUM BY ICP 6010B/200.7
	2371	MG.6010	MAGNESIUM BY ICP 6010B
	2373	MN.6010	MANGANESE BY ICP 6010B
	2385	NA.6010	SODIUM BY ICP 6010B
	4118	NI.6020	NICKEL BY ICP/MS 6020
	4112	PB.6020	LEAD BY ICP/MS 6020
	2345	SB.6010	ANTIMONY BY ICP 6010B
	4114	SE.6020	SELENIUM BY ICP/MS 6020
	4127	TL.6020	THALLIUM BY ICP/MS 6020
	4130	V.6020	VANADIUM BY ICP/MS 6020

RDER # : 1046918 **MATRIX:** SOIL/SEDIMENT COLLECTION SITE: OU1-SS-SB-306-66-67

RDER # STATUS: H PROTOCOL LIST NA/846/ASPB/RUN/N

ATE RECEIVED: 10/18/07 SAMPLE DATE: 10/16/07 TIME: 1335 LOG DATE: 10/18/07 **QC:** NA

ROFILE NO.	TEST NO.	TEST NAME
	2389	ZN.6010 ZINC BY ICP 6010B
	2153	160.3M PERCENT SOLIDS

Columbia Analytical Services INC.
An Employee - Owned Company
www.caslab.com

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

One Mustard St., Suite 250 • Rochester, NY 14609-0859 • (585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475 PAGE 1 OF 2

SR #
CAS Contact

Project Name: Carus Chemical
Project Number: FR1347
Project Manager: Nandra Weeks
Report CC: Joey McKinnon
Company/Address: Geosyntec
2258 Riverside Avenue
Jacksonville, Florida 32204
Phone #: 904-388-8821
FAX#: 904-388-8163
Sampler's Signature: [signature]
Sampler's Printed Name: Elena Evans

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

PRESERVATIVE: 2 EE, 0/4 EE, 0, 0

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's 8260 ☐ 624 ☐ CLP	GC/MS SVOA's 8270 ☐ 625 ☐ CLP	GC VOA's ☐ 8021 ☐ 601/602	PESTICIDES ☐ 8081 ☐ 608 ☐ CLP	PCB's ☐ 8082 ☐ 608 ☐ CLP	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	SPLP 23 metals	Cyanide	% solids					REMARKS/ ALTERNATE DESCRIPTION
x OU1-SW-MW401	1046886	10/16	15:42	Water	1								X							1 liter
x OU1-SW-MW401	1046887	10/16	15:40	Water	1		X													1 liter
x OU1-SW-MW401	891	10/16	15:39	Water	1									X						
x OU1-SW-MW401	894	10/16	15:44	Water	3	X														
x OU1-SW-MW401	899	10/16	15:37	Water	1						X	~~AA~~ EE								Metals Total
x OU1-SW-MW405	900	10/16	15:00	Water	1						X	~~AA~~ EE								Metals Total
x OU1-SW-MW405	896	10/16	15:02	Water	3	X														VOAs
x OU1-SS-SB306-0-1	903	10/16	11:00	Soil	3	X														VOAs
x OU1-SS-SB306-0-1	909	10/16	11:02	Soil	1		X													4oz JAR
x OU1-SS-SB306-0-1	910	10/16	11:03	Soil	1									X	X					4oz JAR

SPECIAL INSTRUCTIONS/COMMENTS
Metals - project specified metals list

See QAPP ☐

TURNAROUND REQUIREMENTS
___ RUSH (SURCHARGES APPLY)
___ 24 hr ___ 48 hr ___ 5 day
X STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
___ I. Results Only
___ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
___ III. Results + QC and Calibration Summaries
___ IV. Data Validation Report with Raw Data
X V. Speicalized Forms / Custom Report
Edata X Yes ___ No

INVOICE INFORMATION
PO# FR1347
BILL TO: Jill Johnson
Geosyntec
SUBMISSION #: R27-40355

SAMPLE RECEIPT: CONDITION/COOLER TEMP: ___ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature: [signature]	Signature: [signature]	Signature	Signature	Signature	Signature
Printed Name: Elena Evans	Printed Name: Amy Hentschke	Printed Name	Printed Name	Printed Name	Printed Name
Firm: Geosyntec	Firm: CAS	Firm	Firm	Firm	Firm
Date/Time: 10/17 6:15pm	Date/Time: 10/18/07 1030	Date/Time	Date/Time	Date/Time	Date/Time

SCOC-1102-08

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

Columbia Analytical Services, INC.
An Employee - Owned Company
www.caslab.com
One Mustard St., Suite 250 • Rochester, NY 14609-0859 • (585) 288-5380 • 800-695-7222 x11 • FAX (585) 288-8475

SR #

CAS Contact

Project Name: Carus Chemical	Project Number: FR1347
Project Manager: Nandra Weeks	Report CC: Joey McKinnon
Company/Address: Geosyntec 2258 Riverside Avenue Jacksonville, Florida 32204	
Phone #: 904-388-8821	FAX#: 904-388-8163
Sampler's Signature: Elena Evans	Sampler's Printed Name: Elena Evans

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOA's ☐ 8260 ☐ 624 ☐ CLP	GC/MS SVOA's ☐ 8270 ☐ 625 ☐ CLP	GC VOA's ☐ 8021 ☐ 601/602	PESTICIDES ☐ 8081 ☐ 608 ☐ CLP	PCB's ☐ 8082 ☐ 608 ☐ CLP	METALS, TOTAL 6010B/6020 (List in comments below)	METALS, DISSOLVED (List in comments below)	SPLP 23 metals	pH	REMARKS/ ALTERNATE DESCRIPTION
PRESERVATIVE								0				6		0	0
x OU1-SS-SB306-0-1	1046915	10/16	11:04	Soil	1						X				4oz
x OU1-SS-SB306-67-68	916	10/16	13:32	Soil	1						X				4oz w/Soil
x OU1-SS-SB306-67-68	917	10/16	13:30	Soil	1							X	X		8oz J
x OU1-SS-SB306-66-67	918	10/16	13:35	Soil	1						X				4oz w/Soil
x OU1-MW-402	1046895	10/16	1020	water	3	X									VOAs

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other _____

SPECIAL INSTRUCTIONS/COMMENTS
Metals – project specified metals list

See QAPP ☐

TURNAROUND REQUIREMENTS
_____ RUSH (SURCHARGES APPLY)
_____ 24 hr _____ 48 hr _____ 5 day
X STANDARD
REQUESTED FAX DATE
REQUESTED REPORT DATE

REPORT REQUIREMENTS
_____ I. Results Only
_____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
_____ III. Results + QC and Calibration Summaries
_____ IV. Data Validation Report with Raw Data
X V. Specialized Forms / Custom Report
Edata X Yes _____ No

INVOICE INFORMATION
PO# FR 1347
BILL TO: Jill Johnson
Geosyntec
SUBMISSION #: R27-40355

SAMPLE RECEIPT: CONDITION/COOLER TEMP: _____ CUSTODY SEALS: Y N

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature: Elena Evans	Signature: Amy Hentschke	Signature	Signature	Signature	Signature
Printed Name: Geosyntec	Printed Name: CAS	Printed Name	Printed Name	Printed Name	Printed Name
Firm	Firm	Firm	Firm	Firm	Firm
Date/Time: 10/17 6:15pm	Date/Time: 10/18/07 1030	Date/Time	Date/Time	Date/Time	Date/Time

SCOC-1102-08

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

Cooler Receipt And Preservation Check Form

Project/Client GeoSyntec Submission Number B27-403555.

Cooler received on 10/18/07 by: AWH **COURIER:** CAS UPS (FEDEX) VELOCITY CLIENT

1.	Were custody seals on outside of cooler?	(YES)	NO			
2.	Were custody papers properly filled out (ink, signed, etc.)?	(YES)	NO			
3.	Did all bottles arrive in good condition (unbroken)?	(YES)	NO			
4.	Did any VOA vials have significant air bubbles?	YES	(NO)	N/A		
5.	Were **Ice** or **Ice packs** present?	(YES)	NO			
6.	Where did the bottles originate?	(CAS/ROC, CLIENT)				
7.	Temperature of cooler(s) upon receipt:	3°				
	Is the temperature within 0° - 6° C?:	(Yes)	Yes	Yes	Yes	Yes
	If No, Explain Below	No	No	No	No	No

Date/Time Temperatures Taken: 10/18/07 10:42

Thermometer ID: 161 or (IR GUN) Reading From: Temp Blank or (Sample Bottle)

If out of Temperature, Client Approval to Run Samples _____

PC Secondary Review: _____

Cooler Breakdown: Date : _____ by: _____

1.	Were all bottle labels complete (*i.e.* analysis, preservation, etc.)?	YES	NO
2.	Did all bottle labels and tags agree with custody papers?	YES	NO
3.	Were correct containers used for the tests indicated?	YES	NO
4.	Air Samples: Cassettes / Tubes Intact Canisters Pressurized Tedlar® Bags Inflated		N/A

Explain any discrepancies: _____

		YES	NO	Sample I.D.	Reagent	Vol. Added	Final pH
pH	Reagent						
≥12	NaOH						
≤2	HNO_3						
≤2	H_2SO_4						
Residual Chlorine (+/-)	for TCN & Phenol						

YES = All samples OK NO = Samples were preserved at lab as listed PC OK to adjust pH _____

VOC Vial pH Verification (Tested after Analysis) Following Samples Exhibited pH > 2		

Other Comments:

PC Secondary Review: _____

RSR011 **TESTAMERICA LABORATORIES, INC.** Run Date: 10/11/07
SAMPLE CONFIRMATION REPORT Page : 1
Time : 22:06:59

The following samples have been received by TestAmerica Laboratories, Inc. at Knoxville, Tennessee. Please verify that the sample ID's and the requested tests are correct. Contact the TestAmerica project manager listed below to resolve any discrepancies.

Report to:
Nandra Weeks
GeoSyntec Consultants
2258 Riverside Ave
Jacksonville, FL32204

Bill to:
Accounts Payable
GeoSyntec Consultants
2258 Riverside Ave
Jacksonville, FL 32204

Client
Project : Carus Chemical Company
Number : FR1347
Manager : Nandra Weeks

TestAmerica
Date Rec: 10/11/07
Quote No: 076168
Manager : Linda McWhirter

Due Dates
Preliminary: 10/25/07
Hard Copy : 10/25/07

Analytical TAT: 14

Client ID: OU1-SS-SB302-10.5-11.5 - Step1
Date Sampled: 10/09/07 Time Sampled: 10:30
LAB ID: H7J110169-001 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B SEP Step 1	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 1	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB302-10.5-11.5 - Step2
Date Sampled: 10/09/07 Time Sampled: 10:30
LAB ID: H7J110169-002 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B, SEP Step 2	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 2	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB302-10.5-11.5 - Step3
Date Sampled: 10/09/07 Time Sampled: 10:30
LAB ID: H7J110169-003 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B, SEP Step 3	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 3	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB302-10.5-11.5 - Step4
Date Sampled: 10/09/07 Time Sampled: 10:30
LAB ID: H7J110169-004 Matrix: SOLID

Parameter	Method	Rep

Client
Project : Carus Chemical Company
Number : FR1347
Manager : Nandra Weeks

TestAmerica
Date Rec: 10/11/07
Quote No: 076168
Manager : Linda McWhirter

Due Dates
Preliminary: 10/25/07
Hard Copy : 10/25/07

Analytical TAT: 14

- -

Client ID: OU1-SS-SB302-10.5-11.5 - Step4
Date Sampled: 10/09/07 Time Sampled: 10:30
LAB ID: H7J110169-004 Matrix: SOLID

Parameter	Method		Rep
* Continued*			
SOLID, 6010B, SEP Step 4	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 4	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB302-10.5-11.5 - Step5
Date Sampled: 10/09/07 Time Sampled: 10:30
LAB ID: H7J110169-005 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B, SEP Step 5	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 5	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB302-10.5-11.5 - Step6
Date Sampled: 10/09/07 Time Sampled: 10:30
LAB ID: H7J110169-006 Matrix: SOLID

Parameter	Method		Rep
SOLID,6010B, SEP Step 6	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 6	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB302-10.5-11.5 - Step7
Date Sampled: 10/09/07 Time Sampled: 10:30
LAB ID: H7J110169-007 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B, SEP Step 7	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 7	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB302-10.5-11.5 - Totals
Date Sampled: 10/09/07 Time Sampled: 10:30
LAB ID: H7J110169-008 Matrix: SOLID

Parameter	Method	Rep

Client
Project : Carus Chemical Company
Number : FR1347
Manager : Nandra Weeks

TestAmerica
Date Rec: 10/11/07
Quote No: 076168
Manager : Linda McWhirter

Due Dates
Preliminary: 10/25/07
Hard Copy : 10/25/07

Analytical TAT: 14

- -

Client ID: OU1-SS-SB302-10.5-11.5 - Totals
Date Sampled: 10/09/07 Time Sampled: 10:30
LAB ID: H7J110169-008 Matrix: SOLID

Parameter	Method		Rep
* Continued*			
SOLID, 6010B, SEP Totals	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Totals	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB301-0-1 - Step1
Date Sampled: 10/09/07 Time Sampled: 14:32
LAB ID: H7J110169-009 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B SEP Step 1	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 1	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB301-0-1 - Step2
Date Sampled: 10/09/07 Time Sampled: 14:32
LAB ID: H7J110169-010 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B, SEP Step 2	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 2	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB301-0-1 - Step3
Date Sampled: 10/09/07 Time Sampled: 14:32
LAB ID: H7J110169-011 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B, SEP Step 3	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 3	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB301-0-1 - Step4
Date Sampled: 10/09/07 Time Sampled: 14:32
LAB ID: H7J110169-012 Matrix: SOLID

Parameter	Method	Rep

Client
Project : Carus Chemical Company
Number : FR1347
Manager : Nandra Weeks

TestAmerica
Date Rec: 10/11/07
Quote No: 076168
Manager : Linda McWhirter

Due Dates
Preliminary: 10/25/07
Hard Copy : 10/25/07

Analytical TAT: 14

- -

Client ID: OU1-SS-SB301-0-1 - Step4
Date Sampled: 10/09/07 Time Sampled: 14:32
LAB ID: H7J110169-012 Matrix: SOLID

Parameter	Method		Rep
* Continued*			
SOLID, 6010B, SEP Step 4	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 4	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB301-0-1 - Step5
Date Sampled: 10/09/07 Time Sampled: 14:32
LAB ID: H7J110169-013 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B, SEP Step 5	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 5	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB301-0-1 - Step6
Date Sampled: 10/09/07 Time Sampled: 14:32
LAB ID: H7J110169-014 Matrix: SOLID

Parameter	Method		Rep
SOLID,6010B, SEP Step 6	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 6	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB301-0-1 - Step7
Date Sampled: 10/09/07 Time Sampled: 14:32
LAB ID: H7J110169-015 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B, SEP Step 7	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 7	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB301-0-1 - Totals
Date Sampled: 10/09/07 Time Sampled: 14:32
LAB ID: H7J110169-016 Matrix: SOLID

Parameter	Method		Rep

Client
Project : Carus Chemical Company
Number : FR1347
Manager : Nandra Weeks

TestAmerica
Date Rec: 10/11/07
Quote No: 076168
Manager : Linda McWhirter

Due Dates
Preliminary: 10/25/07
Hard Copy : 10/25/07

Analytical TAT: 14

Client ID: OU1-SS-SB301-0-1 - Totals
Date Sampled: 10/09/07 Time Sampled: 14:32
LAB ID: H7J110169-016 Matrix: SOLID

Parameter	Method		Rep
* Continued*			
SOLID, 6010B, SEP Totals	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Totals	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB304-58-59 - Step1
Date Sampled: 10/10/07 Time Sampled: 16:22
LAB ID: H7J110169-017 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B SEP Step 1	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 1	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB304-58-59 - Step2
Date Sampled: 10/10/07 Time Sampled: 16:22
LAB ID: H7J110169-018 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B, SEP Step 2	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 2	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB304-58-59 - Step3
Date Sampled: 10/10/07 Time Sampled: 16:22
LAB ID: H7J110169-019 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B, SEP Step 3	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 3	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB304-58-59 - Step4
Date Sampled: 10/10/07 Time Sampled: 16:22
LAB ID: H7J110169-020 Matrix: SOLID

Parameter	Method		Rep

Client
Project : Carus Chemical Company
Number : FR1347
Manager : Nandra Weeks

TestAmerica
Date Rec: 10/11/07
Quote No: 076168
Manager : Linda McWhirter

Due Dates
Preliminary: 10/25/07
Hard Copy : 10/25/07

Analytical TAT: 14

Client ID: OU1-SS-SB304-58-59 - Step4
Date Sampled: 10/10/07 Time Sampled: 16:22
LAB ID: H7J110169-020 Matrix: SOLID

Parameter	Method		Rep
* Continued*			
SOLID, 6010B, SEP Step 4	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 4	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB304-58-59 - Step5
Date Sampled: 10/10/07 Time Sampled: 16:22
LAB ID: H7J110169-021 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B, SEP Step 5	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 5	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB304-58-59 - Step6
Date Sampled: 10/10/07 Time Sampled: 16:22
LAB ID: H7J110169-022 Matrix: SOLID

Parameter	Method		Rep
SOLID,6010B, SEP Step 6	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 6	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB304-58-59 - Step7
Date Sampled: 10/10/07 Time Sampled: 16:22
LAB ID: H7J110169-023 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B, SEP Step 7	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 7	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB304-58-59 - Totals
Date Sampled: 10/10/07 Time Sampled: 16:22
LAB ID: H7J110169-024 Matrix: SOLID

Parameter	Method	Rep

RSR011 **TESTAMERICA LABORATORIES, INC.** Run Date: 10/11/07

SAMPLE CONFIRMATION REPORT Page : 7

Time : 22:06:59

Client
Project : Carus Chemical Company
Number : FR1347
Manager : Nandra Weeks

TestAmerica
Date Rec: 10/11/07
Quote No: 076168
Manager : Linda McWhirter

Due Dates
Preliminary: 10/25/07
Hard Copy : 10/25/07

Analytical TAT: 14

- -

Client ID: OU1-SS-SB304-58-59 - Totals
Date Sampled: 10/10/07 Time Sampled: 16:22
LAB ID: H7J110169-024 Matrix: SOLID

Parameter	Method		Rep
* Continued*			
SOLID, 6010B, SEP Totals	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Totals	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

RSR011 **TESTAMERICA LABORATORIES, INC.** Run Date: 10/12/07
SAMPLE CONFIRMATION REPORT Page : 1
Time : 22:05:19

The following samples have been received by TestAmerica Laboratories, Inc. at Knoxville, Tennessee. Please verify that the sample ID's and the requested tests are correct. Contact the TestAmerica project manager listed below to resolve any discrepancies.

Report to:
Nandra Weeks
GeoSyntec Consultants
2258 Riverside Ave
Jacksonville, FL32204

Bill to:
Jill Johnson
GeoSyntec Consultants
2258 Riverside Ave
Jacksonville, FL 32204

Client
Project : Carus Chemical Company
Number :
Manager : Nandra Weeks

TestAmerica
Date Rec: 10/12/07
Quote No: 076168
Manager : Linda McWhirter

Due Dates
Preliminary: 10/26/07
Hard Copy : 10/26/07

Analytical TAT: 14

Client ID: OU1-SS-SB303-89-90 - Step1
Date Sampled: 10/11/07 Time Sampled: 15:32
LAB ID: H7J120107-001 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B SEP Step 1	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 1	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB303-89-90 - Step2
Date Sampled: 10/11/07 Time Sampled: 15:32
LAB ID: H7J120107-002 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B, SEP Step 2	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 2	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB303-89-90 - Step3
Date Sampled: 10/11/07 Time Sampled: 15:32
LAB ID: H7J120107-003 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B, SEP Step 3	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 3	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB303-89-90 - Step4
Date Sampled: 10/11/07 Time Sampled: 15:32
LAB ID: H7J120107-004 Matrix: SOLID

Parameter	Method	Rep

Client
Project : Carus Chemical Company
Number :
Manager : Nandra Weeks

TestAmerica
Date Rec: 10/12/07
Quote No: 076168
Manager : Linda McWhirter

Due Dates
Preliminary: 10/26/07
Hard Copy : 10/26/07

Analytical TAT: 14

Client ID: OU1-SS-SB303-89-90 - Step4
Date Sampled: 10/11/07 Time Sampled: 15:32
LAB ID: H7J120107-004 Matrix: SOLID

Parameter	Method		Rep
* Continued*			
SOLID, 6010B, SEP Step 4	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 4	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB303-89-90 - Step5
Date Sampled: 10/11/07 Time Sampled: 15:32
LAB ID: H7J120107-005 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B, SEP Step 5	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 5	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB303-89-90 - Step6
Date Sampled: 10/11/07 Time Sampled: 15:32
LAB ID: H7J120107-006 Matrix: SOLID

Parameter	Method		Rep
SOLID,6010B, SEP Step 6	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 6	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB303-89-90 - Step7
Date Sampled: 10/11/07 Time Sampled: 15:32
LAB ID: H7J120107-007 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B, SEP Step 7	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 7	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB303-89-90 - Totals
Date Sampled: 10/11/07 Time Sampled: 15:32
LAB ID: H7J120107-008 Matrix: SOLID

Parameter	Method	Rep

Client
Project : Carus Chemical Company
Number :
Manager : Nandra Weeks

TestAmerica
Date Rec: 10/12/07
Quote No: 076168
Manager : Linda McWhirter

Due Dates
Preliminary: 10/26/07
Hard Copy : 10/26/07

Analytical TAT: 14

- -

Client ID: OU1-SS-SB303-89-90 - Totals
Date Sampled: 10/11/07 Time Sampled: 15:32
LAB ID: H7J120107-008 Matrix: SOLID

Parameter	Method		Rep
* Continued*			
SOLID, 6010B, SEP Totals	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Totals	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB303-108-109 - Step1
Date Sampled: 10/11/07 Time Sampled: 15:38
LAB ID: H7J120107-009 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B SEP Step 1	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 1	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB303-108-109 - Step2
Date Sampled: 10/11/07 Time Sampled: 15:38
LAB ID: H7J120107-010 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B, SEP Step 2	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 2	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB303-108-109 - Step3
Date Sampled: 10/11/07 Time Sampled: 15:38
LAB ID: H7J120107-011 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B, SEP Step 3	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 3	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB303-108-109 - Step4
Date Sampled: 10/11/07 Time Sampled: 15:38
LAB ID: H7J120107-012 Matrix: SOLID

Parameter	Method	Rep

TESTAMERICA LABORATORIES, INC.
SAMPLE CONFIRMATION REPORT

Client
Project : Carus Chemical Company
Number :
Manager : Nandra Weeks

TestAmerica
Date Rec: 10/12/07
Quote No: 076168
Manager : Linda McWhirter

Due Dates
Preliminary: 10/26/07
Hard Copy : 10/26/07

Analytical TAT: 14

Client ID: OU1-SS-SB303-108-109 - Step4
Date Sampled: 10/11/07 Time Sampled: 15:38
LAB ID: H7J120107-012 Matrix: SOLID

Parameter	Method		Rep
* Continued*			
SOLID, 6010B, SEP Step 4	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 4	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB303-108-109 - Step5
Date Sampled: 10/11/07 Time Sampled: 15:38
LAB ID: H7J120107-013 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B, SEP Step 5	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 5	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB303-108-109 - Step6
Date Sampled: 10/11/07 Time Sampled: 15:38
LAB ID: H7J120107-014 Matrix: SOLID

Parameter	Method		Rep
SOLID,6010B, SEP Step 6	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 6	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB303-108-109 - Step7
Date Sampled: 10/11/07 Time Sampled: 15:38
LAB ID: H7J120107-015 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B, SEP Step 7	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 7	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB303-108-109 - Totals
Date Sampled: 10/11/07 Time Sampled: 15:38
LAB ID: H7J120107-016 Matrix: SOLID

Parameter	Method	Rep

TESTAMERICA LABORATORIES, INC.
SAMPLE CONFIRMATION REPORT

Client
Project : Carus Chemical Company
Number :
Manager : Nandra Weeks

TestAmerica
Date Rec: 10/12/07
Quote No: 076168
Manager : Linda McWhirter

Due Dates
Preliminary: 10/26/07
Hard Copy : 10/26/07

Analytical TAT: 14

- -

Client ID: OU1-SS-SB303-108-109 - Totals
Date Sampled: 10/11/07 Time Sampled: 15:38
LAB ID: H7J120107-016 Matrix: SOLID

Parameter	Method		Rep
* Continued*			
SOLID, 6010B, SEP Totals	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Totals	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB406-89-90 - Step1
Date Sampled: 10/11/07 Time Sampled: 10:33
LAB ID: H7J120107-017 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B SEP Step 1	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 1	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB406-89-90 - Step2
Date Sampled: 10/11/07 Time Sampled: 10:33
LAB ID: H7J120107-018 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B, SEP Step 2	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 2	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB406-89-90 - Step3
Date Sampled: 10/11/07 Time Sampled: 10:33
LAB ID: H7J120107-019 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B, SEP Step 3	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 3	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB406-89-90 - Step4
Date Sampled: 10/11/07 Time Sampled: 10:33
LAB ID: H7J120107-020 Matrix: SOLID

Parameter	Method		Rep

TESTAMERICA LABORATORIES, INC.
SAMPLE CONFIRMATION REPORT

Client
Project : Carus Chemical Company
Number :
Manager : Nandra Weeks

TestAmerica
Date Rec: 10/12/07
Quote No: 076168
Manager : Linda McWhirter

Due Dates
Preliminary: 10/26/07
Hard Copy : 10/26/07

Analytical TAT: 14

Client ID: OU1-SS-SB406-89-90 - Step4
Date Sampled: 10/11/07 Time Sampled: 10:33
LAB ID: H7J120107-020 Matrix: SOLID

Parameter	Method		Rep
* Continued*			
SOLID, 6010B, SEP Step 4	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 4	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB406-89-90 - Step5
Date Sampled: 10/11/07 Time Sampled: 10:33
LAB ID: H7J120107-021 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B, SEP Step 5	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 5	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB406-89-90 - Step6
Date Sampled: 10/11/07 Time Sampled: 10:33
LAB ID: H7J120107-022 Matrix: SOLID

Parameter	Method		Rep
SOLID,6010B, SEP Step 6	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 6	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB406-89-90 - Step7
Date Sampled: 10/11/07 Time Sampled: 10:33
LAB ID: H7J120107-023 Matrix: SOLID

Parameter	Method		Rep
SOLID, 6010B, SEP Step 7	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Step 7	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Client ID: OU1-SS-SB406-89-90 - Totals
Date Sampled: 10/11/07 Time Sampled: 10:33
LAB ID: H7J120107-024 Matrix: SOLID

Parameter	Method		Rep

Client
Project : Carus Chemical Company
Number :
Manager : Nandra Weeks

TestAmerica
Date Rec: 10/12/07
Quote No: 076168
Manager : Linda McWhirter

Due Dates
Preliminary: 10/26/07
Hard Copy : 10/26/07

Analytical TAT: 14

- -

Client ID: OU1-SS-SB406-89-90 - Totals
Date Sampled: 10/11/07 Time Sampled: 10:33
LAB ID: H7J120107-024 Matrix: SOLID

Parameter	Method		Rep
* Continued*			
SOLID, 6010B, SEP Totals	SW846	6010B	
Metals: AS CD CR CU NI PB SE ZN			
SOLID, Mercury, SEP Totals	SW846	7470A	
SOLID, 160.3 MOD, Moisture, Percent (160	MCAWW	160.3 MOD	

Appendix G-4-10
VOC Results for Groundwater Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site

Analyte	CAS #	Tapwater RSL (µg/L)	Location ID Sample ID Date Units Total or Dissolved MCL (µg/L)	G-02 G-02 11/15/1993 µg/L T	G-101 G101 11/1/1991 µg/L T	G-103 G103 11/1/1991 µg/L T	G-106 G106 11/1/1991 µg/L T	G-103 OU1-GW-G-103-0712 12/3/2007 µg/L T	G-106 OU1-GW-G-106-0712 12/4/2007 µg/L T	MW-A OU1-GW-MW404-0712 12/5/2007 µg/L T	MW-A OU1-GW-MW-A-0712 12/5/2007 µg/L T
1,1,1-Trichloroethane	71-55-6	9,100	200	10.0 U	10.0 U	10.0 U	10.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	79-34-5	0.067	NS	10.0 U	10.0 U	10.0 U	10.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	79-00-5	0.24	5	10.0 U	10.0 U	10.0 U	10.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	75-34-3	2.4	NS	10.0 U	10.0 U	10.0 U	10.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	75-35-4	340	7	10.0 U	10.0 U	10.0 U	10.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2,4-Trichlorobenzene	120-82-1	2.3	70	NM	NM	NM	NM	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane	96-12-8	0.00032	0.2	NM	NM	NM	NM	2.0 U	2.0 U	2.0 U	2.0 U
1,2-Dibromoethane	106-93-4	0.0065	0.05	NM	NM	NM	NM	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	95-50-1	370	600	NM	NM	NM	NM	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	107-06-2	0.15	5	10.0 U	10.0 U	10.0 U	10.0 U	**1.6**	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	78-87-5	0.39	5	10.0 U	10.0 U	10.0 U	10.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	541-73-1	0.43	75	NM	NM	NM	NM	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	106-46-7	0.43	75	NM	NM	NM	NM	1.0 U	1.0 U	1.0 U	1.0 U
2-Butanone (MEK)	78-93-3	7,100	NS	10.0 U	10.0 U	10.0 U	10.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Hexanone	591-78-6	47	NS	10.0 U	10.0 U	10.0 U	10.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone	108-10-1	2,000	NS	10.0 U	10.0 U	10.0 U	10.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	67-64-1	22,000	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Benzene	71-43-2	0.41	5	10.0 U	10.0 U	10.0 U	10.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	75-25-2	8.5	NS	10.0 U	10.0 U	10.0 U	10.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	74-83-9	8.7	NS	10.0 U	10.0 U	10.0 U	10.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Carbon disulfide	75-15-0	1,000	NS	10.0 U	10.0 U	10.0 U	10.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	56-23-5	0.2	5	10.0 U	10.0 U	10.0 U	10.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	108-90-7	91	100	10.0 U	10.0 U	10.0 U	10.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	75-00-3	21,000	NS	10.0 U	10.0 U	10.0 U	10.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Chloroform	67-66-3	0.19	NS	10.0 U	10.0 U	10.0 U	10.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloromethane	74-87-3	190	NS	10.0 U	10.0 U	10.0 U	10.0 U	2.0 U	2.0 U	2.0 U	2.0 U
cis/trans-1,2-Dichloroethene	540-59-0	NS	NS	10.0 U	10.0 U	10.0 U	10.0 U	NM	NM	NM	NM
cis-1,2-Dichloroethene	156-59-2	370	70	NM	NM	NM	NM	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	10061-01-5	0.43	NS	10.0 U	10.0 U	10.0 U	10.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	110-82-7	13,000	NS	NM	NM	NM	NM	1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloromethane	124-48-1	0.15	NS	10.0 U	10.0 U	10.0 U	10.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorobromomethane	75-27-4	0.12	NS	10.0 U	10.0 U	10.0 U	10.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dichloromethane (Methylene chloride)	75-09-2	4.8	5	10.0 U	10.0 U	10.0 U	10.0 U	1.0 U	1.0 U	**0.26 J**	**0.24 J**
Ethyl benzene	100-41-4	1.5	700	10.0 U	10.0 U	10.0 U	10.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Freon-11	75-69-4	1,300	NS	NM	NM	NM	NM	1.0 U	1.0 U	1.0 U	1.0 U
Freon-113	76-13-1	59,000	NS	NM	NM	NM	NM	1.0 U	1.0 U	1.0 U	1.0 U
Freon-12	75-71-8	390	NS	NM	NM	NM	NM	1.0 U	1.0 U	1.0 U	1.0 U
Isopropylbenzene	98-82-8	680	NS	NM	NM	NM	NM	1.0 U	1.0 U	1.0 U	1.0 U
m&p-Xylene	XYLMP	NS	NS	NM	NM	NM	NM	1.0 U	1.0 U	1.0 U	1.0 U
Methyl acetate	79-20-9	37,000	NS	NM	NM	NM	NM	10.0 U	10.0 U	10.0 U	10.0 U
Methyl tertbutyl ether (MTBE)	1634-04-4	12	NS	NM	NM	NM	NM	1.0 U	1.0 U	1.0 U	1.0 U
Methylcyclohexane	108-87-2	13,000	NS	NM	NM	NM	NM	1.0 U	1.0 U	1.0 U	1.0 U
o-Xylene	95-47-6	1,200	NS	NM	NM	NM	NM	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	100-42-5	1,600	100	10.0 U	10.0 U	10.0 U	10.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	127-18-4	0.11	5	10.0 U	10.0 U	10.0 U	10.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	108-88-3	2,300	1,000	10.0 U	10.0 U	10.0 U	10.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	156-60-5	110	100	NM	NM	NM	NM	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	10061-02-6	0.43	NS	10.0 U	10.0 U	10.0 U	10.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	79-01-6	2	5	10.0 U	10.0 U	10.0 U	10.0 U	**0.65 J**	1.0 U	1.0 U	1.0 U
Vinyl chloride	75-01-4	0.016	2	10.0 U	10.0 U	10.0 U	10.0 U	**0.55 J**	1.0 U	1.0 U	1.0 U
Xylenes (unspecified)	XYLENES	NS	NS	10.0 U	10.0 U	10.0 U	10.0 U	NM	NM	NM	NM

Notes:

	Exceedance of Tapwater RSL and/or MCL
1,000	Bold indicates a detection
J	Estimated
U	Non-Detect
NM	Not Measured
NS	No applicable standard
T	Total

Appendix G-4-10
VOC Results for Groundwater Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site

Analyte	CAS #	Tapwater RSL (µg/L)	Location ID Sample ID Date Units Total or Dissolved MCL (µg/L)	MW-2 OU1-GW-MW2-0801 1/14/2008 µg/L T	MW-322H OU1-GW-MW-322-H 1/15/2008 µg/L T	MW-1 MW-1 11/16/1993 µg/L T	P-6 P-6 11/8/1994 µg/L T
1,1,1-Trichloroethane	71-55-6	9100	200	1.0 U	1.0 U	10.0 U	NM
1,1,2,2-Tetrachloroethane	79-34-5	0	NS	1.0 U	1.0 U	10.0 U	NM
1,1,2-Trichloroethane	79-00-5	0	5	1.0 U	1.0 U	10.0 U	NM
1,1-Dichloroethane	75-34-3	2	NS	1.0 U	1.0 U	10.0 U	NM
1,1-Dichloroethene	75-35-4	340	7	1.0 U	1.0 U	10.0 U	NM
1,2,4-Trichlorobenzene	120-82-1	2	70	1.0 U	1.0 U	NM	NM
1,2-Dibromo-3-chloropropane	96-12-8	0	0	2.0 U	2.0 U	NM	NM
1,2-Dibromoethane	106-93-4	0	0	1.0 U	1.0 U	NM	NM
1,2-Dichlorobenzene	95-50-1	370	600	1.0 U	1.0 U	NM	NM
1,2-Dichloroethane	107-06-2	0	5	1.0 U	1.0 U	10.0 U	NM
1,2-Dichloropropane	78-87-5	0	5	1.0 U	1.0 U	10.0 U	NM
1,3-Dichlorobenzene	541-73-1	0	75	1.0 U	1.0 U	NM	NM
1,4-Dichlorobenzene	106-46-7	0	75	1.0 U	1.0 U	NM	NM
2-Butanone (MEK)	78-93-3	7100	NS	5.0 U	5.0 U	10.0 U	NM
2-Hexanone	591-78-6	47	NS	5.0 U	5.0 U	10.0 U	NM
4-Methyl-2-pentanone	108-10-1	2000	NS	5.0 U	5.0 U	10.0 U	NM
Acetone	67-64-1	22000	NS	10.0 U	10.0 U	10.0 U	NM
Benzene	71-43-2	0	5	1.0 U	1.0 U	10.0 U	5.0 U
Benzo(b)fluoranthene	205-99-2	0	NS	NM	NM	NM	0.18 U
Bromoform	75-25-2	9	NS	1.0 U	1.0 U	10.0 U	NM
Bromomethane	74-83-9	9	NS	2.0 U	2.0 U	10.0 U	NM
Carbon disulfide	75-15-0	1000	NS	1.0 U	1.0 U	10.0 U	NM
Carbon tetrachloride	56-23-5	0	5	1.0 U	1.0 U	10.0 U	NM
Chlorobenzene	108-90-7	91	100	1.0 U	1.0 U	10.0 U	NM
Chloroethane	75-00-3	21000	NS	2.0 U	2.0 U	10.0 U	NM
Chloroform	67-66-3	0	NS	1.0 U	1.0 U	10.0 U	NM
Chloromethane	74-87-3	190	NS	2.0 U	2.0 U	10.0 U	NM
cis/trans-1,2-Dichloroethene	540-59-0	NS	NS	NM	NM	10.0 U	NM
cis-1,2-Dichloroethene	156-59-2	370	70	1.0 U	1.0 U	NM	NM
cis-1,3-Dichloropropene	10061-01-5	0	NS	1.0 U	1.0 U	10.0 U	NM
Cyclohexane	110-82-7	13000	NS	1.0 U	1.0 U	NM	NM
Dibromochloromethane	124-48-1	0	NS	1.0 U	1.0 U	10.0 U	NM

Appendix G-4-10
VOC Results for Groundwater Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site

Analyte	CAS #	Tapwater RSL (µg/L)	Location ID Sample ID Date Units Total or Dissolved MCL (µg/L)	MW-2 OU1-GW-MW2-0801 1/14/2008 µg/L T	MW-322H OU1-GW-MW-322-H 1/15/2008 µg/L T	MW-1 MW-1 11/16/1993 µg/L T	P-6 P-6 11/8/1994 µg/L T
Dichlorobromomethane	75-27-4	0	NS	1.0 U	1.0 U	10.0 U	NM
Dichloromethane (Methylene chloride)	75-09-2	5	5	1.0 U	1.0 U	10.0 U	NM
Ethyl benzene	100-41-4	2	700	1.0 U	1.0 U	10.0 U	5.0 U
Freon-11	75-69-4	1300	NS	1.0 U	1.0 U	NM	NM
Freon-113	76-13-1	59000	NS	1.0 U	1.0 U	NM	NM
Freon-12	75-71-8	390	NS	1.0 U	1.0 U	NM	NM
Isopropylbenzene	98-82-8	680	NS	1.0 U	1.0 U	NM	NM
m&p-Xylene	XYLMP	NS	NS	1.0 U	1.0 U	NM	NM
Methyl acetate	79-20-9	37000	NS	10.0 U	10.0 U	NM	NM
Methyl tertbutyl ether (MTBE)	1634-04-4	12	NS	1.0 U	1.0 U	NM	NM
Methylcyclohexane	108-87-2	13000	NS	1.0 U	1.0 U	NM	NM
o-Xylene	95-47-6	1200	NS	1.0 U	1.0 U	NM	NM
Styrene	100-42-5	1600	100	1.0 U	1.0 U	10.0 U	NM
Tetrachloroethene	127-18-4	0	5	1.0 U	1.0 U	10.0 U	NM
Toluene	108-88-3	2300	1000	1.0 U	1.0 U	10.0 U	5.0 U
trans-1,2-Dichloroethene	156-60-5	110	100	1.0 U	1.0 U	NM	NM
trans-1,3-Dichloropropene	10061-02-6	0	NS	1.0 U	1.0 U	10.0 U	NM
Trichloroethene	79-01-6	2	5	1.0 U	1.0 U	10.0 U	NM
Vinyl chloride	75-01-4	0	2	1.0 U	1.0 U	10.0 U	NM
Xylenes (unspecified)	XYLENES	NS	NS	NM	NM	10.0 U	5.0 U

Notes:

U	Non-Detect
T	Total
NM	Not Measured
NS	No applicable standard

Appendix G-4-11
SVOC Results for Groundwater Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site

Analyte	CAS #	Tapwater RSL (µg/L)	Location ID Sample ID Date Units Total or Dissolved MCL (µg/L)	G-02 G-02 11/15/1993 µg/L T	G-101 G101 11/1/1991 µg/L T	G-103 G103 11/1/1991 µg/L T	G-106 G106 11/1/1991 µg/L T	G-101 OU1-GW-G-101-0712 12/5/2007 µg/L T	G-103 OU1-GW-G-103-0712 12/3/2007 µg/L T	G-106 OU1-GW-G-106-0712 12/4/2007 µg/L T	MW-A OU1-GW-MW404-0712 12/5/2007 µg/L T	MW-A OU1-GW-MW-A-0712 12/5/2007 µg/L T
1,1-Biphenyl	92-52-4	1,800	NS	NM	NM	NM	NM	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
1,2,4-Trichlorobenzene	120-82-1	2.3	70	10.0 U	10.0 U	10.0 U	10.0 U	NM	NM	NM	NM	NM
1,2-Dichlorobenzene	95-50-1	370	600	10.0 U	10.0 U	10.0 U	10.0 U	NM	NM	NM	NM	NM
1,3-Dichlorobenzene	541-73-1	0.43	75	10.0 U	10.0 U	10.0 U	10.0 U	NM	NM	NM	NM	NM
1,4-Dichlorobenzene	106-46-7	0.43	75	10.0 U	10.0 U	10.0 U	10.0 U	NM	NM	NM	NM	NM
2,2'-Oxybis(1-Chloropropane)	108-60-1	0.32	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
2,4,5-Trichlorophenol	95-95-4	3,700	NS	25.0 U	25.0 U	25.0 U	25.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
2,4,6-Trichlorophenol	88-06-2	6.1	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
2,4-Dichlorophenol	120-83-2	110	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
2,4-Dimethylphenol	105-67-9	730	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
2,4-Dinitrophenol	51-28-5	73	NS	25.0 U	25.0 U	25.0 U	25.0 U	50.0 U	48.0 U	47.0 U	47.0 U	47.0 U
2,4-Dinitrotoluene	121-14-2	0.22	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
2,6-Dinitrotoluene	606-20-2	37	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
2-Chloronaphthalene	91-58-7	2,900	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
2-Chlorophenol	95-57-8	180	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
2-Methylnaphthalene	91-57-6	150	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
2-Methylphenol	95-48-7	1,800	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
2-Nitroaniline	88-74-4	370	NS	25.0 U	25.0 U	25.0 U	25.0 U	50.0 U	48.0 U	47.0 U	47.0 U	47.0 U
2-Nitrophenol	88-75-5	73	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
3,3'-Dichlorobenzidine	91-94-1	0.15	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
3-Nitroaniline	99-09-2	3.4	NS	25.0 U	25.0 U	25.0 U	25.0 U	50.0 U	48.0 U	47.0 U	47.0 U	47.0 U
4,6-Dinitro-2-methylphenol	534-52-1	3.7	NS	25.0 U	25.0 U	25.0 U	25.0 U	50.0 U	48.0 U	47.0 U	47.0 U	47.0 U
4-Bromophenyl-phenylether	101-55-3	3.7	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
4-Chloro-3-methylphenol	59-50-7	3,700	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
4-Chloroaniline	106-47-8	0.34	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
4-Chlorophenyl-phenylether	7005-72-3	3.7	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
4-Methylphenol	106-44-5	180	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
4-Nitroaniline	100-01-6	3.4	NS	25.0 U	25.0 U	25.0 U	25.0 U	50.0 U	48.0 U	47.0 U	47.0 U	47.0 U
4-Nitrophenol	100-02-7	73	NS	25.0 U	25.0 U	25.0 U	25.0 U	50.0 U	48.0 U	47.0 U	47.0 U	47.0 U
Acenaphthene	83-32-9	2,200	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Acenaphthylene	208-96-8	2,200	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Acetophenone	98-86-2	3,700	NS	NM	NM	NM	NM	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Anthracene	120-12-7	11,000	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Atrazine	1912-24-9	0.29	3	NM	NM	NM	NM	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Benzaldehyde	100-52-7	3,700	NS	NM	NM	NM	NM	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Benzo(a)anthracene	56-55-3	0.029	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Benzo(a)pyrene	50-32-8	0.0029	0.2	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Benzo(b)fluoranthene	205-99-2	0.029	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Benzo(g,h,i)perylene	191-24-2	0.029	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Benzo(k)fluoranthene	207-08-9	0.29	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
bis(2-Chloroethoxy) methane	111-91-1	110	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
bis(2-Chloroethyl) ether	111-44-4	0.012	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
bis(2-Ethylhexyl) phthalate	117-81-7	4.8	6	10.0 U	10.0 U	10.0 U	**7.0 J**	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Butylbenzylphthalate	85-68-7	35	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Caprolactam	105-60-2	18,000	NS	NM	NM	NM	NM	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Carbazole	86-74-8	11,000	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Chrysene	218-01-9	2.9	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Dibenzo(a,h)anthracene	53-70-3	0.0029	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Dibenzofuran	132-64-9	37	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U

Appendix G-4-11
SVOC Results for Groundwater Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site

Analyte	CAS #	Tapwater RSL (µg/L)	Location ID Sample ID Date Units Total or Dissolved MCL (µg/L)	G-02 G-02 11/15/1993 µg/L T	G-101 G101 11/1/1991 µg/L T	G-103 G103 11/1/1991 µg/L T	G-106 G106 11/1/1991 µg/L T	G-101 OU1-GW-G-101-0712 12/5/2007 µg/L T	G-103 OU1-GW-G-103-0712 12/3/2007 µg/L T	G-106 OU1-GW-G-106-0712 12/4/2007 µg/L T	MW-A OU1-GW-MW404-0712 12/5/2007 µg/L T	MW-A OU1-GW-MW-A-0712 12/5/2007 µg/L T
Diethylphthalate	84-66-2	29,000	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Dimethylphthalate	131-11-3	29,000	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Di-n-butylphthalate	84-74-2	3,700	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Di-n-octylphthalate	117-84-0	4.8	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Fluoranthene	206-44-0	1,500	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Fluorene	86-73-7	1,500	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Hexachlorobenzene	118-74-1	0.042	1	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Hexachlorobutadiene	87-68-3	0.86	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Hexachlorocyclopentadiene	77-47-4	220	50	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Hexachloroethane	67-72-1	4.8	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Indeno(1,2,3-cd)pyrene	193-39-5	0.029	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Isophorone	78-59-1	71	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Naphthalene	91-20-3	0.14	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Nitrobenzene	98-95-3	0.12	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
N-Nitroso-di-n-propylamine	621-64-7	0.0096	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
N-Nitrosodiphenylamine/Diphenylamine	86-30-6	14	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Pentachlorophenol	87-86-5	0.56	1	25.0 U	25.0 U	25.0 U	25.0 U	50.0 U	48.0 U	47.0 U	47.0 U	47.0 U
Phenanthrene	85-01-8	11,000	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Phenol	108-95-2	11,000	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U
Pyrene	129-00-0	1,100	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	9.5 U	9.4 U	9.4 U	9.4 U

Notes:

	Exceedance of MCL and Tapwater RSL
1,000	Bold indicates a detection
J	Estimated
U	Non-Detect
NM	Not Measured
NS	No applicable standard
T	Total

Appendix G-4-11
SVOC Results for Groundwater Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site

Analyte	CAS #	Tapwater RSL (µg/L)	Location ID Sample ID Date Units Total or Dissolved MCL (µg/L)	MW-1 MW-1 11/16/1993 µg/L T	MW-2 OU1-GW-MW2-0801 1/14/2008 µg/L T	MW-322H OU1-GW-MW-322-H 1/15/2008 µg/L T	P-6 P-6 11/8/1994 µg/L T
1,1-Biphenyl	92-52-4	1,800	NS	NM	10.0 U	9.8 U	NM
1,2,4-Trichlorobenzene	120-82-1	2.3	70	10.0 U	NM	NM	NM
1,2-Dichlorobenzene	95-50-1	370	600	10.0 U	NM	NM	NM
1,3-Dichlorobenzene	541-73-1	0.43	75	10.0 U	NM	NM	NM
1,4-Dichlorobenzene	106-46-7	0.43	75	10.0 U	NM	NM	NM
2,2'-Oxybis(1-Chloropropane)	108-60-1	0.32	NS	10.0 U	10.0 U	9.8 U	NM
2,4,5-Trichlorophenol	95-95-4	3,700	NS	25.0 U	10.0 U	9.8 U	NM
2,4,6-Trichlorophenol	88-06-2	6.1	NS	10.0 U	10.0 U	9.8 U	NM
2,4-Dichlorophenol	120-83-2	110	NS	10.0 U	10.0 U	9.8 U	NM
2,4-Dimethylphenol	105-67-9	730	NS	10.0 U	10.0 U	9.8 U	NM
2,4-Dinitrophenol	51-28-5	73	NS	25.0 U	52.0 U	49.0 U	NM
2,4-Dinitrotoluene	121-14-2	0.22	NS	10.0 U	10.0 U	9.8 U	NM
2,6-Dinitrotoluene	606-20-2	37	NS	10.0 U	10.0 U	9.8 U	NM
2-Chloronaphthalene	91-58-7	2,900	NS	10.0 U	10.0 U	9.8 U	NM
2-Chlorophenol	95-57-8	180	NS	10.0 U	10.0 U	9.8 U	NM
2-Methylnaphthalene	91-57-6	150	NS	10.0 U	10.0 U	9.8 U	NM
2-Methylphenol	95-48-7	1,800	NS	10.0 U	10.0 U	9.8 U	NM
2-Nitroaniline	88-74-4	370	NS	25.0 U	52.0 U	49.0 U	NM
2-Nitrophenol	88-75-5	73	NS	10.0 U	10.0 U	9.8 U	NM
3,3'-Dichlorobenzidine	91-94-1	0.15	NS	10.0 U	10.0 U	9.8 U	NM
3-Nitroaniline	99-09-2	3.4	NS	25.0 U	52.0 U	49.0 U	NM
4,6-Dinitro-2-methylphenol	534-52-1	3.7	NS	25.0 U	52.0 U	49.0 U	NM
4-Bromophenyl-phenylether	101-55-3	3.7	NS	10.0 U	10.0 U	9.8 U	NM
4-Chloro-3-methylphenol	59-50-7	3,700	NS	10.0 U	10.0 U	9.8 U	NM
4-Chloroaniline	106-47-8	0.34	NS	10.0 U	10.0 U	9.8 U	NM
4-Chlorophenyl-phenylether	7005-72-3	3.7	NS	10.0 U	10.0 U	9.8 U	NM
4-Methylphenol	106-44-5	180	NS	10.0 U	10.0 U	9.8 U	NM
4-Nitroaniline	100-01-6	3.4	NS	25.0 U	52.0 U	49.0 U	NM
4-Nitrophenol	100-02-7	73	NS	25.0 U	52.0 U	49.0 U	NM
Acenaphthene	83-32-9	2,200	NS	10.0 U	10.0 U	9.8 U	18.0 U
Acenaphthylene	208-96-8	2,200	NS	10.0 U	10.0 U	9.8 U	10.0 U
Acetophenone	98-86-2	3,700	NS	NM	10.0 U	9.8 U	NM
Anthracene	120-12-7	11,000	NS	10.0 U	10.0 U	9.8 U	6.6 U
Atrazine	1912-24-9	0.29	3	NM	10.0 U	9.8 U	NM
Benzaldehyde	100-52-7	3,700	NS	NM	10.0 U	9.8 U	NM
Benzo(a)anthracene	56-55-3	0.029	NS	10.0 U	10.0 U	9.8 U	0.13 U
Benzo(a)pyrene	50-32-8	0.0029	0.2	10.0 U	10.0 U	9.8 U	0.23 U
Benzo(b)fluoranthene	205-99-2	0.029	NS	10.0 U	10.0 U	9.8 U	NM
Benzo(g,h,i)perylene	191-24-2	0.029	NS	10.0 U	10.0 U	9.8 U	0.76 U
Benzo(k)fluoranthene	207-08-9	0.29	NS	10.0 U	10.0 U	9.8 U	0.17 U

Appendix G-4-11
SVOC Results for Groundwater Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site

Analyte	CAS #	Tapwater RSL (µg/L)	Location ID Sample ID Date Units Total or Dissolved MCL (µg/L)	MW-1 MW-1 11/16/1993 µg/L T	MW-2 OU1-GW-MW2-0801 1/14/2008 µg/L T	MW-322H OU1-GW-MW-322-H 1/15/2008 µg/L T	P-6 P-6 11/8/1994 µg/L T
bis(2-Chloroethoxy) methane	111-91-1	110	NS	10.0 U	10.0 U	9.8 U	NM
bis(2-Chloroethyl) ether	111-44-4	0.012	NS	10.0 U	10.0 U	9.8 U	NM
bis(2-Ethylhexyl) phthalate	117-81-7	4.8	6	10.0 U	10.0 U	9.8 U	NM
Butylbenzylphthalate	85-68-7	35	NS	10.0 U	10.0 U	9.8 U	NM
Caprolactam	105-60-2	18,000	NS	NM	10.0 U	9.8 U	NM
Carbazole	86-74-8	11,000	NS	10.0 U	10.0 U	9.8 U	NM
Chrysene	218-01-9	2.9	NS	10.0 U	10.0 U	9.8 U	1.5 U
Dibenzo(a,h)anthracene	53-70-3	0.0029	NS	10.0 U	10.0 U	9.8 U	0.30 U
Dibenzofuran	132-64-9	37	NS	10.0 U	10.0 U	9.8 U	NM
Diethylphthalate	84-66-2	29,000	NS	10.0 U	10.0 U	9.8 U	NM
Dimethylphthalate	131-11-3	29,000	NS	10.0 U	10.0 U	9.8 U	NM
Di-n-butylphthalate	84-74-2	3,700	NS	**2.0 J**	10.0 U	9.8 U	NM
Di-n-octylphthalate	117-84-0	4.8	NS	10.0 U	10.0 U	9.8 U	NM
Fluoranthene	206-44-0	1,500	NS	10.0 U	10.0 U	9.8 U	2.1 U
Fluorene	86-73-7	1,500	NS	10.0 U	10.0 U	9.8 U	2.1 U
Hexachlorobenzene	118-74-1	0.042	1	10.0 U	10.0 U	9.8 U	NM
Hexachlorobutadiene	87-68-3	0.86	NS	10.0 U	10.0 U	9.8 U	NM
Hexachlorocyclopentadiene	77-47-4	220	50	10.0 U	10.0 U	9.8 U	NM
Hexachloroethane	67-72-1	4.8	NS	10.0 U	10.0 U	9.8 U	NM
Indeno(1,2,3-cd)pyrene	193-39-5	0.029	NS	10.0 U	10.0 U	9.8 U	0.43 U
Isophorone	78-59-1	71	NS	10.0 U	10.0 U	9.8 U	NM
Naphthalene	91-20-3	0.14	NS	10.0 U	10.0 U	9.8 U	10.0 U
Nitrobenzene	98-95-3	0.12	NS	10.0 U	10.0 U	9.8 U	NM
N-Nitroso-di-n-propylamine	621-64-7	0.0096	NS	10.0 U	10.0 U	9.8 U	NM
N-Nitrosodiphenylamine/Diphenylamine	86-30-6	14	NS	10.0 U	10.0 U	9.8 U	NM
Pentachlorophenol	87-86-5	0.56	1	25.0 U	52.0 U	49.0 U	NM
Phenanthrene	85-01-8	NS	NS	10.0 U	10.0 U	9.8 U	6.4 U
Phenol	108-95-2	11,000	NS	10.0 U	10.0 U	9.8 U	NM
Pyrene	129-00-0	1,100	NS	10.0 U	10.0 U	9.8 U	2.7 U

Notes:

1,000	Bold indicates a detection
J	Estimated
U	Non-Detect
T	Total
NM	Not Measured
NS	No applicable standard

Appendix G-4-12
PCB Results for Groundwater Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site

Analyte	CAS #	Tapwater RSL (µg/L)	Location ID Sample ID Date Units Total or Dissolved MCL (µg/L)	G-02 G-02 34288 µg/L T	G-101 G101 33543 µg/L T	G-103 G103 11/1/1991 µg/L T	G-106 G106 11/1/1991 µg/L T
Aroclor 1016	12674-11-2	0.96	0.5	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor 1221	11104-28-2	0.0068	0.5	2.0 U	2.0 U	2.0 U	2.0 U
Aroclor 1232	11141-16-5	0.0068	0.5	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor 1242	53469-21-9	0.034	0.5	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor 1248	12672-29-6	0.034	0.5	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor 1254	11097-69-1	0.034	0.5	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor 1260	11096-82-5	0.034	0.5	1.0 U	1.0 U	1.0 U	1.0 U

Notes:

U Non-Detect
T Total

Appendix G-4-12
Metals and Cyanide Results for Groundwater Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site

Analyte	CAS #	Tapwater RSL (µg/L)	Location ID Sample ID Date Units Total or Dissolved MCL (µg/L)	MW-1 MW-1 11/16/1993 µg/L T
Aroclor 1016	12674-11-2	0.96	0.5	1.0 U
Aroclor 1221	11104-28-2	0.0068	0.5	2.0 U
Aroclor 1232	11141-16-5	0.0068	0.5	1.0 U
Aroclor 1242	53469-21-9	0.034	0.5	1.0 U
Aroclor 1248	12672-29-6	0.034	0.5	1.0 U
Aroclor 1254	11097-69-1	0.034	0.5	1.0 U
Aroclor 1260	11096-82-5	0.034	0.5	1.0 U

Notes:

U	Non-Detect
T	Total

Appendix G-4-13
Pesticide Results for Groundwater Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site

Analyte	CAS #	Tapwater RSL (µg/L)	Location ID Sample ID Date Units Total or Dissolved MCL (µg/L)	G-02 G-02 11/15/1993 µg/L T	G-101 G101 11/1/1991 µg/L T	G-103 G103 11/1/1991 µg/L T	G-106 G106 11/1/1991 µg/L T
4,4'-DDD	72-54-8	0.28	NS	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDE	72-55-9	0.2	NS	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDT	50-29-3	0.2	NS	0.10 U	0.10 U	0.10 U	0.10 U
Aldrin	309-00-2	0.004	NS	0.050 U	0.050 U	0.050 U	0.050 U
alpha-BHC	319-84-6	0.011	NS	0.050 U	0.050 U	0.050 U	0.050 U
alpha-Chlordane	5103-71-9	0.19	NS	0.050 U	0.050 U	0.050 U	0.050 U
beta-BHC	319-85-7	0.037	NS	0.050 U	0.050 U	0.050 U	0.050 U
delta-BHC	319-86-8	0.011	NS	0.050 U	0.050 U	0.050 U	0.050 U
Dieldrin	60-57-1	0.0042	NS	0.10 U	0.10 U	0.10 U	0.10 U
Endosulfan I	959-98-8	220	NS	0.050 U	0.050 U	0.050 U	0.050 U
Endosulfan II	33213-65-9	220	NS	0.10 U	0.10 U	0.10 U	0.10 U
Endosulfan sulfate	1031-07-8	220	NS	0.10 U	0.10 U	0.10 U	0.10 U
Endrin	72-20-8	11	2	0.10 U	0.10 U	0.10 U	0.10 U
Endrin Aldehyde	7421-93-4	11	NS	0.10 U	0.10 U	0.10 U	0.10 U
Endrin ketone	53494-70-5	11	NS	0.10 U	0.10 U	0.10 U	0.10 U
gamma-BHC (Lindane)	58-89-9	0.061	0.2	0.050 U	0.050 U	0.050 U	0.050 U
gamma-Chlordane	5566-34-7	2	NS	0.050 U	0.050 U	0.050 U	0.050 U
Heptachlor	76-44-8	0.015	0.4	0.050 U	0.050 U	0.050 U	0.050 U
Heptachlor epoxide	1024-57-3	0.0074	0.2	0.050 U	0.050 U	0.050 U	0.050 U
Methoxychlor	72-43-5	180	40	0.50 U	0.50 U	0.50 U	0.50 U
Toxaphene	8001-35-2	0.061	3	5.0 U	5.0 U	5.0 U	5.0 U

Notes:

U	Non-Detect
T	Total
NS	No applicable standard

Appendix G-4-13
Metals and Cyanide Results for Groundwater Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site

Analyte	CAS #	Tapwater RSL (µg/L)	Location ID Sample ID Date Units Total or Dissolved MCL (µg/L)	MW-1 MW-1 11/16/1993 µg/L T
4,4'-DDD	72-54-8	0.28	NS	0.10 U
4,4'-DDE	72-55-9	0.2	NS	0.10 U
4,4'-DDT	50-29-3	0.2	NS	0.10 U
Aldrin	309-00-2	0.004	NS	0.050 U
alpha-BHC	319-84-6	0.011	NS	0.050 U
alpha-Chlordane	5103-71-9	0.19	NS	0.050 U
beta-BHC	319-85-7	0.037	NS	0.050 U
delta-BHC	319-86-8	0.011	NS	0.050 U
Dieldrin	60-57-1	0.0042	NS	0.10 U
Endosulfan I	959-98-8	220	NS	0.050 U
Endosulfan II	33213-65-9	220	NS	0.10 U
Endosulfan sulfate	1031-07-8	220	NS	0.10 U
Endrin	72-20-8	11	2	0.10 U
Endrin Aldehyde	7421-93-4	11	NS	0.10 U
Endrin ketone	53494-70-5	11	NS	0.10 U
gamma-BHC (Lindane)	58-89-9	0.061	0.2	0.050 U
gamma-Chlordane	5566-34-7	0.19	NS	0.050 U
Heptachlor	76-44-8	0.015	0.4	0.050 U
Heptachlor epoxide	1024-57-3	0.0074	0.2	0.050 U
Methoxychlor	72-43-5	180	40	0.50 U
Toxaphene	8001-35-2	0.061	3	5.0 U

Notes:

U	Non-Detect
T	Total
NS	No applicable standard

Appendix G-4-14
Other Inorganics Results for Groundwater Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site

Analyte	Location ID / Sample ID / Date / Units / Total or Dissolved / CAS #	G-02 G-02 11/15/1993 µg/L D	G-02 G-02 11/15/1993 µg/L T	G-05 G-05 11/15/1993 µg/L D	G-05 G-05 11/15/1993 µg/L T	G-101 G101 11/1/1991 µg/L T	G-101 G101 11/15/1993 µg/L D	G-101 G101 11/15/1993 µg/L T	G-103 G103 11/1/1991 µg/L T	G-103 G103 11/15/1993 µg/L D	G-103 G103 11/15/1993 µg/L T	G-106 G106 11/1/1991 µg/L T	G-106 G106 11/16/1993 µg/L D	G-106 G106 11/16/1993 µg/L T	G-02 OU1-GW-G-02-0712 12/5/2007 µg/L T
Calcium	7440-70-2	**461,000**	**437,000**	**274,000**	**260,000**	**303 J**	**226,000**	**204,000**	**655,000**	**326,000**	**292,000**	**654,000**	**596,000**	**578,000**	**577,000**
Magnesium	7439-95-4	**95,900**	**103,000**	**138,000**	**132,000**	**119,000**	**119,000**	**111,000**	**195,000**	**146,000**	**136,000**	**120,000**	**68,000**	**64,200**	**99,900**
Potassium	7440-09-7	**10,600**	**12,800**	**77,300**	**77,300 J**	**33,800**	**8,640**	**8,160**	**46,100**	**2,550**	**2,420**	**133,000**	**83,300**	**80,200**	**14,600**
Sodium	7440-23-5	**104,000**	**115,000**	**153,000**	**151,000**	**278,000**	**215,000**	**215,000**	**2,000,000**	**124,000**	**125,000**	**215,000**	**132,000**	**12,900**	**164,000**
Sulfate	14808-79-8	NM	**1,300,000**	NM	**885,000**	**1,060,000**	NM	**610,000**	**1,680,000**	NM	**908,000**	**2,080,000**	NM	**1,520,000**	NM
Sulfide	18496-25-8	NM	1,000 U	NM	1,000 U	1,000 U	NM	1,000 U	1,000 U	NM	1,000 U	1,000 U	NM	1,000 U	NM

Notes:

1,000	Bold indicates a detection
J	Estimated
U	Non-Detect
NM	Not Measured
T	Total
D	Dissolved

Appendix G-4-14
Other Inorganics Results for Groundwater Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site

Analyte	Location ID Sample ID Date Units Total or Dissolved CAS #	G-101 OU1-GW-G-101-0712 12/5/2007 µg/L T	G-101 OU1-GW-G-101-0712 12/6/2007 µg/L D	G-103 OU1-GW-G-103-0712 12/3/2007 µg/L T	G-106 GW-G-106- 12/4/2007 µg/L D	G-106 GW-G-106 12/4/2007 µg/L T	MW-A GW-MW404 12/5/2007 µg/L T	MW-A -GW-MW-A-(12/5/2007 µg/L D	MW-A OU1-GW-MW-A-0712 12/5/2007 µg/L T
Calcium	7440-70-2	**250,000**	**253,000**	**466,000**	**715,000**	**663,000**	**720,000**	**719,000**	**719,000**
Magnesium	7439-95-4	**132,000**	**135,000**	**141,000**	**75,400**	**72,000**	**81,000**	**81,200**	**80,100**
Potassium	7440-09-7	**13,900**	**14,000**	**3,610**	**89,300**	**86,700**	**114,000**	**113,000**	**111,000**
Sodium	7440-23-5	**272,000**	**275,000**	**252,000**	**372,000**	**362,000**	**417,000**	**412,000**	**423,000**
Sulfate	14808-79-8	NM	NM	NM	NM	NM	NM	NM	NM
Sulfide	18496-25-8	NM	NM	NM	NM	NM	NM	NM	NM

Notes:

1,000	Bold indicates a detection
J	Estimated
U	Non-Detect
NM	Not Measured
T	Total
D	Dissolved

Appendix G-4-14
Other Inorganics Results for Groundwater Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site

Analyte	Location ID / Sample ID / Date / Units / Total or Dissolved / CAS #	MW-1 / MW-1 / 11/16/1993 / µg/L / D	MW-1 / MW-1 / 11/16/1993 / µg/L / T	MW-1 / MW-1 / 11/5/1994 / µg/L / T	MW-1 / MW-1-Dup / 11/5/1994 / µg/L / T	MW-2 / MW-2 / 11/16/1993 / µg/L / D	MW-2 / MW-2 / 11/16/1993 / µg/L / T	MW-2 / MW-2 / 11/9/1994 / µg/L / T	ISW-001 / OU1-GW-ISW001-0906 / 6/19/2009 / µg/L / D	ISW-001 / OU1-GW-ISW001-0906 / 6/19/2009 / µg/L / T	ISW-001 / OU1-GW-ISW001-0908 / 8/19/2009 / µg/L / D
Bicarbonate**	71-52-3	NM	NM	**229,000**	229,000 U	NM	NM	**203,000**	NM	NM	NM
Calcium	7440-70-2	**647,000**	**603,000**	NM	NM	**432,000**	**706,000**	NM	**87,600**	**85,300**	**104,000**
Carbonate**	3812-32-6	NM	NM	**206**	175 U	NM	NM	**170**	NM	NM	NM
Magnesium	7439-95-4	**49,800**	**48,400**	NM	NM	**126,000**	**140,000**	NM	**37,000**	**35,700**	**41,500**
Potassium	9/7/7440	**102,000**	**96,700**	NM	NM	**108,000**	**108,000**	NM	**4,700**	**4,560**	**4,840**
Sodium	7440-23-5	**117,000**	**114,000**	NM	NM	**228,000**	**227,000**	NM	**20,500**	**19,700**	**26,200**
Sulfate	14808-79-8	NM	**1,480,000**	**1,590,000**	**1,640,000**	NM	**1,460,000**	**1,170,000**	NM	NM	NM
Sulfide	18496-25-8	NM	1,000 U	1,000 U	1,000 U	NM	**2,300**	1,000 U	NM	NM	NM

Notes:

1,000	Bold indicates a detection
J	Estimated
U	Non-Detect
NM	Not Measured
T	Total
D	Dissolved
**	Expressed as $CaCO_3$

Appendix G-4-14
Other Inorganics Results for Groundwater Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site

Analyte	CAS #	Location ID / Sample ID / Date / Units / Total or Dissolved	ISW-001 / OU1-GW-ISW001-0908 / 8/19/2009 / µg/L / T	ISW-002 / OU1-GW-ISW002-0906 / 6/19/2009 / µg/L / D	ISW-002 / OU1-GW-ISW002-0906 / 6/19/2009 / µg/L / T	ISW-002 / OU1-GW-ISW002-0908 / 8/20/2009 / µg/L / D	ISW-002 / OU1-GW-ISW002-0908 / 8/20/2009 / µg/L / T	MW-2 / OU1-GW-MW2-0801 / 1/14/2008 / µg/L / D	MW-2 / OU1-GW-MW2-0801 / 1/14/2008 / µg/L / T	MW-303H / OU1-GW-MW-303H-0712 / 12/4/2007 / µg/L / D
Bicarbonate**	71-52-3		NM	NM	NM	NM	NM	NM	NM	NM
Calcium	7440-70-2		**100,000**	**351,000**	**335,000**	**367,000**	**360,000**	**188,000**	**190,000**	**435,000**
Carbonate**	3812-32-6		NM	NM	NM	NM	NM	NM	NM	NM
Magnesium	7439-95-4		**41,900**	**45,400**	**44,300**	**55,500**	**58,000**	**49,600**	**51,400**	**190,000**
Potassium	9/7/7440		**4,930**	**28,400**	**28,700**	**43,300**	**48,700**	**38,500**	**41,800**	**48,800**
Sodium	7440-23-5		**25,700**	**53,700**	**54,500**	**95,800**	**103,000**	**232,000**	**240,000**	**218,000**
Sulfate	14808-79-8		NM	NM	NM	NM	NM	NM	NM	NM
Sulfide	18496-25-8		NM	NM	NM	NM	NM	NM	NM	NM

Notes:

1,000	Bold indicates a detection
J	Estimated
U	Non-Detect
NM	Not Measured
T	Total
D	Dissolved
**	Expressed as $CaCO_3$

Appendix G-4-14
Other Inorganics Results for Groundwater Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site

Analyte	CAS #	Location ID	Sample ID	Date	Units	Total or Dissolved	MW-303H	MW-305H	MW-305H	MW-321H	MW-322H	P-17	P-18	P-1	P-7
							OU1-GW-MW-303H-0712	OU1-GW-MW-305H-0712	U1-GW-MW-305H-071	OU1-GW-MW-321-H	J1-GW-MW-322	OU1-GW-P-17	OU1-GW-P-1	P-1	OU1-GW-P-7-0712
							12/4/2007	12/4/2007	12/4/2007	1/15/2008	1/15/2008	1/15/2008	1/14/2008	11/10/1994	12/6/2007
							µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
							T	D	T	T	T	T	T	T	T
Bicarbonate**	71-52-3						NM	NM	NM	NM	NM	NM	NM	**4,960**	NM
Calcium	7440-70-2						**422,000**	**512,000**	**496,000**	**590,000**	**480,000**	**329,000**	**136,000**	NM	**720,000**
Carbonate**	3812-32-6						NM	NM	NM	NM	NM	NM	NM	0.0 U	NM
Magnesium	7439-95-4						**191,000**	**155,000**	**149,000**	**140,000**	**176,000**	**92,800**	**30,000**	NM	**89,400**
Potassium	9/7/7440						**48,200**	**98,100**	**98,600**	**5,820**	**178,000**	**82,700**	**23,700**	NM	**87,300**
Sodium	7440-23-5						**209,000**	**161,000**	**162,000**	**413,000**	**172,000**	**211,000**	**189,000**	NM	**390,000**
Sulfate	14808-79-8						NM	NM	NM	NM	NM	NM	NM	**4,440,000**	NM
Sulfide	18496-25-8						NM	NM	NM	NM	NM	NM	NM	1,000 U	NM

Notes:

1,000	Bold indicates a detection
J	Estimated
U	Non-Detect
NM	Not Measured
T	Total
D	Dissolved
**	Expressed as $CaCO_3$

Appendix G-4-14
Other Inorganics Results for Groundwater Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site

Analyte	Location ID / Sample ID / Date / Units / Total or Dissolved / CAS #									
	Location ID	**P-9**	**P-6**	**P-6**	**P-7**	**P-9**	**P-15**	**P-17**	**P-18**	**P-19**
	Sample ID	**OU1-GW-P-9-0712**	**P-6**	**P-6**	**P-7**	**P-9**	**P-15**	**P-17**	**P-18**	**P-19**
	Date	**12/6/2007**	**11/8/1994**	**11/9/1994**	**11/7/1994**	**11/7/1994**	**11/10/1994**	**11/9/1994**	**11/10/1994**	**11/10/1994**
	Units	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**
	Total or Dissolved	**T**	**T**	**T**	**T**	**T**	**T**	**T**	**T**	**T**
Analyte	**CAS #**									
Bicarbonate**	71-52-3	NM	**453,000**	**396,000**	**384,000**	**413,000**	**466,000**	**223,000**	**124,000**	**332,000**
Calcium	7440-70-2	**744,000**	NM	NM	NM	NM	NM	NM	NM	NM
Carbonate**	3812-32-6	NM	**331**	**526**	**249**	**224**	**390**	**276**	**36**	**291**
Magnesium	7439-95-4	**123,000**	NM	NM	NM	NM	NM	NM	NM	NM
Potassium	9/7/7440	**79,200**	NM	NM	NM	NM	NM	NM	NM	NM
Sodium	7440-23-5	**217,000**	NM	NM	NM	NM	NM	NM	NM	NM
Sulfate	14808-79-8	NM	**1,890,000**	**157,000**	**1,890,000**	**1,510,000**	**502,000**	**1,350,000**	**2,450,000**	**1,300,000**
Sulfide	18496-25-8	NM	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U

Notes:

1,000	Bold indicates a detection
J	Estimated
U	Non-Detect
NM	Not Measured
T	Total
D	Dissolved
**	Expressed as $CaCO_3$

Appendix G-4-15
Metals and Cyanide Results for Sediment Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Depth Sediment ESV (mg/kg)	Pond Line 1 Pond Line 1 11/1/1994 mg/Kg 0'	Pond Line 1 Pond Line 1 DP 11/1/1994 mg/Kg 0'	Pond Line 2 Pond Line 2 11/1/1994 mg/Kg 0'	Pond Line 4 Pond Line 4 11/1/1994 mg/Kg 0'	SSI-X205 SSI-X205 11/21/1991 mg/Kg 0 - 0.667'	SSI-X206 SSI-X206 11/21/1991 mg/Kg 0 - 0.667'	UL-215 OU1-SE-UL215-071101 11/1/2007 mg/Kg 0'
Aluminum	7429-90-5		NM	NM	NM	NM	**4,160**	**5,810**	**11,200**
Antimony	7440-36-0		NM	NM	NM	NM	**52.3**	**30.8**	**4.8 J**
Arsenic	7440-38-2	9.79	NM	NM	NM	NM	**31.5**	**37.7**	**42.8**
Barium	7440-39-3		**2,020**	**6,770**	**7,310**	**3,620**	**361**	**867**	**626**
Beryllium	7440-41-7		NM	NM	NM	NM	0.48 U	0.43 U	**0.99 J**
Cadmium	7440-43-9	0.99	**8**	**5**	**5**	**5**	**3**	**10**	**99**
Chromium	7440-47-3	43.4	**130**	**277**	**255**	**280**	**57**	**42**	**17**
Cobalt	7440-48-4	50	NM	NM	NM	NM	**11.9 J**	**18.4 J**	**30**
Copper	7440-50-8	31.6	NM	NM	NM	NM	**185**	**383**	**550**
Cyanide	57-12-5	0.0001	1.1 U	1.2 U	1.3 U	1.5 U	0.61 U	0.54 U	1.5 U
Iron	7439-89-6		**33,800**	**127,000**	**109,000**	**193,000**	**3,890**	**10,200**	**52,000**
Lead	7439-92-1	35.8	**133**	**141**	**148**	**130**	**70**	**326**	**1,810**	
Manganese	7439-96-5		**46,700**	**103,000**	**76,200**	**155,000**	**17,000**	**28,900**	**5,370**
Mercury	7439-97-6	0.18	**1**	**1.4**	**2**	**0.97**	**0**	**0**	**0**
Nickel	7440-02-0	22.7	**174**	**448**	**495**	**737**	**50**	**91**	**79**
Selenium	7782-49-2		NM	NM	NM	NM	9.4 U	7.7 U	**5**
Silver	7440-22-4	0.5	NM	NM	NM	NM	4.3 U	3.8 U	**15**
Thallium	7440-28-0		NM	NM	NM	NM	1.4 U	1.1 U	**0.62 J**
Vanadium	7440-62-2		NM	NM	NM	NM	**57.5**	**50**	**34**
Zinc	7440-66-6	121	**1,620**	**513**	**595**	**551**	**609**	**2,790**	**87,700**

Notes:

	Exceedance of Sediment Ecological Screening Value (ESV)
1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NM	Not Measured

Appendix G-4-15
Metals and Cyanide Results for Sediment Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID / Sample ID / Date / Units / Depth — Sediment ESV (mg/kg)	5thSt-05B / 5thSt 05B / 11/8/1994 / mg/Kg / 0'	ISA-X202 / ISA-X202 / 12/14/1993 / mg/Kg / 0 - 0.25'	ISA-X203 / ISA-X203 / 12/14/1993 / mg/Kg / 0'	ISA-X204 / ISA-X204 / 12/14/1993 / mg/Kg / 0 - 0.5'	ISA-X205 / ISA-X205 / 12/14/1993 / mg/Kg / 0 - 0.25'	LRS-412 / OU1-SS-LRS412S-0908 / 8/11/2009 / mg/Kg / 0'	LRS-412 / OU1-SS-LRS412T-0908 / 8/11/2009 / mg/Kg / 0'	LRS-412 / OU1-SS-SB406-0908 / 8/11/2009 / mg/Kg / 0'
Aluminum	7429-90-5		NM	0.0 U	0.0 U	0.0 U	0.0 U	**9,290 J**	**2,540**	**0.73 J+**
Antimony	7440-36-0		NM	NM	NM	NM	NM	**49.0 J**	**1.6 J**	0.0030 U
Arsenic	7440-38-2	9.79	NM	0.0 U	0.0 U	0.0 U	**15.8**	**79.7**	**8.7 J**	**20.0 J**
Barium	7440-39-3		**42.2 J**	0.0 U	0.0 U	0.0 U	0.0 U	**488**	**120 J**	**79.5**
Beryllium	7440-41-7		NM	**0.48 J**	**0.82 J**	**0.61 J**	**0.55 J**	**2.6**	**0.56 J-**	**0.74**
Cadmium	7440-43-9	0.99	**4.3**	**28.4**	**46.5**	**2.7**	**2.8**	**2.5**	**3.0 J+**	**3.9**
Chromium	7440-47-3	43.4	**4.6**	0.0 U	0.0 U	**18.7**	**20.1**	**11**	**5.3 J+**	**6.9**
Cobalt	7440-48-4	50	NM	0.0 U	0.0 U	0.0 U	0.0 U	**16**	**5.6 J+**	**4.4**
Copper	7440-50-8	31.6	NM	**109**	**259**	0.0 U	0.0 U	**3,320**	**184 J**	**96**
Cyanide	57-12-5	0.0001	NM	0.0 U	0.0 U	0.0 U	0.0 U	NM	NM	NM
Iron	7439-89-6		**9,990**	0.0 U	0.0 U	0.0 U	0.0 U	**45,000**	**13,700**	**15,700**
Lead	7439-92-1	35.8	**31.2**	**164**	**325**	**28.8**	0.0 U	**94.5**	**45.5 J**	**34.1**
Manganese	7439-96-5		**313**	0.0 U	0.0 U	0.0 U	0.0 U	**3,580 J**	**609**	**622**
Mercury	7439-97-6	0.18	0.13 U	**0.4**	**0.51**	**0.060 J**	0.0 U	NM	NM	0.00040 U
Nickel	7440-02-0	22.7	**12.8**	0.0 U	**22**	**17.7**	**25.3**	**339**	**23.1 J**	**13.8 J**
Selenium	7782-49-2		NM	0.0 U	**0.41 J**	**0.69 J**	0.0 U	**1.7 J**	0.45 U	**0.63**
Silver	7440-22-4	0.5	NM	0.0 U	0.0 U	0.0 U	0.0 U	**34**	0.0 U	0.0030 U
Thallium	7440-28-0		NM	0.0 U	**0.29 J**	**0.38 J**	0.0 U	0.030 U	**0.043 J**	**0.063 J**
Vanadium	7440-62-2		NM	0.0 U	0.0 U	0.0 U	**66**	**11**	**10.8 J**	**12.9**
Zinc	7440-66-6	121	**598**	**4,670**	**12,100**	**282**	**150**	**5,970**	**781**	**0.16**

Analyte	CAS #	Location ID / Sample ID / Date / Units / Depth — Sediment ESV (mg/kg)	LRS-413 / OU1-SS-LRS413S-0908 / 8/12/2009 / mg/Kg / 0'	LRS-413 / OU1-SS-LRS413T-0908 / 8/12/2009 / mg/Kg / 0'	LVR-201 / OU1-SS-LVR201-071029 / 10/29/2007 / mg/Kg / 0'	LVR-201 / OU1-SS-LVR406-071029 / 10/29/2007 / mg/Kg / 0'	LVR-202 / OU1-SS-LVR202-071030 / 10/30/2007 / mg/Kg / 0'	LVR-203 / OU1-SS-LVR203-071030 / 10/30/2007 / mg/Kg / 0'	LVR-402 / OU1-SE-LVR402C-0908 / 8/12/2009 / mg/Kg / 0'	LVR-402 / OU1-SE-LVR402E-0908 / 8/12/2009 / mg/Kg / 0'
Aluminum	7429-90-5		**18,100**	**3,270**	**3,990**	**8,370**	**2,220**	**1,530**	**2,650**	**3,610**
Antimony	7440-36-0		0.0 U	0.0 U	**22.5 J**	**10.9 J**	0.88 U	**2.0 J**	**1.2 J**	**7.0 J**
Arsenic	7440-38-2	9.79	**73.7**	**3.9**	**9.6**	**50.8**	**5**	**17.9**	**6.5**	**19.2**
Barium	7440-39-3		**204**	**29.9**	**59.1**	**44.7**	**27.6**	**90.2**	**49.6**	**143**
Beryllium	7440-41-7		**3.6**	**0.26**	**0.45 J**	**0.51 J**	**0.15 J**	**0.14 J**	**0.29 J**	**0.76**
Cadmium	7440-43-9	0.99	**4.5**	**2.3**	**6.2**	**9.7**	**1.8**	**6.4**	**2.8**	**9.3**
Chromium	7440-47-3	43.4	**11**	**5.2**	**5.2**	**14.1**	**4.2**	**3.5**	**5.1**	**8.8**
Cobalt	7440-48-4	50	**27.4**	**38**	**8.7**	**21.5**	**3.7**	**8.3**	**5.2**	**11.5**
Copper	7440-50-8	31.6	**1,870**	**20**	**29**	**440**	**37**	**54**	**62**	**600**
Cyanide	57-12-5	0.0001	NM	NM	1.5 U	1.8 U	NM	NM	NM	NM
Iron	7439-89-6		**116,000**	**48,800**	**73,500**	**27,700**	**9,880**	**30,200**	**18,400**	**65,600**
Lead	7439-92-1	35.8	**66**	**12.2**	**37.3**	**61**	**19.8**	**124**	**130**	**914**
Manganese	7439-96-5		**3,060**	**2,210**	**759**	**1,050**	**521**	**595**	**1,980**	**1,930**
Mercury	7439-97-6	0.18	NM	NM	**0.0060 J**	**0.010 J**	**0.014 J**	**0.022 J**	0.20 U	0.20 U
Nickel	7440-02-0	22.7	**289**	**24.4**	**28.3**	**57.5**	**16.6**	**16.2**	**14.5**	**39**
Selenium	7782-49-2		**0.43 J**	**0.55 J**	**0.91 J**	**2**	**0.38 J**	0.35 U	**1**	**1**
Silver	7440-22-4	0.5	**46**	0.0 U	**10.5 J**	**4.2 J**	**0.61 J**	**0.76 J**	**1**	**6**
Thallium	7440-28-0		0.0 U	0.031 U	**0.080 J**	**0.23 J**	0.047 U	0.048 U	0.13 U	**0.20 J**
Vanadium	7440-62-2		**13**	**11**	**17**	**81**	**13.4**	**9.5**	**11**	**14**
Zinc	7440-66-6	121	**49,100**	**1,840**	**2,620**	**2,700**	**393**	**783**	**1,250**	**6,910**

Appendix G-4-15
Metals and Cyanide Results for Sediment Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Sediment ESV (mg/kg)	Location ID / Sample ID / Date / Units / Depth	LVR-204 OU1-SS-LVR204-071030 10/30/2007 mg/Kg 0'	LVR-205 LVR205-071030 10/30/2007 mg/Kg 0'	LVR-206 OU1-SS-LVR206-071030 10/30/2007 mg/Kg 0'	LVR-207 OU1-SS-LVR207-071030 10/30/2007 mg/Kg 0'	LVR-208 OU1-SS-LVR208-071030 10/30/2007 mg/Kg 0'	LVR-209 OU1-SS-LVR209-071031 10/31/2007 mg/Kg 0'	LVR-210 OU1-SS-LVR210-071031 10/31/2007 mg/Kg 0'
Aluminum	7429-90-5			3,750	13,500	2,250	3,000	5,690	4,930	2,900
Antimony	7440-36-0			1.5 U	1.2 U	0.98 U	0.97 U	1.2 U	0.93 U	1.3 U
Arsenic	7440-38-2	9.79		10.6	7.6	4	4.7	2.2	5.3	3.3
Barium	7440-39-3			81	82	29	33.1	76.6	44.1	103
Beryllium	7440-41-7			0.42 J	0.85 J	0.23 J	0.29 J	0.36 J	0.36 J	0.22 J
Cadmium	7440-43-9	0.99		3.3	13.9	1.1 J	1.2	0.76 J	1.4	1.9
Chromium	7440-47-3	43.4		11.5	15.3	6.2	4.6	10	6.2	4.9 J
Cobalt	7440-48-4	50		10.3	9.8	3.5	4.8	6.4	5.9	4.4
Copper	7440-50-8	31.6		298	28	8	5.9 J	6.5 J	10	9
Cyanide	57-12-5	0.0001		NM	1.5 U	NM	NM	NM	1.2 U	NM
Iron	7439-89-6			265,000	27,600	11,700	15,300	66,200	23,900	10,600
Lead	7439-92-1	35.8		25	125	9.3	8.6	3.9	9.7	9.1
Manganese	7439-96-5			922	336	274	455	1,230	781	291
Mercury	7439-97-6	0.18		0.041 J	0.17	0.011 J	0.012 J	0.0070 J	0.051 J	0.0080 J
Nickel	7440-02-0	22.7		25.1	32.2	9.1	12.5	24.8	19	11.5
Selenium	7782-49-2			0.98 J	1.2 J	0.52 J	0.52 J	0.54 J	0.49 J	0.71 J
Silver	7440-22-4	0.5		0.14 U	0.76 J	0.39 J	0.25 J	0.88 J	0.35 J	0.22 J
Thallium	7440-28-0			0.074 U	0.34 J	0.057 J	0.052 U	0.063 U	0.085 J	0.073 U
Vanadium	7440-62-2			22	19	13.5	10.9	13.1	16.5	10.4
Zinc	7440-66-6	121		11,100	4,210	101	76.1	162 J	229 J	86.2

Analyte	CAS #	Sediment ESV (mg/kg)	Location ID / Sample ID / Date / Units / Depth	LVR-211 OU1-SS-LVR211-071031 10/31/2007 mg/Kg 0'	LVR-212 OU1-SS-LVR212-071031 10/31/2007 mg/Kg 0'	LVR-401 OU1-SE-LVR401C-0908 8/11/2009 mg/Kg 0'	LVR-401 OU1-SE-LVR401E-0908 8/11/2009 mg/Kg 0'	LVR-401 OU1-SE-LVR401W-0908 8/11/2009 mg/Kg 0'	LVR-402 OU1-SE-LVR402W-0908 8/12/2009 mg/Kg 0'	LVR-403 OU1-SE-LVR403C-0908 8/12/2009 mg/Kg 0'
Aluminum	7429-90-5			10,200	2,710	2,180	3,140	3,170	2,250	3,120
Antimony	7440-36-0			1.1 U	0.95 U	7.9	6.8 U	7.2 U	18	0.46 U
Arsenic	7440-38-2	9.79		8.1	3.4	8.3 J	6.9 J	22.0 J	8.9	16.5
Barium	7440-39-3			71.4	53.7	35.8	41.2	54.2	86.4	62.8
Beryllium	7440-41-7			0.62 J	0.26 J	0.35	0.23	0.41 J-	0.27 J	0.54 J
Cadmium	7440-43-9	0.99		3.5	0.99 J	2.2	2.7	4.3 J-	6	5.1
Chromium	7440-47-3	43.4		14.3	6.3	4.5	4.8	6	7.4	11.1
Cobalt	7440-48-4	50		10.9	4.8	5	5.1	5.3 J+	7.5	11.1
Copper	7440-50-8	31.6		22	11	73	69	150 J	81	844
Cyanide	57-12-5	0.0001		NM	NM	NM	NM	NM	NM	NM
Iron	7439-89-6			23,700	20,300	25,600	26,900	14,000 J	43,100	24,900
Lead	7439-92-1	35.8		29.7	8.8	29.8	35.8	44.8 J	300	63.9
Manganese	7439-96-5			656	676	831	959	757 J	3,230	1,030
Mercury	7439-97-6	0.18		0.033 J	0.0090 J	0.20 U	0.19 U	0.20 U	0.20 U	0.18 U
Nickel	7440-02-0	22.7		30.7	13.5	27.2 J	15.3 J	15.1 J	21	23.5
Selenium	7782-49-2			0.66 J	0.51 J	0	0	0.42 J-	1	0.61
Silver	7440-22-4	0.5		0.41 J	0.38 J	13	0.78 J	1.2 J	2	0.54
Thallium	7440-28-0			0.16 J	0.061 J	0.060 J	0.069 J	0.061 J	0.12 U	0.11 U
Vanadium	7440-62-2			15.9	10.6	10	15	12	22	20.8
Zinc	7440-66-6	121		626	103	1,090	1,050	1,230	1,620	526

Appendix G-4-15
Metals and Cyanide Results for Sediment Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Sediment ESV (mg/kg)	Location ID / Sample ID / Date / Units / Depth	LVR-403 OU1-SE-LVR403E-0908 8/12/2009 mg/Kg 0'	LVR-403 OU1-SE-LVR403W-0908 8/12/2009 mg/Kg 0'	LVR-404 OU1-SE-LVR404C-0908 8/12/2009 mg/Kg 0'	LVR-404 OU1-SE-LVR404E-0908 8/12/2009 mg/Kg 0'	LVR-404 OU1-SE-LVR404W-0908 8/12/2009 mg/Kg 0'	LVR-405 OU1-SE-LVR405C-0908 8/13/2009 mg/Kg 0'	LVR-405 OU1-SE-LVR405E-0908 8/13/2009 mg/Kg 0'
Aluminum	7429-90-5			2,310	3,230	1,510	1,550	2,150	5,760	1,850
Antimony	7440-36-0			52.5	1.7 J	0.43 U	4.3 J	0.46 U	0.47 U	0.47 U
Arsenic	7440-38-2	9.79		5.6	9.1	6.2 J+	6.4	4.3	9.6	4.4
Barium	7440-39-3			24.2	46.5	72.6 J	36.9	32.6	77	44.2
Beryllium	7440-41-7			0.24 J	0.38 J	0.14 J	0.25 J	0.15 J	0.52 J	0.16 J
Cadmium	7440-43-9	0.99		2.7	5.4	2.6 J-	3.8	1.8	1.5	2.6
Chromium	7440-47-3	43.4		8.8	5.9	3.4 J+	3.6	4.3	9.6	4.7
Cobalt	7440-48-4	50		4.1	7.3	5.2 J+	5.2	3.9	7.4	4
Copper	7440-50-8	31.6		30	107	91.0 J	29.6	17	11	5
Cyanide	57-12-5	0.0001		NM	NM	NM	NM	NM	NM	NM
Iron	7439-89-6			54,300	81,400	19,200	19,800 J	21,200	19,900	14,600
Lead	7439-92-1	35.8		19.4	39.6	34.1 J	28.5	12.6	14.7	10.9
Manganese	7439-96-5			1,310	1,320	620	671 J	775	1,770	1,870
Mercury	7439-97-6	0.18		0.20 U	0.20 U	0.18 U	0.19 U	0.19 U	0.19 U	0.19 U
Nickel	7440-02-0	22.7		15.3	19.6	10.9	13.3	9.9	16.1	9.5
Selenium	7782-49-2			0	1	0.29 J-	0.42	0	0.46	0.26
Silver	7440-22-4	0.5		28	2	0.56	7.7 J-	1	0.48	0.18
Thallium	7440-28-0			0.12 U	0.12 U	0.11 U	0.12 U	0.12 U	0.46 J	0.046 J
Vanadium	7440-62-2			17	14	11.6 J	9.8	8	19.3	12.4
Zinc	7440-66-6	121		1,840	2,060	488	2,770 J	2,160	195	523

Analyte	CAS #	Sediment ESV (mg/kg)	Location ID / Sample ID / Date / Units / Depth	LVR-405 OU1-SE-LVR405W-0908 8/13/2009 mg/Kg 0'	LVR-406 OU1-SE-LVR406-0908 8/14/2009 mg/Kg 0'	LVR-407 OU1-SE-LVR407-0908 8/14/2009 mg/Kg 0'	LVR-408 OU1-SE-LVR408-0908 8/14/2009 mg/Kg 0'	Section_Line_DP Sctn Line 11/11/1994 mg/Kg 0'	SSI-X201 SSI-X201 11/21/1991 mg/Kg 0 - 0.583'	SSI-X202 SSI-X202 11/21/1991 mg/Kg 0 - 0.25'
Aluminum	7429-90-5			185	14,000	10,200	3,480	NM	7,980	20,000
Antimony	7440-36-0			9.0 J	8.6 U	0.56 U	0.54 U	NM	5.8 U	7.6 U
Arsenic	7440-38-2	9.79		276	7.9	4.2	2.9	NM	3.3	8.6
Barium	7440-39-3			6.6 J	127	112	46.4	35.3 J	72	157
Beryllium	7440-41-7			1,170	0.025 J	0.45 J	0.25 J	NM	0.69 J	1.5
Cadmium	7440-43-9	0.99		11.6	10.5 J+	8.4 J+	1.3 J+	20.5	36.8	22.8
Chromium	7440-47-3	43.4		1.1 U	0.53	12.8	6.1	7.1	20	39
Cobalt	7440-48-4	50		182 J	12.7	6.7	4.4	NM	9.7 J	18.6
Copper	7440-50-8	31.6		4.8 U	26	17.4 J+	10.4 J+	NM	102	46
Cyanide	57-12-5	0.0001		NM	NM	NM	NM	NM	0.32 U	1
Iron	7439-89-6			27.9	30,000	16,600	11,100	41,500	15,000	23,100
Lead	7439-92-1	35.8		0.83 U	6.2	16.3 J+	16.5 J+	55.8	594	1,050
Manganese	7439-96-5			0.12 U	1,580 J+	667 J+	313	662	500	758
Mercury	7439-97-6	0.18		0.019 U	0.23 U	0.24 U	0.22 U	0.12 U	0.53	0.15 U
Nickel	7440-02-0	22.7		22,000	35.5 J+	18.1 J+	10.9 J+	25.4	19.9	28.9
Selenium	7782-49-2			2.5 U	0.72 U	0.73 U	0.69 U	NM	4.7 U	6.2 U
Silver	7440-22-4	0.5		10.0 U	1.0 J	0.39 J	0.22 J	NM	2.1 U	2.7 U
Thallium	7440-28-0			0.38 J	0.23 J	0.22 J	0.070 J	NM	0.71 U	0.94 U
Vanadium	7440-62-2			47.2	0.65	20.2	11.3	NM	26	44
Zinc	7440-66-6	121		21.3	4,340 J+	1,760 J+	116 J+	1,400	6,500	4,630

Appendix G-4-15
Metals and Cyanide Results for Sediment Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID / Sample ID / Date / Units / Depth — Sediment ESV (mg/kg)	SSI-X203 / SSI-X203 / 11/21/1991 / mg/Kg / 0 - 0.667'	SSI-X204 / SSI-X204 / 11/21/1991 / mg/Kg / 0 - 0.667'	SSI-X208 / SSI-X208 / 11/20/1991 / mg/Kg / 0 - 0.667'	ISA-X201 / ISA-X201 / 12/14/1993 / mg/Kg / 0 - 0.25'	LVR-409 / OU1-SE-LVR409-0908 / 8/14/2009 / mg/Kg / 0'	LVR-213 / OU1-SS-LVR213-071031 / 10/31/2007 / mg/Kg / 0'	LVR-214 / OU1-SS-LVR214-071031 / 10/31/2007 / mg/Kg / 0'	QuarryBridge-07B / QB-07B / 11/8/1994 / mg/Kg / 0'
Aluminum	7429-90-5		**6,200**	**6,810**	**3,430**	**4,170**	**2,330**	**7,760**	**3,420**	NM
Antimony	7440-36-0		5.3 U	7.1 U	**58.4**	NM	7.2 U	1.3 U	0.87 U	NM
Arsenic	7440-38-2	9.79	0.44 U	**7.7**	**4.5**	**3.2**	**2.5**	**3.8**	**12.4**	NM
Barium	7440-39-3		**111**	**226**	33.5 U	0.0 U	**31.5**	**91.6**	**88.5**	**101**
Beryllium	7440-41-7		**2.3**	**1.1 J**	**0.50 J**	0.24 U	**0.16 J**	**0.39 J**	**0.34 J**	NM
Cadmium	7440-43-9	0.99	**15.3**	**5.1**	**1.3**	0.72 U	**0.71 J+**	**1.1 J**	**1.6**	**2.4**
Chromium	7440-47-3	43.4	**38**	**21**	**6**	**5.3**	**4.4**	**9.5**	**7.0**	**13.1**
Cobalt	7440-48-4	50	**11.1**	**11.6 J**	**5.5 J**	0.0 U	**3.5**	**7.8**	**5.5**	NM
Copper	7440-50-8	31.6	**186**	**49**	**8**	**5.5 J**	**6.5 J+**	**15.3**	**8.6**	NM
Cyanide	57-12-5	0.0001	**0.48**	0.32 U	0.26 U	0.0 U	NM	1.7 U	1.2 U	NM
Iron	7439-89-6		**46,000**	**15,400**	**8,600**	0.0 U	**8,190**	**16,300**	**34,900**	**16,100**
Lead	7439-92-1	35.8	**733**	**262**	**7.6**	**6.9**	**8.6 J+**	**12.1**	**17.4**	**101**
Manganese	7439-96-5		**1,580**	**1,210**	**520**	0.0 U	**225**	**468**	**2,160**	**584**
Mercury	7439-97-6	0.18	**0.35**	**0.18**	0.074 U	0.070 U	0.19 U	**0.027 J**	**0.0060 J**	**0.35**
Nickel	7440-02-0	22.7	**85.4**	**16.7**	**7.4**	**5.6 J**	**7.0 J+**	**16.9**	**14.1**	**24.0**
Selenium	7782-49-2		0.44 U	5.5 U	3.5 U	0.54 U	0.60 U	0.51 U	**0.67 J**	NM
Silver	7440-22-4	0.5	1.9 U	2.6 U	1.5 U	0.0 U	**0.25 J**	**0.24 J**	**0.57 J**	NM
Thallium	7440-28-0		0.67 U	0.82 U	0.52 U	0.32 U	**0.050 J**	**0.13 J**	**0.12 J**	NM
Vanadium	7440-62-2		**69**	**20**	**8.7**	**10.6 J**	**7.6**	**13.8**	**17.0**	NM
Zinc	7440-66-6	121	**6,290**	**1,570**	**60.2**	**48.2**	**97.7 J+**	**94.7**	**184 J**	**175**

Notes:

	Exceedance of Sediment Ecological Screening Value (ESV)
1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J+	The analyte was positively identified; however, the associated numerical value is likely to be higher than the concentration of the analyte in the sample due to bias attributable to matrix interference.
J-	The analyte was posively identified; however, the associated numerical value is likely to be lower than the concentration of the analyte in the sample due to bias attributable to matrix interference.
NM	Not Measured

Appendix G-4-16
VOC Results for Sediment Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Depth Sediment ESV (µg/Kg)	SSI-X205 SSI-X205 11/21/1991 µg/Kg 0 - 0.667'	SSI-X206 SSI-X206 11/21/1991 µg/Kg 0 - 0.667'	UL-215 OU1-SE-UL215-071101 11/1/2007 µg/Kg 0'
1,1,1-Trichloroethane	71-55-6	213	30.0 U	24.0 U	6.9 U
1,1,2,2-Tetrachloroethane	79-34-5	850	30.0 U	24.0 U	6.9 U
1,1,2-Trichloroethane	79-00-5	518	30.0 U	24.0 U	6.9 U
1,1-Dichloroethane	75-34-3	0.575	30.0 U	24.0 U	6.9 U
1,1-Dichloroethene	75-35-4	19.4	30.0 U	24.0 U	6.9 U
1,2,4-Trichlorobenzene	120-82-1	5062	NM	NM	6.9 U
1,2-Dibromo-3-chloropropane	96-12-8		NM	NM	6.9 U
1,2-Dibromoethane	106-93-4		NM	NM	6.9 U
1,2-Dichlorobenzene	95-50-1	294	NM	NM	6.9 U
1,2-Dichloroethane	107-06-2	260	30.0 U	24.0 U	6.9 U
1,2-Dichloropropane	78-87-5	333	30.0 U	24.0 U	6.9 U
1,3-Dichlorobenzene	541-73-1	1315	NM	NM	6.9 U
1,4-Dichlorobenzene	106-46-7	318	NM	NM	6.9 U
2-Butanone (MEK)	78-93-3	42.4	30.0 U	24.0 U	14.0 U
2-Hexanone	591-78-6	58.2	30.0 U	24.0 U	14.0 U
4-Methyl-2-pentanone	108-10-1	25.1	30.0 U	24.0 U	14.0 U
Acetone	67-64-1	9.9	**410 J**	**220 J**	**3.2 J**
Benzene	71-43-2	142	30.0 U	24.0 U	6.9 U
Bromoform	75-25-2	492	30.0 U	24.0 U	6.9 U
Bromomethane	74-83-9	1.37	30.0 U	24.0 U	6.9 U
Carbon disulfide	75-15-0	23.9	30.0 U	**10.0 J**	14.0 U
Carbon tetrachloride	56-23-5	1450	30.0 U	24.0 U	6.9 U
Chlorobenzene	108-90-7	291	30.0 U	24.0 U	6.9 U
Chloroethane	75-00-3		30.0 U	24.0 U	14.0 U
Chloroform	67-66-3	121	30.0 U	24.0 U	6.9 U
Chloromethane	74-87-3		30.0 U	24.0 U	6.9 U
cis/trans-1,2-Dichloroethene	540-59-0	654	30.0 U	24.0 U	NM
cis-1,2-Dichloroethene	156-59-2	654	NM	NM	6.9 U
cis-1,3-Dichloropropene	10061-01-5		30.0 U	24.0 U	6.9 U
Cyclohexane	110-82-7		NM	NM	6.9 U
Dibromochloromethane	124-48-1		30.0 U	24.0 U	6.9 U
Dichlorobromomethane	75-27-4		30.0 U	24.0 U	6.9 U
Dichloromethane (Methylene chloride)	75-09-2	159	30.0 U	24.0 U	6.9 U
Ethyl benzene	100-41-4	175	30.0 U	24.0 U	6.9 U
Freon-11	75-69-4		NM	NM	6.9 U
Freon-113	76-13-1		NM	NM	6.9 U
Freon-12	75-71-8		NM	NM	6.9 U
Isopropylbenzene	98-82-8		NM	NM	6.9 U
m&p-Xylene	XYLMP	433	NM	NM	6.9 U
Methyl acetate	79-20-9		NM	NM	14.0 U
Methyl tertbutyl ether (MTBE)	1634-04-4		NM	NM	6.9 U
Methylcyclohexane	108-87-2		NM	NM	6.9 U
o-Xylene	95-47-6	433	NM	NM	6.9 U
Styrene	100-42-5	254	30.0 U	24.0 U	6.9 U
Tetrachloroethene	127-18-4	990	30.0 U	24.0 U	6.9 U
Toluene	108-88-3	1220	30.0 U	24.0 U	6.9 U
trans-1,2-Dichloroethene	156-60-5	654	NM	NM	6.9 U
trans-1,3-Dichloropropene	10061-02-6		30.0 U	24.0 U	6.9 U
Trichloroethene	79-01-6	112	30.0 U	24.0 U	6.9 U
Vinyl chloride	75-01-4	202	30.0 U	24.0 U	6.9 U
Xylenes (unspecified)	XYLENES	433	30.0 U	24.0 U	NM

Notes:

	Exceedance of Sediment Ecological Screening Value (ESV)
1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NM	Not Measured

Appendix G-4-16
VOC Results for Sediment Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Depth Sediment ESV (µg/Kg)	ISA-X201 ISA-X201 34,317 µg/Kg 0 - 0.25'	ISA-X202 ISA-X202 12/14/1993 µg/Kg 0 - 0.25'	ISA-X203 ISA-X203 12/14/1993 µg/Kg 0'	ISA-X204 ISA-X204 12/14/1993 µg/Kg 0 - 0.5'	ISA-X205 ISA-X205 12/14/1993 µg/Kg 0 - 0.25'	LVR-201 OU1-SS-LVR201-071029 10/29/2007 µg/Kg 0'	LVR-201 OU1-SS-LVR406-071029 10/29/2007 µg/Kg 0'	LVR-205 LVR205-071030 10/30/2007 µg/Kg 0'	LVR-209 OU1-SS-LVR209-071031 10/31/2007 µg/Kg 0'	LVR-213 OU1-SS-LVR213-071031 10/31/2007 µg/Kg 0'	LVR-214 OU1-SS-LVR214-071031 10/31/2007 µg/Kg 0'	SSI-X201 SSI-X201 11/21/1991 µg/Kg 0 - 0.583'
1,1,1-Trichloroethane	71-55-6	213	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	**6.0 J**
1,1,2,2-Tetrachloroethane	79-34-5	850	NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	14.0 U
1,1,2-Trichloroethane	79-00-5	518	NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	14.0 U
1,1-Dichloroethane	75-34-3	0.575	NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	14.0 U
1,1-Dichloroethene	75-35-4	19.4	NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	14.0 U
1,2,4-Trichlorobenzene	120-82-1	5,062	NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	NM
1,2-Dibromo-3-chloropropane	96-12-8		NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	NM
1,2-Dibromoethane	106-93-4		NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	NM
1,2-Dichlorobenzene	95-50-1	294	NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	4.5 UJ	4.8 U	NM
1,2-Dichloroethane	107-06-2	260	NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	14.0 U
1,2-Dichloropropane	78-87-5	333	NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	14.0 U
1,3-Dichlorobenzene	541-73-1	1,315	NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	NM
1,4-Dichlorobenzene	106-46-7	318	NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	NM
2-Butanone (MEK)	78-93-3	42.4	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	**4.6 J**	**5.0 J**	**27**	**6.1 J**	**66.0**	**2.9 J**	14.0 U
2-Hexanone	591-78-6	58.2	NM	NM	NM	NM	NM	16.0 U	18.0 U	15.0 U	7.4 U	9.0 U	9.7 U	14.0 U
4-Methyl-2-pentanone	108-10-1	25.1	NM	NM	NM	NM	NM	16.0 U	18.0 U	15.0 U	7.4 U	9.0 U	9.7 U	14.0 U
Acetone	67-64-1	9.9	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	**49**	**41**	**130**	**37**	**240 J**	**21.0**	**18**
Benzene	71-43-2	142	NM	NM	NM	NM	NM	**1.1 J**	**1.8 J**	**1.0 J**	3.7 U	450 U	**0.91 J**	14.0 U
Bromoform	75-25-2	492	NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	14.0 U
Bromomethane	74-83-9	1.37	NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	14.0 U
Carbon disulfide	75-15-0	23.9	NM	NM	NM	NM	NM	**4.6 J**	**14.0 J**	**6.6 J**	**0.92 J**	**4.0 J**	**0.88 J**	14.0 U
Carbon tetrachloride	56-23-5	1,450	NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	14.0 U
Chlorobenzene	108-90-7	291	NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	14.0 U
Chloroethane	75-00-3		NM	NM	NM	NM	NM	16.0 U	18.0 U	15.0 U	7.4 U	9.0 U	9.7 U	14.0 U
Chloroform	67-66-3	121	NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	14.0 U
Chloromethane	74-87-3		NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	14.0 U
cis/trans-1,2-Dichloroethene	540-59-0	654	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	14.0 U
cis-1,2-Dichloroethene	156-59-2	654	NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	NM
cis-1,3-Dichloropropene	10061-01-5		NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	14.0 U
Cyclohexane	110-82-7		NM	NM	NM	NM	NM	**6.1 J**	**1.7 J**	**1.2 J**	3.7 U	450 U	**1.3 J**	NM
Dibromochloromethane	124-48-1		NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	14.0 U
Dichlorobromomethane	75-27-4		NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	14.0 U
Dichloromethane (Methylene chloride)	75-09-2	159	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	**7.0 J**
Ethyl benzene	100-41-4	175	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	**0.97 J**	8.8 U	7.6 U	3.7 U	450 U	4.8 U	14.0 U
Freon-11	75-69-4		NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	NM
Freon-113	76-13-1		NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	NM
Freon-12	75-71-8		NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	NM
Isopropylbenzene	98-82-8		NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	NM
m&p-Xylene	XYLMP	433	NM	NM	NM	NM	NM	**0.94 J**	8.8 U	7.6 U	3.7 U	450 U	4.8 U	NM
Methyl acetate	79-20-9		NM	NM	NM	NM	NM	16.0 U	18.0 U	**1.7 J**	7.4 U	**240 J**	9.7 U	NM
Methyl tertbutyl ether (MTBE)	1634-04-4		NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	NM
Methylcyclohexane	108-87-2		NM	NM	NM	NM	NM	**7.5 J**	**3.6 J**	**1.7 J**	**0.34 J**	450 U	**1.8 J**	NM
o-Xylene	95-47-6	433	NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	NM
Styrene	100-42-5	254	NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	14.0 U
Tetrachloroethene	127-18-4	990	NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	14.0 U
Toluene	108-88-3	1,220	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	**2.6 J**	**2.1 J**	**1.7 J**	**0.23 J**	450 U	**0.93 J**	**6.0 J**
trans-1,2-Dichloroethene	156-60-5	654	NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	NM

Appendix G-4-16
VOC Results for Sediment Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Depth Sediment ESV (µg/Kg)	ISA-X201 ISA-X201 34,317 µg/Kg 0 - 0.25'	ISA-X202 ISA-X202 12/14/1993 µg/Kg 0 - 0.25'	ISA-X203 ISA-X203 12/14/1993 µg/Kg 0'	ISA-X204 ISA-X204 12/14/1993 µg/Kg 0 - 0.5'	ISA-X205 ISA-X205 12/14/1993 µg/Kg 0 - 0.25'	LVR-201 OU1-SS-LVR201-071029 10/29/2007 µg/Kg 0'	LVR-201 OU1-SS-LVR406-071029 10/29/2007 µg/Kg 0'	LVR-205 LVR205-071030 10/30/2007 µg/Kg 0'	LVR-209 OU1-SS-LVR209-071031 10/31/2007 µg/Kg 0'	LVR-213 OU1-SS-LVR213-071031 10/31/2007 µg/Kg 0'	LVR-214 OU1-SS-LVR214-071031 10/31/2007 µg/Kg 0'	SSI-X201 SSI-X201 11/21/1991 µg/Kg 0 - 0.583'
trans-1,3-Dichloropropene	10061-02-6		NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	14.0 U
Trichloroethene	79-01-6	112	NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	7.7	14.0 U
Vinyl chloride	75-01-4	202	NM	NM	NM	NM	NM	7.8 U	8.8 U	7.6 U	3.7 U	450 U	4.8 U	14.0 U
Xylenes (unspecified)	XYLENES	433	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	NM	NM	NM	NM	NM	NM	**9.0 J**

Notes:

	Exceedance of Sediment Ecological Screening Value (ESV)
1,000	Bold indicates a detection
NM	Not Measured
J	The analyte was positively identified; the associated numerical value is the
U	The analyte was analyzed for, but was not detected

Appendix G-4-16
VOC Results for Sediment Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Depth Sediment ESV (µg/Kg)	SSI-X202 SSI-X202 11/21/1991 µg/Kg 0 - 0.25'	SSI-X203 SSI-X203 11/21/1991 µg/Kg 0 - 0.667'	SSI-X204 SSI-X204 11/21/1991 µg/Kg 0 - 0.667'	SSI-X208 SSI-X208 11/20/1991 µg/Kg 0 - 0.667'
1,1,1-Trichloroethane	71-55-6	213	19.0 U	13.0 U	**2.0 J**	12.0 U
1,1,2,2-Tetrachloroethane	79-34-5	850	19.0 U	13.0 U	16.0 U	12.0 U
1,1,2-Trichloroethane	79-00-5	518	19.0 U	13.0 U	16.0 U	12.0 U
1,1-Dichloroethane	75-34-3	0.575	19.0 U	13.0 U	16.0 U	12.0 U
1,1-Dichloroethene	75-35-4	19.4	19.0 U	13.0 U	16.0 U	12.0 U
1,2,4-Trichlorobenzene	120-82-1	5,062	NM	NM	NM	NM
1,2-Dibromo-3-chloropropane	96-12-8		NM	NM	NM	NM
1,2-Dibromoethane	106-93-4		NM	NM	NM	NM
1,2-Dichlorobenzene	95-50-1	294	NM	NM	NM	NM
1,2-Dichloroethane	107-06-2	260	19.0 U	13.0 U	16.0 U	12.0 U
1,2-Dichloropropane	78-87-5	333	19.0 U	13.0 U	16.0 U	12.0 U
1,3-Dichlorobenzene	541-73-1	1,315	NM	NM	NM	NM
1,4-Dichlorobenzene	106-46-7	318	NM	NM	NM	NM
2-Butanone (MEK)	78-93-3	42.4	19.0 U	13.0 U	16.0 U	12.0 U
2-Hexanone	591-78-6	58.2	19.0 U	13.0 U	16.0 U	12.0 U
4-Methyl-2-pentanone	108-10-1	25.1	19.0 U	13.0 U	16.0 U	12.0 U
Acetone	67-64-1	9.9	**80.0 J**	**13.0 J**	**14.0 J**	**7.0 J**
Benzene	71-43-2	142	19.0 U	13.0 U	16.0 U	12.0 U
Bromoform	75-25-2	492	19.0 U	13.0 U	16.0 U	12.0 U
Bromomethane	74-83-9	1.37	19.0 U	13.0 U	16.0 U	12.0 U
Carbon disulfide	75-15-0	23.9	19.0 U	13.0 U	16.0 U	12.0 U
Carbon tetrachloride	56-23-5	1,450	19.0 U	13.0 U	16.0 U	12.0 U
Chlorobenzene	108-90-7	291	19.0 U	13.0 U	16.0 U	12.0 U
Chloroethane	75-00-3		19.0 U	13.0 U	16.0 U	12.0 U
Chloroform	67-66-3	121	**2.0 J**	**1.0 J**	**1.0 J**	**1.0 J**
Chloromethane	74-87-3		19.0 U	13.0 U	16.0 U	12.0 U
cis/trans-1,2-Dichloroethene	540-59-0	654	**8.0 J**	13.0 U	16.0 U	12.0 U
cis-1,2-Dichloroethene	156-59-2	654	NM	NM	NM	NM
cis-1,3-Dichloropropene	10061-01-5		19.0 U	13.0 U	16.0 U	12.0 U
Cyclohexane	110-82-7		NM	NM	NM	NM
Dibromochloromethane	124-48-1		19.0 U	13.0 U	16.0 U	12.0 U
Dichlorobromomethane	75-27-4		19.0 U	13.0 U	16.0 U	12.0 U
Dichloromethane (Methylene chloride)	75-09-2	159	19.0 U	**2.0 J**	**3.0 J**	**2.0 J**
Ethyl benzene	100-41-4	175	19.0 U	13.0 U	16.0 U	12.0 U
Freon-11	75-69-4		NM	NM	NM	NM
Freon-113	76-13-1		NM	NM	NM	NM
Freon-12	75-71-8		NM	NM	NM	NM
Isopropylbenzene	98-82-8		NM	NM	NM	NM
m&p-Xylene	XYLMP	433	NM	NM	NM	NM
Methyl acetate	79-20-9		NM	NM	NM	NM
Methyl tertbutyl ether (MTBE)	1634-04-4		NM	NM	NM	NM
Methylcyclohexane	108-87-2		NM	NM	NM	NM
o-Xylene	95-47-6	433	NM	NM	NM	NM
Styrene	100-42-5	254	19.0 U	13.0 U	16.0 U	12.0 U
Tetrachloroethene	127-18-4	990	19.0 U	13.0 U	16.0 U	12.0 U
Toluene	108-88-3	1,220	19.0 U	13.0 U	16.0 U	**11.0 J**
trans-1,2-Dichloroethene	156-60-5	654	NM	NM	NM	NM

Appendix G-4-16
VOC Results for Sediment Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Depth Sediment ESV (µg/Kg)	SSI-X202 SSI-X202 11/21/1991 µg/Kg 0 - 0.25'	SSI-X203 SSI-X203 11/21/1991 µg/Kg 0 - 0.667'	SSI-X204 SSI-X204 11/21/1991 µg/Kg 0 - 0.667'	SSI-X208 SSI-X208 11/20/1991 µg/Kg 0 - 0.667'
trans-1,3-Dichloropropene	10061-02-6		19.0 U	13.0 U	16.0 U	12.0 U
Trichloroethene	79-01-6	112	19.0 U	13.0 U	16.0 U	12.0 U
Vinyl chloride	75-01-4	202	19.0 U	13.0 U	16.0 U	12.0 U
Xylenes (unspecified)	XYLENES	433	19.0 U	13.0 U	16.0 U	12.0 U

Notes:

	Exceedance of Sediment Ecolc
1,000	Bold indicates a detection
NM	Not Measured
J	The analyte was positively identified; the associated numerical value is the
U	The analyte was analyzed for, but was not detected

Appendix G-4-17
SVOC Results for Sediment Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Depth Sediment ESV (µg/Kg)	Pond Line 1 Pond Line 1 11/1/1994 µg/Kg 0'	Pond Line 1 Pond Line 1 DP 11/1/1994 µg/Kg 0'	Pond Line 2 Pond Line 2 11/1/1994 µg/Kg 0'	Pond Line 4 Pond Line 4 11/1/1994 µg/Kg 0'	SSI-X205 SSI-X205 11/21/1991 µg/Kg 0 - 0.667'	SSI-X206 SSI-X206 11/21/1991 µg/Kg 0 - 0.667'	UL-215 OU1-SE-UL215-071101 11/1/2007 µg/Kg 0'
1,1-Biphenyl	92-52-4		NM	NM	NM	NM	NM	NM	2,900 U
1,2,4-Trichlorobenzene	120-82-1	5,062	NM	NM	NM	NM	1,000 U	790 U	NM
1,2-Dichlorobenzene	95-50-1	294	NM	NM	NM	NM	1,000 U	790 U	NM
1,3-Dichlorobenzene	541-73-1	1,315	NM	NM	NM	NM	1,000 U	790 U	NM
1,4-Dichlorobenzene	106-46-7	318	NM	NM	NM	NM	1,000 U	790 U	NM
2,2'-Oxybis(1-Chloropropane)	108-60-1		NM	NM	NM	NM	1,000 U	790 U	2,900 U
2,4,5-Trichlorophenol	95-95-4	208	NM	NM	NM	NM	2,400 U	1,900 U	2,900 U
2,4,6-Trichlorophenol	88-06-2	208	NM	NM	NM	NM	1,000 U	790 U	2,900 U
2,4-Dichlorophenol	120-83-2	81.7	NM	NM	NM	NM	1,000 U	790 U	2,900 U
2,4-Dimethylphenol	105-67-9	304	NM	NM	NM	NM	1,000 U	790 U	2,900 U
2,4-Dinitrophenol	51-28-5	6.21	NM	NM	NM	NM	2,400 U	1,900 U	15,000 U
2,4-Dinitrotoluene	121-14-2	14.4	NM	NM	NM	NM	1,000 U	790 U	2,900 U
2,6-Dinitrotoluene	606-20-2	39.8	NM	NM	NM	NM	1,000 U	790 U	2,900 U
2-Chloronaphthalene	91-58-7	417	NM	NM	NM	NM	1,000 U	790 U	2,900 U
2-Chlorophenol	95-57-8	31.9	NM	NM	NM	NM	1,000 U	790 U	2,900 U
2-Methylnaphthalene	91-57-6	20.2	NM	NM	NM	NM	1,000 U	790 U	2,900 U
2-Methylphenol	95-48-7	55.4	NM	NM	NM	NM	1,000 U	790 U	2,900 U
2-Nitroaniline	88-74-4		NM	NM	NM	NM	2,400 U	1,900 U	15,000 U
2-Nitrophenol	88-75-5	13.3	NM	NM	NM	NM	1,000 U	790 U	2,900 U
3,3'-Dichlorobenzidine	91-94-1	127	NM	NM	NM	NM	1,000 U	790 U	2,900 U
3-Nitroaniline	99-09-2		NM	NM	NM	NM	2,400 U	1,900 U	15,000 U
4,6-Dinitro-2-methylphenol	534-52-1	104	NM	NM	NM	NM	2,400 U	1,900 U	15,000 U
4-Bromophenyl-phenylether	101-55-3	1,550	NM	NM	NM	NM	1,000 U	790 U	2,900 U
4-Chloro-3-methylphenol	59-50-7	388	NM	NM	NM	NM	1,000 U	790 U	2,900 U
4-Chloroaniline	106-47-8	146	NM	NM	NM	NM	1,000 U	790 U	2,900 U
4-Chlorophenyl-phenylether	7005-72-3		NM	NM	NM	NM	1,000 U	790 U	2,900 U
4-Methylphenol	106-44-5	20.2	NM	NM	NM	NM	1,000 U	790 U	2,900 U
4-Nitroaniline	100-01-6		NM	NM	NM	NM	2,400 U	1,900 U	15,000 U
4-Nitrophenol	100-02-7	13.3	NM	NM	NM	NM	2,400 U	1,900 U	15,000 U
Acenaphthene	83-32-9	6.71	18.0 U	18.0 U	18.0 U	18.0 U	1,000 U	790 U	**160 J**
Acenaphthylene	208-96-8	5.87	10.0 U	10.0 U	10.0 U	10.0 U	1,000 U	790 U	**1,400 J**
Acetophenone	98-86-2		NM	NM	NM	NM	NM	NM	2,900 U
Anthracene	120-12-7	57.2	6.6 U	6.6 U	6.6 U	6.6 U	1,000 U	**250 J**	**1,800 J**
Atrazine	1912-24-9		NM	NM	NM	NM	NM	NM	2,900 U
Benzaldehyde	100-52-7		NM	NM	NM	NM	NM	NM	2,900 U
Benzo(a)anthracene	56-55-3	108	0.13 U	0.13 U	0.13 U	0.13 U	1,000 U	**1,100**	**6,700**
Benzo(a)pyrene	50-32-8	150	0.23 U	0.23 U	0.23 U	0.23 U	1,000 U	**1,000**	**6,700**
Benzo(b)fluoranthene	205-99-2	10,000	0.18 U	0.18 U	0.18 U	0.18 U	1,000 U	**1,600**	**5,300**
Benzo(g,h,i)perylene	191-24-2	170	0.76 U	0.76 U	0.88 U	0.76 U	1,000 U	790 U	**4,400**
Benzo(k)fluoranthene	207-08-9	240	0.17 U	0.17 U	0.17 U	0.17 U	1,000 U	**420 J**	**5,300**
bis(2-Chloroethoxy) methane	111-91-1		NM	NM	NM	NM	1,000 U	790 U	2,900 U
bis(2-Chloroethyl) ether	111-44-4	3,520	NM	NM	NM	NM	1,000 U	790 U	2,900 U
bis(2-Ethylhexyl) phthalate	117-81-7	182	NM	NM	NM	NM	**460 J**	**580 J**	2,900 U
Butylbenzylphthalate	85-68-7	1,970	NM	NM	NM	NM	1,000 U	790 U	2,900 U
Caprolactam	105-60-2		NM	NM	NM	NM	NM	NM	2,900 U
Carbazole	86-74-8	57.2	NM	NM	NM	NM	1,000 U	790 U	**470 J**
Chrysene	218-01-9	166	1.5 U	1.5 U	1.5 U	1.5 U	1,000 U	**1,100**	**7,000**
Dibenzo(a,h)anthracene	53-70-3	33	0.30 U	0.30 U	0.30 U	0.30 U	1,000 U	790 U	**1,100 J**
Dibenzofuran	132-64-9	449	NM	NM	NM	NM	1,000 U	790 U	2,900 U

Appendix G-4-17
SVOC Results for Sediment Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Depth Sediment ESV (µg/Kg)	Pond Line 1 Pond Line 1 11/1/1994 µg/Kg 0'	Pond Line 1 Pond Line 1 DP 11/1/1994 µg/Kg 0'	Pond Line 2 Pond Line 2 11/1/1994 µg/Kg 0'	Pond Line 4 Pond Line 4 11/1/1994 µg/Kg 0'	SSI-X205 SSI-X205 11/21/1991 µg/Kg 0 - 0.667'	SSI-X206 SSI-X206 11/21/1991 µg/Kg 0 - 0.667'	UL-215 OU1-SE-UL215-071101 11/1/2007 µg/Kg 0'
Diethylphthalate	84-66-2	295	NM	NM	NM	NM	1,000 U	790 U	2,900 U
Dimethylphthalate	131-11-3	295	NM	NM	NM	NM	1,000 U	790 U	2,900 U
Di-n-butylphthalate	84-74-2	1,114	NM	NM	NM	NM	1,000 U	790 U	2,900 U
Di-n-octylphthalate	117-84-0	40,600	NM	NM	NM	NM	1,000 U	790 U	2,900 U
Fluoranthene	206-44-0	423	2.1 U	2.1 U	2.1 U	2.1 U	1,000 U	**2,300**	**14,000**
Fluorene	86-73-7	77.4	2.1 U	2.1 U	2.1 U	2.1 U	1,000 U	790 U	2,900 U
Hexachlorobenzene	118-74-1	20	NM	NM	NM	NM	1,000 U	790 U	2,900 U
Hexachlorobutadiene	87-68-3	26.5	NM	NM	NM	NM	1,000 U	790 U	2,900 U
Hexachlorocyclopentadiene	77-47-4	901	NM	NM	NM	NM	1,000 U	790 U	2,900 U
Hexachloroethane	67-72-1	584	NM	NM	NM	NM	1,000 U	790 U	2,900 U
Indeno(1,2,3-cd)pyrene	193-39-5	200	0.43 U	0.43 U	0.43 U	0.43 U	1,000 U	790 U	**3,700**
Isophorone	78-59-1	432	NM	NM	NM	NM	1,000 U	790 U	2,900 U
Naphthalene	91-20-3	176	10.0 U	10.0 U	10.0 U	10.0 U	1,000 U	790 U	2,900 U
Nitrobenzene	98-95-3	145	NM	NM	NM	NM	1,000 U	790 U	2,900 U
N-Nitroso-di-n-propylamine	621-64-7		NM	NM	NM	NM	1,000 U	790 U	2,900 U
N-Nitrosodiphenylamine/Diphenylamine	86-30-6		NM	NM	NM	NM	1,000 U	790 U	2,900 U
Pentachlorophenol	87-86-5	23,000	NM	NM	NM	NM	2,400 U	1,900 U	15,000 U
Phenanthrene	85-01-8	24	6.4 U	6.4 U	6.4 U	6.4 U	1,000 U	**1,400**	**6,000**
Phenol	108-95-2	49.1	NM	NM	NM	NM	1,000 U	790 U	2,900 U
Pyrene	129-00-0	195	2.7 U	2.7 U	2.7 U	2.7 U	1,000 U	**2,000**	**14,000**

Notes:

	Exceedance of Sediment Ecological Screening Value (ESV)
1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NM	Not Measured

Appendix G-4-17
SVOC Results for Sediment Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Depth Sediment ESV (µg/Kg)	ISA-X201 ISA-X201 12/14/1993 µg/Kg 0 - 0.25'	ISA-X202 ISA-X202 12/14/1993 µg/Kg 0 - 0.25'	ISA-X203 ISA-X203 12/14/1993 µg/Kg 0'	ISA-X204 ISA-X204 12/14/1993 µg/Kg 0 - 0.5'	ISA-X205 ISA-X205 12/14/1993 µg/Kg 0 - 0.25'	LVR-201 OU1-SS-LVR201-071029 10/29/2007 µg/Kg 0'	LVR-201 OU1-SS-LVR406-071029 10/29/2007 µg/Kg 0'	LVR-205 LVR205-071030 10/30/2007 µg/Kg 0'	LVR-209 OU1-SS-LVR209-071031 10/31/2007 µg/Kg 0'	LVR-213 OU1-SS-LVR213-071031 10/31/2007 µg/Kg 0'	LVR-214 OU1-SS-LVR214-071031 10/31/2007 µg/Kg 0'	SSI-X201 SSI-X201 11/21/1991 µg/Kg 0 - 0.583'
1,1-Biphenyl	92-52-4		NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	NM
1,2,4-Trichlorobenzene	120-82-1	5,062	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	470 U
1,2-Dichlorobenzene	95-50-1	294	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	470 U
1,3-Dichlorobenzene	541-73-1	1,315	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	470 U
1,4-Dichlorobenzene	106-46-7	318	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	470 U
2,2'-Oxybis(1-Chloropropane)	108-60-1		NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
2,4,5-Trichlorophenol	95-95-4	208	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	1,100 U
2,4,6-Trichlorophenol	88-06-2	208	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
2,4-Dichlorophenol	120-83-2	81.7	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
2,4-Dimethylphenol	105-67-9	304	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
2,4-Dinitrophenol	51-28-5	6.21	NM	NM	NM	NM	NM	2,500 U	3,000 U	2,600 U	2,100 U	5,800 U	2,000 U	1,100 U
2,4-Dinitrotoluene	121-14-2	14.4	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
2,6-Dinitrotoluene	606-20-2	39.8	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
2-Chloronaphthalene	91-58-7	417	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
2-Chlorophenol	95-57-8	31.9	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
2-Methylnaphthalene	91-57-6	20.2	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
2-Methylphenol	95-48-7	55.4	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
2-Nitroaniline	88-74-4		NM	NM	NM	NM	NM	2,500 U	3,000 U	2,600 U	2,100 U	5,800 U	2,000 U	1,100 U
2-Nitrophenol	88-75-5	13.3	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
3,3'-Dichlorobenzidine	91-94-1	127	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
3-Nitroaniline	99-09-2		NM	NM	NM	NM	NM	2,500 U	3,000 U	2,600 U	2,100 U	5,800 U	2,000 U	1,100 U
4,6-Dinitro-2-methylphenol	534-52-1	104	NM	NM	NM	NM	NM	2,500 U	3,000 U	2,600 U	2,100 U	5,800 U	2,000 U	1,100 U
4-Bromophenyl-phenylether	101-55-3	1,550	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
4-Chloro-3-methylphenol	59-50-7	388	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
4-Chloroaniline	106-47-8	146	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
4-Chlorophenyl-phenylether	7005-72-3		NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
4-Methylphenol	106-44-5	20.2	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
4-Nitroaniline	100-01-6		NM	NM	NM	NM	NM	2,500 U	3,000 U	2,600 U	2,100 U	5,800 U	2,000 U	1,100 U
4-Nitrophenol	100-02-7	13.3	NM	NM	NM	NM	NM	2,500 U	3,000 U	2,600 U	2,100 U	5,800 U	2,000 U	1,100 U
Acenaphthene	83-32-9	6.71	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
Acenaphthylene	208-96-8	5.87	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
Acetophenone	98-86-2		NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	NM
Anthracene	120-12-7	57.2	NM	NM	NM	NM	NM	480 U	590 U	**44.0 J**	410 U	1,100 U	380 U	470 U
Atrazine	1912-24-9		NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	NM
Benzaldehyde	100-52-7		NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	NM
Benzo(a)anthracene	56-55-3	108	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	480 U	590 U	**130 J**	410 U	**58.0 J**	380 U	470 U
Benzo(a)pyrene	50-32-8	150	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	480 U	590 U	**130 J**	410 U	**63.0 J**	380 U	470 U
Benzo(b)fluoranthene	205-99-2	10,000	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	480 U	590 U	**91.0 J**	410 U	1,100 U	380 U	470 U
Benzo(g,h,i)perylene	191-24-2	170	NM	NM	NM	NM	NM	480 U	590 U	**72.0 J**	410 U	1,100 U	380 U	470 U
Benzo(k)fluoranthene	207-08-9	240	NM	NM	NM	NM	NM	480 U	590 U	**100 J**	410 U	1,100 U	380 U	470 U
bis(2-Chloroethoxy) methane	111-91-1		NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
bis(2-Chloroethyl) ether	111-44-4	3,520	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
bis(2-Ethylhexyl) phthalate	117-81-7	182	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	**160 J**
Butylbenzylphthalate	85-68-7	1,970	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
Caprolactam	105-60-2		NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	NM
Carbazole	86-74-8	57.2	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
Chrysene	218-01-9	166	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	480 U	590 U	**140 J**	410 U	**73.0 J**	380 U	470 U
Dibenzo(a,h)anthracene	53-70-3	33	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
Dibenzofuran	132-64-9	449	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
Diethylphthalate	84-66-2	295	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
Dimethylphthalate	131-11-3	295	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
Di-n-butylphthalate	84-74-2	1,114	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
Di-n-octylphthalate	117-84-0	40,600	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
Fluoranthene	206-44-0	423	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	480 U	590 U	**340 J**	410 U	**150 J**	380 U	470 U
Fluorene	86-73-7	77.4	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
Hexachlorobenzene	118-74-1	20	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
Hexachlorobutadiene	87-68-3	26.5	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
Hexachlorocyclopentadiene	77-47-4	901	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
Hexachloroethane	67-72-1	584	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
Indeno(1,2,3-cd)pyrene	193-39-5	200	NM	NM	NM	NM	NM	480 U	590 U	**72.0 J**	410 U	1,100 U	380 U	470 U
Isophorone	78-59-1	432	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
Naphthalene	91-20-3	176	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
Nitrobenzene	98-95-3	145	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
N-Nitroso-di-n-propylamine	621-64-7		NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
N-Nitrosodiphenylamine/Diphenylamine	86-30-6		NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U

Appendix G-4-17
SVOC Results for Sediment Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Depth Sediment ESV (µg/Kg)	ISA-X201 ISA-X201 12/14/1993 µg/Kg 0 - 0.25'	ISA-X202 ISA-X202 12/14/1993 µg/Kg 0 - 0.25'	ISA-X203 ISA-X203 12/14/1993 µg/Kg 0'	ISA-X204 ISA-X204 12/14/1993 µg/Kg 0 - 0.5'	ISA-X205 ISA-X205 12/14/1993 µg/Kg 0 - 0.25'	LVR-201 OU1-SS-LVR201-071029 10/29/2007 µg/Kg 0'	LVR-201 OU1-SS-LVR406-071029 10/29/2007 µg/Kg 0'	LVR-205 LVR205-071030 10/30/2007 µg/Kg 0'	LVR-209 OU1-SS-LVR209-071031 10/31/2007 µg/Kg 0'	LVR-213 OU1-SS-LVR213-071031 10/31/2007 µg/Kg 0'	LVR-214 OU1-SS-LVR214-071031 10/31/2007 µg/Kg 0'	SSI-X201 SSI-X201 11/21/1991 µg/Kg 0 - 0.583'
Pentachlorophenol	87-86-5	23,000	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	2,500 U	3,000 U	2,600 U	2,100 U	5,800 U	2,000 U	1,100 U
Phenanthrene	85-01-8	24	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	480 U	590 U	**200 J**	410 U	**91.0 J**	380 U	470 U
Phenol	108-95-2	49.1	NM	NM	NM	NM	NM	480 U	590 U	500 U	410 U	1,100 U	380 U	470 U
Pyrene	129-00-0	195	0.0 U	0.0 U	0.0 U	0.0 U	0.0 U	480 U	590 U	**260 J**	410 U	**120 J**	380 U	470 U

Notes:

	Exceedance of Sediment Ecological Screening Value (ESV)
1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical
U	The analyte was analyzed for, but was not detected above the reported
NM	Not Measured

Appendix G-4-17
SVOC Results for Sediment Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Depth Sediment ESV (µg/Kg)	SSI-X202 SSI-X202 11/21/1991 µg/Kg 0 - 0.25'	SSI-X203 SSI-X203 11/21/1991 µg/Kg 0 - 0.667'	SSI-X204 SSI-X204 11/21/1991 µg/Kg 0 - 0.667'	SSI-X208 SSI-X208 11/20/1991 µg/Kg 0 - 0.667'
1,1-Biphenyl	92-52-4		NM	NM	NM	NM
1,2,4-Trichlorobenzene	120-82-1	5,062	630 U	430 U	540 U	400 U
1,2-Dichlorobenzene	95-50-1	294	630 U	430 U	540 U	400 U
1,3-Dichlorobenzene	541-73-1	1,315	630 U	430 U	540 U	400 U
1,4-Dichlorobenzene	106-46-7	318	630 U	430 U	540 U	400 U
2,2'-Oxybis(1-Chloropropane)	108-60-1		630 U	430 U	540 U	400 U
2,4,5-Trichlorophenol	95-95-4	208	1,500 U	1,000 U	1,300 U	980 U
2,4,6-Trichlorophenol	88-06-2	208	630 U	430 U	540 U	400 U
2,4-Dichlorophenol	120-83-2	81.7	630 U	430 U	540 U	400 U
2,4-Dimethylphenol	105-67-9	304	630 U	430 U	540 U	400 U
2,4-Dinitrophenol	51-28-5	6.21	1,500 U	1,000 U	1,300 U	980 U
2,4-Dinitrotoluene	121-14-2	14.4	630 U	430 U	540 U	400 U
2,6-Dinitrotoluene	606-20-2	39.8	630 U	430 U	540 U	400 U
2-Chloronaphthalene	91-58-7	417	630 U	430 U	540 U	400 U
2-Chlorophenol	95-57-8	31.9	630 U	430 U	540 U	400 U
2-Methylnaphthalene	91-57-6	20.2	630 U	430 U	540 U	400 U
2-Methylphenol	95-48-7	55.4	630 U	430 U	540 U	400 U
2-Nitroaniline	88-74-4		1,500 U	1,000 U	1,300 U	980 U
2-Nitrophenol	88-75-5	13.3	630 U	430 U	540 U	400 U
3,3'-Dichlorobenzidine	91-94-1	127	630 U	430 U	540 U	400 U
3-Nitroaniline	99-09-2		1,500 U	1,000 U	1,300 U	980 U
4,6-Dinitro-2-methylphenol	534-52-1	104	1,500 U	1,000 U	1,300 U	980 U
4-Bromophenyl-phenylether	101-55-3	1,550	630 U	430 U	540 U	400 U
4-Chloro-3-methylphenol	59-50-7	388	630 U	430 U	540 U	400 U
4-Chloroaniline	106-47-8	146	630 U	430 U	540 U	400 U
4-Chlorophenyl-phenylether	7005-72-3		630 U	430 U	540 U	400 U
4-Methylphenol	106-44-5	20.2	630 U	430 U	540 U	400 U
4-Nitroaniline	100-01-6		1,500 U	1,000 U	1,300 U	980 U
4-Nitrophenol	100-02-7	13.3	1,500 U	1,000 U	1,300 U	980 U
Acenaphthene	83-32-9	6.71	630 U	430 U	540 U	400 U
Acenaphthylene	208-96-8	5.87	630 U	430 U	540 U	400 U
Acetophenone	98-86-2		NM	NM	NM	NM
Anthracene	120-12-7	57.2	630 U	430 U	540 U	400 U
Atrazine	1912-24-9		NM	NM	NM	NM
Benzaldehyde	100-52-7		NM	NM	NM	NM
Benzo(a)anthracene	56-55-3	108	**330 J**	430 U	540 U	400 U
Benzo(a)pyrene	50-32-8	150	**250 J**	430 U	540 U	400 U
Benzo(b)fluoranthene	205-99-2	10,000	**320 J**	430 U	540 U	400 U
Benzo(g,h,i)perylene	191-24-2	170	630 U	430 U	540 U	400 U
Benzo(k)fluoranthene	207-08-9	240	**220 J**	430 U	540 U	400 U
bis(2-Chloroethoxy) methane	111-91-1		630 U	430 U	540 U	400 U
bis(2-Chloroethyl) ether	111-44-4	3,520	630 U	430 U	540 U	400 U
bis(2-Ethylhexyl) phthalate	117-81-7	182	**170 J**	**230 J**	**200 J**	**130 J**
Butylbenzylphthalate	85-68-7	1,970	630 U	430 U	540 U	400 U
Caprolactam	105-60-2		NM	NM	NM	NM
Carbazole	86-74-8	57.2	630 U	430 U	540 U	400 U
Chrysene	218-01-9	166	**330 J**	430 U	540 U	400 U
Dibenzo(a,h)anthracene	53-70-3	33	630 U	430 U	540 U	400 U
Dibenzofuran	132-64-9	449	630 U	430 U	540 U	400 U
Diethylphthalate	84-66-2	295	630 U	430 U	540 U	400 U
Dimethylphthalate	131-11-3	295	630 U	430 U	540 U	400 U
Di-n-butylphthalate	84-74-2	1,114	630 U	430 U	540 U	400 U
Di-n-octylphthalate	117-84-0	40,600	630 U	430 U	540 U	400 U
Fluoranthene	206-44-0	423	**670**	430 U	540 U	400 U
Fluorene	86-73-7	77.4	630 U	430 U	540 U	400 U
Hexachlorobenzene	118-74-1	20	630 U	430 U	540 U	400 U
Hexachlorobutadiene	87-68-3	26.5	630 U	430 U	540 U	400 U
Hexachlorocyclopentadiene	77-47-4	901	630 U	430 U	540 U	400 U
Hexachloroethane	67-72-1	584	630 U	430 U	540 U	400 U
Indeno(1,2,3-cd)pyrene	193-39-5	200	630 U	430 U	540 U	400 U
Isophorone	78-59-1	432	630 U	430 U	540 U	400 U
Naphthalene	91-20-3	176	630 U	430 U	540 U	400 U
Nitrobenzene	98-95-3	145	630 U	430 U	540 U	400 U
N-Nitroso-di-n-propylamine	621-64-7		630 U	430 U	540 U	400 U
N-Nitrosodiphenylamine/Diphenylamine	86-30-6		630 U	430 U	540 U	400 U

Appendix G-4-17
SVOC Results for Sediment Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Depth Sediment ESV (µg/Kg)	SSI-X202 SSI-X202 11/21/1991 µg/Kg 0 - 0.25'	SSI-X203 SSI-X203 11/21/1991 µg/Kg 0 - 0.667'	SSI-X204 SSI-X204 11/21/1991 µg/Kg 0 - 0.667'	SSI-X208 SSI-X208 11/20/1991 µg/Kg 0 - 0.667'
Pentachlorophenol	87-86-5	23,000	1,500 U	1,000 U	1,300 U	980 U
Phenanthrene	85-01-8	24	**400 J**	430 U	540 U	400 U
Phenol	108-95-2	49.1	630 U	430 U	540 U	400 U
Pyrene	129-00-0	195	**580 J**	430 U	540 U	400 U

Notes:

	Exceedance of Sediment Ecological S
1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical
U	The analyte was analyzed for, but was not detected above the reported
NM	Not Measured

Appendix G-4-18
PCB Results for Sediment Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Depth Sediment ESV (µg/Kg)	SSI-X205 SSI-X205 11/21/1991 µg/Kg 0 - 0.667'	SSI-X206 SSI-X206 11/21/1991 µg/Kg 0 - 0.667'	UL-215 OU1-SE-UL215-071101 11/1/2007 µg/Kg 0'
Aroclor 1016	12674-11-2	59.8	1,000 U	790 U	240 U
Aroclor 1221	11104-28-2	59.8	2,000 U	1,600 U	490 U
Aroclor 1232	11141-16-5	59.8	1,000 U	790 U	240 U
Aroclor 1242	53469-21-9	59.8	1,000 U	790 U	240 U
Aroclor 1248	12672-29-6	59.8	1,000 U	790 U	240 U
Aroclor 1254	11097-69-1	59.8	1,000 U	**2,900**	240 U
Aroclor 1260	11096-82-5	59.8	1,000 U	790 U	**1,900**

Notes:

	Exceedance of Sediment Ecological Screening Value (ESV)
1,000	Bold indicates a detection
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NM	Not Measured

Appendix G-4-18
PCB Results for Sediment Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Depth Sediment ESV (µg/Kg)	ISA-X201 ISA-X201 34,317 µg/Kg 0 - 0.25'	ISA-X202 ISA-X202 12/14/1993 µg/Kg 0 - 0.25'	ISA-X203 ISA-X203 12/14/1993 µg/Kg 0'	ISA-X204 ISA-X204 12/14/1993 µg/Kg 0 - 0.5'	ISA-X205 ISA-X205 12/14/1993 µg/Kg 0 - 0.25'	LVR-201 OU1-SS-LVR201-071029 10/29/2007 µg/Kg 0'	LVR-201 OU1-SS-LVR406-071029 10/29/2007 µg/Kg 0'	LVR-205 LVR205-071030 10/30/2007 µg/Kg 0'	LVR-209 OU1-SS-LVR209-07103 10/31/2007 µg/Kg 0'	LVR-213 OU1-SS-LVR213-071031 10/31/2007 µg/Kg 0'	LVR-214 OU1-SS-LVR213-071031 10/31/2007 µg/Kg 0'	SSI-X201 SSI-X201 11/21/1991 µg/Kg 0 - 0.583'	SSI-X202 SSI-X202 11/21/1991 µg/Kg 0 - 0.25'	SSI-X203 SSI-X203 11/21/1991 µg/Kg 0 - 0.667'	SSI-X204 SSI-X204 11/21/1991 µg/Kg 0 - 0.667'	SSI-X208 SSI-X208 11/20/1991 µg/Kg 0 - 0.667'
Aroclor 1016	12674-11-2	59.8	NM	NM	NM	NM	NM	48.0 U	59.0 U	50.0 U	41.0 U	56.0 U	38.0 U	47.0 U	63.0 U	43.0 U	54.0 U	40.0 U
Aroclor 1221	11104-28-2	59.8	NM	NM	NM	NM	NM	97.0 U	120 U	100 U	83.0 U	110 U	77.0 U	96.0 U	130 U	88.0 U	110 U	82.0 U
Aroclor 1232	11141-16-5	59.8	NM	NM	NM	NM	NM	48.0 U	59.0 U	50.0 U	41.0 U	56.0 U	38.0 U	47.0 U	63.0 U	43.0 U	54.0 U	40.0 U
Aroclor 1242	53469-21-9	59.8	50.0 U	0.0 U	**75**	**810**	**38.0 J**	48.0 U	59.0 U	50.0 U	41.0 U	56.0 U	38.0 U	47.0 U	63.0 U	43.0 U	54.0 U	40.0 U
Aroclor 1248	12672-29-6	59.8	NM	NM	NM	NM	NM	48.0 U	59.0 U	50.0 U	41.0 U	56.0 U	38.0 U	47.0 U	63.0 U	43.0 U	54.0 U	40.0 U
Aroclor 1254	11097-69-1	59.8	50.0 U	**96**	**96**	**820**	**32.0 J**	48.0 U	59.0 U	50.0 U	41.0 U	56.0 U	38.0 U	**81**	63.0 U	43.0 U	**140**	40.0 U
Aroclor 1260	11096-82-5	59.8	50.0 U	**33.0 J**	**23.0 J**	**190**	**12.0 J**	48.0 U	59.0 U	50.0 U	41.0 U	56.0 U	38.0 U	47.0 U	63.0 U	43.0 U	54.0 U	40.0 U

Notes:

	Exceedance of Sediment Ecological Screening Value (ESV)
1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NM	Not Measured

Appendix G-4-19
Pesticide Results for Sediment Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Depth Sediment ESV (µg/Kg)	SSI-X205 SSI-X205 11/21/1991 µg/Kg 0 - 0.667'	SSI-X206 SSI-X206 11/21/1991 µg/Kg 0 - 0.667'	UL-215 OU1-SE-UL215-071101 11/1/2007 µg/Kg 0'
4,4'-DDD	72-54-8	4.88	100 U	80.0 U	4.8 U
4,4'-DDE	72-55-9	3.16	100 U	80.0 U	4.8 U
4,4'-DDT	50-29-3	4.16	100 U	80.0 U	4.8 U
Aldrin	309-00-2	2	52.0 U	40.0 U	2.5 U
alpha-BHC	319-84-6	6	52.0 U	40.0 U	2.5 U
alpha-Chlordane	5103-71-9	3.24	52.0 U	40.0 U	2.5 U
beta-BHC	319-85-7	5	52.0 U	40.0 U	2.5 U
delta-BHC	319-86-8	71,500	52.0 U	40.0 U	2.5 U
Dieldrin	60-57-1	1.9	100 U	80.0 U	4.8 U
Endosulfan I	959-98-8	3.26	52.0 U	40.0 U	2.5 U
Endosulfan II	33213-65-9	1.94	100 U	80.0 U	4.8 U
Endosulfan sulfate	1031-07-8	34.6	100 U	80.0 U	4.8 U
Endrin	72-20-8	2.22	100 U	80.0 U	4.8 U
Endrin Aldehyde	7421-93-4	2.22	100 U	80.0 U	4.8 U
Endrin ketone	53494-70-5	2.22	100 U	80.0 U	4.8 U
gamma-BHC (Lindane)	58-89-9	2.37	52.0 U	40.0 U	2.5 U
gamma-Chlordane	5566-34-7	3.24	52.0 U	40.0 U	2.5 U
Heptachlor	76-44-8	0.6	52.0 U	40.0 U	2.5 U
Heptachlor epoxide	1024-57-3	2.47	52.0 U	40.0 U	2.5 U
Methoxychlor	72-43-5	13.6	520 U	400 U	25.0 U
Toxaphene	8001-35-2	0.077	5,200 U	4,000 U	48.0 U

Notes:

U	The analyte was analyzed
NM	Not Measured

Appendix G-4-19
Pesticides Results for Sediment Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Depth Sediment ESV (µg/Kg)	ISA-X202 ISA-X202 12/14/1993 µg/Kg 0 - 0.25'	ISA-X203 ISA-X203 12/14/1993 µg/Kg 0'	ISA-X204 ISA-X204 12/14/1993 µg/Kg 0 - 0.5'	ISA-X205 ISA-X205 12/14/1993 µg/Kg 0 - 0.25'	LVR-201 OU1-SS-LVR201-071029 10/29/2007 µg/Kg 0'	LVR-201 OU1-SS-LVR406-071029 10/29/2007 µg/Kg 0'	LVR-205 LVR205-071030 10/30/2007 µg/Kg 0'	LVR-206 OU1-SS-LVR206-071030 10/30/2007 µg/Kg 0'	ISA-X201 ISA-X201 12/14/1993 µg/Kg 0 - 0.25'	LVR-213 OU1-SS-LVR213-071031 10/31/2007 µg/Kg 0'
4,4'-DDD	72-54-8	4.88	**2.7 J**	**1.6 J**	**9.7**	**0.79 J**	4.8 U	5.9 U	5.0 U	4.1 U	5.0 U	5.6 U
4,4'-DDE	72-55-9	3.16	0.0 U	0.0 U	0.0 U	**1.4 J**	4.8 U	5.9 U	5.0 U	4.1 U	0.0 U	5.6 U
4,4'-DDT	50-29-3	4.16	**1.6 J**	**1.7 J**	**9.2**	**1.3 J**	4.8 U	5.9 U	5.0 U	4.1 U	5.0 U	5.6 U
Aldrin	309-00-2	2	0.0 U	0.0 U	0.0 U	0.0 U	2.5 U	3.0 U	2.6 U	2.1 U	0.0 U	2.9 U
alpha-BHC	319-84-6	6	0.0 U	0.0 U	0.0 U	0.0 U	2.5 U	3.0 U	2.6 U	2.1 U	0.0 U	2.9 U
alpha-Chlordane	5103-71-9	3.24	**3.5**	**2.9**	**17**	0.0 U	2.5 U	3.0 U	2.6 U	2.1 U	**0.62 J**	2.9 U
beta-BHC	319-85-7	5	0.0 U	0.0 U	0.0 U	0.0 U	2.5 U	3.0 U	2.6 U	2.1 U	0.0 U	2.9 U
delta-BHC	319-86-8	71,500	**1.2 J**	**1.0 J**	**1.0 J**	**3**	2.5 U	3.0 U	2.6 U	2.1 U	2.6 U	2.9 U
Dieldrin	60-57-1	1.9	**6.5**	**5.2**	**17**	0.0 U	4.8 U	5.9 U	5.0 U	4.1 U	**1.5 J**	5.6 U
Endosulfan I	959-98-8	3.26	0.0 U	0.0 U	0.0 U	0.0 U	2.5 U	3.0 U	2.6 U	2.1 U	0.0 U	2.9 U
Endosulfan II	33213-65-9	1.94	0.0 U	0.0 U	0.0 U	0.0 U	4.8 U	5.9 U	5.0 U	4.1 U	0.0 U	5.6 U
Endosulfan sulfate	1031-07-8	34.6	NM	NM	NM	NM	4.8 U	5.9 U	5.0 U	4.1 U	NM	5.6 U
Endrin	72-20-8	2.22	**7.9**	**6.6**	**67**	**2.6 J**	4.8 U	5.9 U	5.0 U	4.1 U	5.0 U	5.6 U
Endrin Aldehyde	7421-93-4	2.22	0.0 U	0.0 U	**9.9**	0.0 U	4.8 U	5.9 U	5.0 U	4.1 U	5.0 U	5.6 U
Endrin ketone	53494-70-5	2.22	0.0 U	**1.4 J**	0.0 U	0.0 U	4.8 U	5.9 U	5.0 U	4.1 U	5.0 U	5.6 U
gamma-BHC (Lindane)	58-89-9	2.37	NM	NM	NM	NM	2.5 U	3.0 U	2.6 U	2.1 U	NM	2.9 U
gamma-Chlordane	5566-34-7	3.24	**1.4 J**	**0.97 J**	**5.1**	**0.56 J**	2.5 U	3.0 U	2.6 U	2.1 U	2.6 U	2.9 U
Heptachlor	76-44-8	0.6	NM	NM	NM	NM	2.5 U	3.0 U	2.6 U	2.1 U	NM	2.9 U
Heptachlor epoxide	1024-57-3	2.47	NM	NM	NM	NM	2.5 U	3.0 U	2.6 U	2.1 U	NM	2.9 U
Methoxychlor	72-43-5	13.6	0.0 U	0.0 U	0.0 U	0.0 U	25.0 U	30.0 U	26.0 U	21.0 U	0.0 U	29.0 U
Toxaphene	8001-35-2	0.077	0.0 U	0.0 U	0.0 U	0.0 U	48.0 U	59.0 U	50.0 U	41.0 U	0.0 U	56.0 U

Analyte	CAS #	Location ID Sample ID Date Units Depth Sediment ESV (µg/Kg)	SSI-X202 SSI-X202 11/21/1991 µg/Kg 0 - 0.25'	SSI-X203 SSI-X203 11/21/1991 µg/Kg 0 - 0.667'	SSI-X204 SSI-X204 11/21/1991 µg/Kg 0 - 0.667'	SSI-X208 SSI-X208 11/20/1991 µg/Kg 0 - 0.667'	LVR-207 OU1-SS-LVR207-071030 10/30/2007 µg/Kg 0'	LVR-208 OU1-SS-LVR208-071030 10/30/2007 µg/Kg 0'	LVR-209 U1-SS-LVR209-0710 10/31/2007 µg/Kg 0'	SSI-X201 SSI-X201 11/21/1991 µg/Kg 0 - 0.583'	LVR-214 OU1-SS-LVR214-071031 10/31/2007 µg/Kg 0'
4,4'-DDD	72-54-8	4.88	6.3 U	4.3 U	5.4 U	4.0 U	4.1 U	5.1 U	4.1 U	4.7 U	3.8 U
4,4'-DDE	72-55-9	3.16	6.3 U	4.3 U	5.4 U	4.0 U	4.1 U	5.1 U	4.1 U	4.7 U	3.8 U
4,4'-DDT	50-29-3	4.16	6.3 U	4.3 U	5.4 U	4.0 U	4.1 U	5.1 U	4.1 U	4.7 U	3.8 U
Aldrin	309-00-2	2	3.3 U	2.2 U	2.8 U	2.1 U	2.1 U	2.6 U	2.1 U	2.4 U	2.0 U
alpha-BHC	319-84-6	6	3.3 U	2.2 U	2.8 U	2.1 U	2.1 U	2.6 U	2.1 U	2.4 U	2.0 U
alpha-Chlordane	5103-71-9	3.24	3.3 U	2.2 U	2.8 U	2.1 U	2.1 U	2.6 U	2.1 U	2.4 U	2.0 U
beta-BHC	319-85-7	5	3.3 U	2.2 U	2.8 U	2.1 U	2.1 U	2.6 U	2.1 U	2.4 U	2.0 U
delta-BHC	319-86-8	71,500	3.3 U	2.2 U	2.8 U	2.1 U	2.1 U	2.6 U	2.1 U	2.4 U	2.0 U
Dieldrin	60-57-1	1.9	6.3 U	4.3 U	5.4 U	4.0 U	4.1 U	5.1 U	4.1 U	4.7 U	3.8 U
Endosulfan I	959-98-8	3.26	3.3 U	2.2 U	2.8 U	2.1 U	2.1 U	2.6 U	2.1 U	2.4 U	2.0 U
Endosulfan II	33213-65-9	1.94	6.3 U	4.3 U	5.4 U	4.0 U	4.1 U	5.1 U	4.1 U	4.7 U	3.8 U
Endosulfan sulfate	1031-07-8	34.6	6.3 U	4.3 U	5.4 U	4.0 U	4.1 U	5.1 U	4.1 U	4.7 U	3.8 U
Endrin	72-20-8	2.22	6.3 U	4.3 U	5.4 U	4.0 U	4.1 U	5.1 U	4.1 U	4.7 U	3.8 U
Endrin Aldehyde	7421-93-4	2.22	6.3 U	4.3 U	5.4 U	4.0 U	4.1 U	5.1 U	4.1 U	4.7 U	3.8 U
Endrin ketone	53494-70-5	2.22	6.3 U	4.3 U	5.4 U	4.0 U	4.1 U	5.1 U	4.1 U	4.7 U	3.8 U
gamma-BHC (Lindane)	58-89-9	2.37	3.3 U	2.2 U	2.8 U	2.1 U	2.1 U	2.6 U	2.1 U	2.4 U	2.0 U
gamma-Chlordane	5566-34-7	3.24	3.3 U	2.2 U	2.8 U	2.1 U	2.1 U	2.6 U	2.1 U	2.4 U	2.0 U
Heptachlor	76-44-8	0.6	3.3 U	2.2 U	2.8 U	2.1 U	2.1 U	2.6 U	2.1 U	2.4 U	2.0 U
Heptachlor epoxide	1024-57-3	2.47	3.3 U	2.2 U	2.8 U	2.1 U	2.1 U	2.6 U	2.1 U	2.4 U	2.0 U
Methoxychlor	72-43-5	13.6	33.0 U	22.0 U	28.0 U	21.0 U	21.0 U	26.0 U	21.0 U	24.0 U	20.0 U
Toxaphene	8001-35-2	0.077	330 U	220 U	280 U	210 U	41.0 U	51.0 U	41.0 U	240 U	38.0 U

Notes:

	Exceedance of Sediment Ecological Screening Value (ESV)
1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NM	Not Measured

Appendix G-4-2
VOC Results for Shallow Soil Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (µg/Kg)	Industrial RSL (µg/Kg)	Location ID Sample ID Date Units Depth C-10 C-10 11/10/1993 µg/Kg 0'	SB-311 OU1-SS-SB311-0-1 10/3/2007 µg/Kg 0 - 1'	SB-315 OU1-SS-SB315-0-1 10/3/2007 µg/Kg 0 - 1'	SB-319 OU1-SS-SB319-0-1 10/3/2007 µg/Kg 0 - 1'	SSI-X102 SSI-X102 11/20/1991 µg/Kg 0'	SSI-X105 SSI-X105 11/20/1991 µg/Kg 0 - 0.667'	SSI-X207 SSI-X207 11/20/1991 µg/Kg 0 - 0.25'
1,1,1-Trichloroethane	71-55-6	8,700,000	38,000,000	12.0 U	6.2 UJ	9.2 UJ	38.0 UJ	13.0 U	13.0 U	12.0 U
1,1,2,2-Tetrachloroethane	79-34-5	560	2,800	12.0 U	6.2 UJ	9.2 UJ	38.0 UJ	13.0 U	13.0 U	12.0 U
1,1,2-Trichloroethane	79-00-5	1,100	5,300	12.0 U	6.2 UJ	9.2 UJ	38.0 UJ	13.0 U	13.0 U	12.0 U
1,1-Dichloroethane	75-34-3	3,300	17,000	12.0 U	6.2 UJ	9.2 UJ	38.0 UJ	13.0 U	13.0 U	12.0 U
1,1-Dichloroethene	75-35-4	240,000	1,100,000	12.0 U	6.2 UJ	9.2 UJ	38.0 UJ	13.0 U	13.0 U	12.0 U
1,2,4-Trichlorobenzene	120-82-1	22,000	99,000	NM	6.2 UJ	9.2 UJ	38.0 UJ	NM	NM	NM
1,2-Dibromo-3-chloropropane	96-12-8	5.4	69	NM	6.2 UJ	9.2 UJ	38.0 UJ	NM	NM	NM
1,2-Dibromoethane	106-93-4	34	170	NM	6.2 UJ	9.2 UJ	38.0 UJ	NM	NM	NM
1,2-Dichlorobenzene	95-50-1	1,900,000	9,800,000	NM	6.2 UJ	9.2 UJ	38.0 UJ	NM	NM	NM
1,2-Dichloroethane	107-06-2	430	2,200	12.0 U	6.2 UJ	9.2 UJ	38.0 UJ	13.0 U	13.0 U	12.0 U
1,2-Dichloropropane	78-87-5	890	4,500	12.0 U	6.2 UJ	9.2 UJ	38.0 UJ	13.0 U	13.0 U	12.0 U
1,3-Dichlorobenzene	541-73-1	2,400	12,000	NM	6.2 UJ	9.2 UJ	38.0 UJ	NM	NM	NM
1,4-Dichlorobenzene	106-46-7	2,400	12,000	NM	6.2 UJ	9.2 UJ	38.0 UJ	NM	NM	NM
2-Butanone (MEK)	78-93-3	28,000,000	200,000,000	12.0 U	12.0 UJ	**1.9 J**	NM	13.0 U	13.0 U	12.0 U
2-Hexanone	591-78-6	210,000	1,400,000	12.0 U	12.0 UJ	18.0 UJ	**22.0 J**	13.0 U	13.0 U	12.0 U
4-Methyl-2-pentanone	108-10-1	5,300,000	53,000,000	12.0 U	12.0 UJ	18.0 UJ	**17.0 J**	13.0 U	13.0 U	12.0 U
Acetone	67-64-1	61,000,000	630,000,000	12.0 U	**8.9 J**	**34.0 J**	NM	13.0 U	**53**	12.0 U
Benzene	71-43-2	1,100	5,400	12.0 U	6.2 UJ	9.2 UJ	38.0 UJ	13.0 U	13.0 U	12.0 U
Bromoform	75-25-2	61,000	220,000	12.0 U	6.2 UJ	9.2 UJ	38.0 UJ	13.0 U	13.0 U	12.0 U
Bromomethane	74-83-9	7,300	32,000	12.0 U	6.2 UJ	9.2 UJ	38.0 UJ	13.0 U	13.0 U	12.0 U
Carbon disulfide	75-15-0	820,000	3,700,000	12.0 U	**0.63 J**	18.0 UJ	**11.0 J**	13.0 U	13.0 U	12.0 U
Carbon tetrachloride	56-23-5	250	1,200	12.0 U	6.2 UJ	9.2 UJ	38.0 UJ	13.0 U	13.0 U	12.0 U
Chlorobenzene	108-90-7	290,000	1,400,000	12.0 U	6.2 UJ	9.2 UJ	38.0 UJ	13.0 U	13.0 U	12.0 U
Chloroethane	75-00-3	15,000,000	61,000,000	12.0 U	12.0 UJ	18.0 UJ	77.0 UJ	13.0 U	13.0 U	12.0 U
Chloroform	67-66-3	290	1,500	12.0 U	6.2 UJ	9.2 UJ	38.0 UJ	13.0 U	13.0 U	12.0 U
Chloromethane	74-87-3	120,000	500,000	12.0 U	6.2 UJ	9.2 UJ	38.0 UJ	13.0 U	13.0 U	12.0 U
cis/trans-1,2-Dichloroethene	540-59-0			12.0 U	NM	NM	NM	13.0 U	13.0 U	12.0 U
cis-1,2-Dichloroethene	156-59-2	780,000	10,000,000	NM	6.2 UJ	9.2 UJ	38.0 UJ	NM	NM	NM
cis-1,3-Dichloropropene	10061-01-5	1,700	8,100	12.0 U	6.2 UJ	9.2 UJ	38.0 UJ	13.0 U	13.0 U	12.0 U
Cyclohexane	110-82-7	7,000,000	29,000,000	NM	**1.5 J**	9.2 UJ	**6.7 J**	NM	NM	NM
Dibromochloromethane	124-48-1	680	3,300	12.0 U	6.2 UJ	9.2 UJ	38.0 UJ	13.0 U	13.0 U	12.0 U
Dichlorobromomethane	75-27-4	270	1,400	12.0 U	6.2 UJ	9.2 UJ	38.0 UJ	13.0 U	13.0 U	12.0 U
Dichloromethane (Methylene chloride)	75-09-2	11,000	53,000	12.0 U	**0.60 J**	9.2 UJ	**3.4 J**	13.0 U	13.0 U	12.0 U
Ethyl benzene	100-41-4	5,400	27,000	12.0 U	**0.43 J**	9.2 UJ	38.0 UJ	13.0 U	13.0 U	12.0 U
Freon-11	75-69-4	790,000	3,400,000	NM	6.2 UJ	9.2 UJ	38.0 UJ	NM	NM	NM
Freon-113	76-13-1	43,000,000	180,000,000	NM	6.2 UJ	9.2 UJ	38.0 UJ	NM	NM	NM
Freon-12	75-71-8	180,000	780,000	NM	6.2 UJ	9.2 UJ	38.0 UJ	NM	NM	NM
Isopropylbenzene	98-82-8	2,100,000	11,000,000	NM	6.2 UJ	9.2 UJ	38.0 UJ	NM	NM	NM
m&p-Xylene	XYLMP			NM	6.2 UJ	9.2 UJ	38.0 UJ	NM	NM	NM
Methyl acetate	79-20-9	78,000,000	1,000,000,000	NM	12.0 UJ	18.0 UJ	77.0 UJ	NM	NM	NM
Methyl tertbutyl ether (MTBE)	1634-04-4	43,000	220,000	NM	6.2 UJ	9.2 UJ	38.0 UJ	NM	NM	NM
Methylcyclohexane	108-87-2	7,000,000	29,000,000	NM	**2.1 J**	9.2 UJ	**9.5 J**	NM	NM	NM
o-Xylene	95-47-6	3,800,000	19,000,000	NM	6.2 UJ	9.2 UJ	38.0 UJ	NM	NM	NM
Styrene	100-42-5	6,300,000	36,000,000	12.0 U	6.2 UJ	9.2 UJ	38.0 UJ	13.0 U	13.0 U	12.0 U
Tetrachloroethene	127-18-4	550	2,600	12.0 U	6.2 UJ	9.2 UJ	38.0 UJ	13.0 U	13.0 U	12.0 U
Toluene	108-88-3	5,000,000	45,000,000	12.0 U	**0.93 J**	9.2 UJ	**4.6 J**	13.0 U	13.0 U	**7.0 J**
trans-1,2-Dichloroethene	156-60-5	150,000	690,000	NM	6.2 UJ	9.2 UJ	38.0 UJ	NM	NM	NM
trans-1,3-Dichloropropene	10061-02-6	1,700	8,100	12.0 U	6.2 UJ	9.2 UJ	38.0 UJ	13.0 U	13.0 U	12.0 U
Trichloroethene	79-01-6	2,800	14,000	12.0 U	6.2 UJ	9.2 UJ	38.0 UJ	13.0 U	13.0 U	12.0 U
Vinyl chloride	75-01-4	60	1,700	12.0 U	6.2 UJ	9.2 UJ	38.0 UJ	13.0 U	13.0 U	12.0 U
Xylenes (unspecified)	XYLENES			12.0 U	NM	NM	NM	13.0 U	13.0 U	12.0 U

Notes:

1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NM	Not Measured

Appendix G-4-2
VOC Results for Deep Soil Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (µg/Kg)	Location ID Sample ID Date Units Depth Industrial RSL (µg/Kg)	C-5 C-5-12 11/12/1993 µg/Kg 12'	C-7 C-7-6 11/12/1993 µg/Kg 6'	C-10 C-10 11/10/1993 µg/Kg 7'	SB-312 OU1-SS-SB312-2-4 10/3/2007 µg/Kg 2 - 4'
1,1,1-Trichloroethane	71-55-6	8,700,000	38,000,000	NM	NM	12.0 U	7.3 UJ
1,1,2,2-Tetrachloroethane	79-34-5	560	2,800	NM	NM	12.0 U	7.3 UJ
1,1,2-Trichloroethane	79-00-5	1,100	5,300	NM	NM	12.0 U	7.3 UJ
1,1-Dichloroethane	75-34-3	3,300	17,000	NM	NM	12.0 U	7.3 UJ
1,1-Dichloroethene	75-35-4	240,000	1,100,000	NM	NM	12.0 U	7.3 UJ
1,2,4-Trichlorobenzene	120-82-1	22,000	99,000	NM	NM	NM	7.3 UJ
1,2-Dibromo-3-chloropropane	96-12-8	5.4	69	NM	NM	NM	7.3 UJ
1,2-Dibromoethane	106-93-4	34	170	NM	NM	NM	7.3 UJ
1,2-Dichlorobenzene	95-50-1	1,900,000	9,800,000	NM	NM	NM	7.3 UJ
1,2-Dichloroethane	107-06-2	430	2,200	NM	NM	12.0 U	7.3 UJ
1,2-Dichloropropane	78-87-5	890	4,500	NM	NM	12.0 U	7.3 UJ
1,3-Dichlorobenzene	541-73-1	2,400	12,000	NM	NM	NM	7.3 UJ
1,4-Dichlorobenzene	106-46-7	2,400	12,000	NM	NM	NM	7.3 UJ
2-Butanone (MEK)	78-93-3	28,000,000	200,000,000	NM	NM	12.0 U	15.0 UJ
2-Hexanone	591-78-6	210,000	1,400,000	NM	NM	12.0 U	15.0 UJ
4-Methyl-2-pentanone	108-10-1	5,300,000	53,000,000	NM	NM	12.0 U	15.0 UJ
Acetone	67-64-1	61,000,000	630,000,000	NM	NM	**9.0 J**	**10.0 J**
Benzene	71-43-2	1,100	5,400	11.0 U	12.0 U	12.0 U	**1.0 J**
Bromoform	75-25-2	61,000	220,000	NM	NM	12.0 U	7.3 UJ
Bromomethane	74-83-9	7,300	32,000	NM	NM	12.0 U	7.3 UJ
Carbon disulfide	75-15-0	820,000	3,700,000	NM	NM	12.0 U	15.0 UJ
Carbon tetrachloride	56-23-5	250	1,200	NM	NM	12.0 U	7.3 UJ
Chlorobenzene	108-90-7	290,000	1,400,000	NM	NM	12.0 U	7.3 UJ
Chloroethane	75-00-3	15,000,000	61,000,000	NM	NM	12.0 U	15.0 UJ
Chloroform	67-66-3	290	1,500	NM	NM	12.0 U	7.3 UJ
Chloromethane	74-87-3	120,000	500,000	NM	NM	12.0 U	7.3 UJ
cis/trans-1,2-Dichloroethene	540-59-0			NM	NM	12.0 U	NM
cis-1,2-Dichloroethene	156-59-2	780,000	10,000,000	NM	NM	NM	7.3 UJ
cis-1,3-Dichloropropene	10061-01-5	1,700	8,100	NM	NM	12.0 U	7.3 UJ
Cyclohexane	110-82-7	7,000,000	29,000,000	NM	NM	NM	**0.63 J**
Dibromochloromethane	124-48-1	680	3,300	NM	NM	12.0 U	7.3 UJ
Dichlorobromomethane	75-27-4	270	1,400	NM	NM	12.0 U	7.3 UJ
Dichloromethane (Methylene chloride)	75-09-2	11,000	53,000	NM	NM	12.0 U	**0.70 J**
Ethyl benzene	100-41-4	5,400	27,000	**16**	13.0 U	12.0 U	7.3 UJ
Freon-11	75-69-4	790,000	3,400,000	NM	NM	NM	7.3 UJ
Freon-113	76-13-1	43,000,000	180,000,000	NM	NM	NM	7.3 UJ
Freon-12	75-71-8	180,000	780,000	NM	NM	NM	7.3 UJ
Isopropylbenzene	98-82-8	2,100,000	11,000,000	NM	NM	NM	7.3 UJ
m&p-Xylene	XYLMP			NM	NM	NM	7.3 UJ
Methyl acetate	79-20-9	78,000,000	1,000,000,000	NM	NM	NM	15.0 UJ
Methyl tertbutyl ether (MTBE)	1634-04-4	43,000	220,000	NM	NM	NM	7.3 UJ
Methylcyclohexane	108-87-2	7,000,000	29,000,000	NM	NM	NM	**0.75 J**
o-Xylene	95-47-6	3,800,000	19,000,000	NM	NM	NM	7.3 UJ
Styrene	100-42-5	6,300,000	36,000,000	NM	NM	12.0 U	7.3 UJ
Tetrachloroethene	127-18-4	550	2,600	NM	NM	12.0 U	7.3 UJ
Toluene	108-88-3	5,000,000	45,000,000	11.0 U	12.0 U	12.0 U	**0.75 J**
trans-1,2-Dichloroethene	156-60-5	150,000	690,000	NM	NM	NM	7.3 UJ
trans-1,3-Dichloropropene	10061-02-6	1,700	8,100	NM	NM	12.0 U	7.3 UJ
Trichloroethene	79-01-6	2,800	14,000	NM	NM	12.0 U	7.3 UJ
Vinyl chloride	75-01-4	60	1,700	NM	NM	12.0 U	7.3 UJ
Xylenes (unspecified)	XYLENES			**41**	14.0 U	12.0 U	NM

Notes:

1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NM	Not Measured

Appendix G-4-2
VOC Results for Shallow Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (µg/Kg)	Location ID Sample ID Date Units Depth Industrial RSL (µg/Kg)	ISA-X104 ISA-X104 12/14/1993 µg/Kg 0 - 0.833'	ISA-X105 ISA-X105 12/14/1993 µg/Kg 0 - 0.833'	ISA-X106 ISA-X106 12/14/1993 µg/Kg 0 - 0.833'	MW-301H OU1-SS-SB301-0-1 10/9/2007 µg/Kg 0 - 1'	MW-306S OU1-SS-SB306-0-1 10/16/2007 µg/Kg 0 - 1'	SSI-X103 SSI-X103 11/21/1991 µg/Kg 0 - 0.5'	SSI-X104 SSI-X104 11/21/1991 µg/Kg 0 - 0.5'
1,1,1-Trichloroethane	71-55-6	8,700,000	38,000,000	0.0 U	0.0 U	0.0 U	8.1 U	8.5 U	12.0 U	**5.0 J**
1,1,2,2-Tetrachloroethane	79-34-5	560	2,800	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
1,1,2-Trichloroethane	79-00-5	1,100	5,300	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
1,1-Dichloroethane	75-34-3	3,300	17,000	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
1,1-Dichloroethene	75-35-4	240,000	1,100,000	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
1,2,4-Trichlorobenzene	120-82-1	22,000	99,000	NM	NM	NM	8.1 U	8.5 U	NM	NM
1,2-Dibromo-3-chloropropane	96-12-8	5.4	69	NM	NM	NM	8.1 U	8.5 U	NM	NM
1,2-Dibromoethane	106-93-4	34	170	NM	NM	NM	8.1 U	8.5 U	NM	NM
1,2-Dichlorobenzene	95-50-1	1,900,000	9,800,000	NM	NM	NM	8.1 U	8.5 U	NM	NM
1,2-Dichloroethane	107-06-2	430	2,200	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
1,2-Dichloropropane	78-87-5	890	4,500	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
1,3-Dichlorobenzene	541-73-1	2,400	12,000	NM	NM	NM	8.1 U	8.5 U	NM	NM
1,4-Dichlorobenzene	106-46-7	2,400	12,000	NM	NM	NM	8.1 U	8.5 U	NM	NM
2-Butanone (MEK)	78-93-3	28,000,000	200,000,000	**23.0 J**	**4.0 J**	**12.0 J**	**1.7 J**	**21**	12.0 U	11.0 U
2-Hexanone	591-78-6	210,000	1,400,000	NM	NM	NM	16.0 U	17.0 U	12.0 U	11.0 U
4-Methyl-2-pentanone	108-10-1	5,300,000	53,000,000	NM	NM	NM	16.0 U	17.0 U	12.0 U	11.0 U
Acetone	67-64-1	61,000,000	630,000,000	0.0 U	0.0 U	0.0 U	**26.0 J**	**180**	12.0 U	11.0 U
Benzene	71-43-2	1,100	5,400	NM	NM	NM	8.1 U	**1.0 J**	12.0 U	11.0 U
Bromoform	75-25-2	61,000	220,000	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
Bromomethane	74-83-9	7,300	32,000	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
Carbon disulfide	75-15-0	820,000	3,700,000	NM	NM	NM	16.0 U	**5.8 J**	12.0 U	11.0 U
Carbon tetrachloride	56-23-5	250	1,200	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
Chlorobenzene	108-90-7	290,000	1,400,000	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
Chloroethane	75-00-3	15,000,000	61,000,000	NM	NM	NM	16.0 U	17.0 U	12.0 U	11.0 U
Chloroform	67-66-3	290	1,500	NM	NM	NM	8.1 U	8.5 U	**2.0 J**	11.0 U
Chloromethane	74-87-3	120,000	500,000	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
cis/trans-1,2-Dichloroethene	540-59-0			NM	NM	NM	NM	NM	**3.0 J**	11.0 U
cis-1,2-Dichloroethene	156-59-2	780,000	10,000,000	NM	NM	NM	8.1 U	8.5 U	NM	NM
cis-1,3-Dichloropropene	10061-01-5	1,700	8,100	NM	NM	NM	8.1 U	8.5 U	**2.0 J**	11.0 U
Cyclohexane	110-82-7	7,000,000	29,000,000	NM	NM	NM	8.1 U	8.5 U	NM	NM
Dibromochloromethane	124-48-1	680	3,300	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
Dichlorobromomethane	75-27-4	270	1,400	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
Dichloromethane (Methylene chloride)	75-09-2	11,000	53,000	**100**	0.0 U	0.0 U	8.1 U	**0.74 J**	12.0 U	**8.0 J**
Ethyl benzene	100-41-4	5,400	27,000	0.0 U	0.0 U	0.0 U	8.1 U	8.5 U	12.0 U	11.0 U
Freon-11	75-69-4	790,000	3,400,000	NM	NM	NM	8.1 U	8.5 U	NM	NM
Freon-113	76-13-1	43,000,000	180,000,000	NM	NM	NM	8.1 U	8.5 U	NM	NM
Freon-12	75-71-8	180,000	780,000	NM	NM	NM	8.1 U	8.5 U	NM	NM
Isopropylbenzene	98-82-8	2,100,000	11,000,000	NM	NM	NM	8.1 U	8.5 U	NM	NM
m&p-Xylene	XYLMP			NM	NM	NM	8.1 U	8.5 U	NM	NM
Methyl acetate	79-20-9	78,000,000	1,000,000,000	NM	NM	NM	16.0 U	**1.8 J**	NM	NM
Methyl tertbutyl ether (MTBE)	1634-04-4	43,000	220,000	NM	NM	NM	8.1 U	8.5 U	NM	NM
Methylcyclohexane	108-87-2	7,000,000	29,000,000	NM	NM	NM	8.1 U	**1.8 J**	NM	NM
o-Xylene	95-47-6	3,800,000	19,000,000	NM	NM	NM	8.1 U	8.5 U	NM	NM
Styrene	100-42-5	6,300,000	36,000,000	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
Tetrachloroethene	127-18-4	550	2,600	NM	NM	NM	8.1 U	8.5 U	**1.0 J**	11.0 U

Appendix G-4-2
VOC Results for Shallow Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (µg/Kg)	Location ID Sample ID Date Units Depth Industrial RSL (µg/Kg)	ISA-X104 ISA-X104 12/14/1993 µg/Kg 0 - 0.833'	ISA-X105 ISA-X105 12/14/1993 µg/Kg 0 - 0.833'	ISA-X106 ISA-X106 12/14/1993 µg/Kg 0 - 0.833'	MW-301H OU1-SS-SB301-0-1 10/9/2007 µg/Kg 0 - 1'	MW-306S OU1-SS-SB306-0-1 10/16/2007 µg/Kg 0 - 1'	SSI-X103 SSI-X103 11/21/1991 µg/Kg 0 - 0.5'	SSI-X104 SSI-X104 11/21/1991 µg/Kg 0 - 0.5'
Toluene	108-88-3	5,000,000	45,000,000	0.0 U	0.0 U	0.0 U	8.1 U	**1.3 J**	**1.0 J**	**8.0 J**
trans-1,2-Dichloroethene	156-60-5	150,000	690,000	NM	NM	NM	8.1 U	8.5 U	NM	NM
trans-1,3-Dichloropropene	10061-02-6	1,700	8,100	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
Trichloroethene	79-01-6	2,800	14,000	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
Vinyl chloride	75-01-4	60	1,700	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
Xylenes (unspecified)	XYLENES			0.0 U	**4.0 J**	**4.0 J**	NM	NM	12.0 U	**11.0 J**

Notes:

1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NM	Not Measured

Appendix G-4-2
VOC Results for Deep Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (µg/Kg)	Industrial RSL (µg/Kg)	Location ID Sample ID Date Units Depth MW-303H OU1-SS-SB303-89-90 10/11/2007 µg/Kg 89 - 90'	MW-304S OU1-SS-SB304-59-60 10/10/2007 µg/Kg 59 - 60'	SB-302 OU1-SS-SB302-10.5-11 10/9/2007 µg/Kg 10.5 - 11.5'	SB-307 OU1-SS-SB307-7-8 10/24/2007 µg/Kg 7 - 8'	SB-308 OU1-SS-SB308-36.5-37.5 10/17/2007 µg/Kg 36.5 - 37'	SB-309 OU1-SS-SB309-48-49 10/17/2007 µg/Kg 48 - 49'	SB-316 OU1-SS-SB316-2-4 39358 µg/Kg 2 - 4'
1,1,1-Trichloroethane	71-55-6	8,700,000	38,000,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
1,1,2,2-Tetrachloroethane	79-34-5	560	2,800	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
1,1,2-Trichloroethane	79-00-5	1,100	5,300	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
1,1-Dichloroethane	75-34-3	3,300	17,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
1,1-Dichloroethene	75-35-4	240,000	1,100,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
1,2,4-Trichlorobenzene	120-82-1	22,000	99,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
1,2-Dibromo-3-chloropropane	96-12-8	5.4	69	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
1,2-Dibromoethane	106-93-4	34	170	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
1,2-Dichlorobenzene	95-50-1	1,900,000	9,800,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
1,2-Dichloroethane	107-06-2	430	2,200	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
1,2-Dichloropropane	78-87-5	890	4,500	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
1,3-Dichlorobenzene	541-73-1	2,400	12,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
1,4-Dichlorobenzene	106-46-7	2,400	12,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
2-Butanone (MEK)	78-93-3	28,000,000	200,000,000	**29**	**2.8 J**	16.0 U	**3.6 J**	**6.6 J**	**4.0 J**	42.0 UJ
2-Hexanone	591-78-6	210,000	1,400,000	24.0 U	13.0 U	16.0 U	14.0 U	11.0 U	13.0 U	42.0 UJ
4-Methyl-2-pentanone	108-10-1	5,300,000	53,000,000	24.0 U	13.0 U	16.0 U	14.0 U	11.0 U	13.0 U	42.0 UJ
Acetone	67-64-1	61,000,000	630,000,000	**190**	**22.0 J**	**20.0 J**	**45**	**43**	**28.0 J**	60.0 U
Benzene	71-43-2	1,100	5,400	**0.94 J**	**4.6 J**	**3.4 J**	**1.4 J**	**0.73 J**	**1.5 J**	**3.6 J**
Bromoform	75-25-2	61,000	220,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Bromomethane	74-83-9	7,300	32,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Carbon disulfide	75-15-0	820,000	3,700,000	**47**	**2.2 J**	16.0 U	**49**	**44**	**0.66 J**	42.0 UJ
Carbon tetrachloride	56-23-5	250	1,200	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Chlorobenzene	108-90-7	290,000	1,400,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Chloroethane	75-00-3	15,000,000	61,000,000	24.0 U	13.0 U	16.0 U	14.0 U	11.0 U	13.0 U	42.0 UJ
Chloroform	67-66-3	290	1,500	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Chloromethane	74-87-3	120,000	500,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
cis-1,2-Dichloroethene	156-59-2	780,000	10,000,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
cis-1,3-Dichloropropene	10061-01-5	1,700	8,100	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Cyclohexane	110-82-7	7,000,000	29,000,000	**3.1 J**	**1.7 J**	**3.1 J**	**6.7 J**	**0.83 J**	**1.1 J**	**5.6 J**
Dibromochloromethane	124-48-1	680	3,300	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Dichlorobromomethane	75-27-4	270	1,400	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Dichloromethane (Methylene chloride)	75-09-2	11,000	53,000	**0.85 J**	**0.45 J**	**0.51 J**	**0.54 J**	**0.37 J**	**0.53 J**	15.0 U
Ethyl benzene	100-41-4	5,400	27,000	12.0 U	**0.83 J**	**0.72 J**	**1.2 J**	5.7 U	**0.43 J**	**1.8 J**
Freon-11	75-69-4	790,000	3,400,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Freon-113	76-13-1	43,000,000	180,000,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Freon-12	75-71-8	180,000	780,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Isopropylbenzene	98-82-8	2,100,000	11,000,000	12.0 U	6.4 U	8.0 U	**0.44 J**	5.7 U	6.7 U	21.0 UJ
m&p-Xylene	XYLMP			12.0 U	**1.8 J**	**1.5 J**	**3.1 J**	5.7 U	6.7 U	**2.9 J**
Methyl acetate	79-20-9	78,000,000	1,000,000,000	**4.3 J**	**1.1 J**	16.0 U	14.0 U	**0.84 J**	13.0 U	42.0 UJ
Methyl tertbutyl ether (MTBE)	1634-04-4	43,000	220,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Methylcyclohexane	108-87-2	7,000,000	29,000,000	**2.9 J**	**2.5 J**	**4.0 J**	**17**	**1.5 J**	**1.7 J**	**7.8 J**
o-Xylene	95-47-6	3,800,000	19,000,000	12.0 U	**0.91 J**	**0.72 J**	**1.9 J**	5.7 U	6.7 U	21.0 UJ
Styrene	100-42-5	6,300,000	36,000,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Tetrachloroethene	127-18-4	550	2,600	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Toluene	108-88-3	5,000,000	45,000,000	**0.94 J**	**4.4 J**	**3.7 J**	**2.4 J**	5.7 U	**1.5 J**	**5.8 J**
trans-1,2-Dichloroethene	156-60-5	150,000	690,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
trans-1,3-Dichloropropene	10061-02-6	1,700	8,100	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Trichloroethene	79-01-6	2,800	14,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Vinyl chloride	75-01-4	60	1,700	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ

Notes:

1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NM	Not Measured

Appendix G-4-2
VOC Results for Shallow Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (µg/Kg)	Location ID Sample ID Date Units Depth Industrial RSL (µg/Kg)	ISA-X104 ISA-X104 12/14/1993 µg/Kg 0 - 0.833'	ISA-X105 ISA-X105 12/14/1993 µg/Kg 0 - 0.833'	ISA-X106 ISA-X106 12/14/1993 µg/Kg 0 - 0.833'	MW-301H OU1-SS-SB301-0-1 10/9/2007 µg/Kg 0 - 1'	MW-306S OU1-SS-SB306-0-1 10/16/2007 µg/Kg 0 - 1'	SSI-X103 SSI-X103 11/21/1991 µg/Kg 0 - 0.5'	SSI-X104 SSI-X104 11/21/1991 µg/Kg 0 - 0.5'
1,1,1-Trichloroethane	71-55-6	8,700,000	38,000,000	0.0 U	0.0 U	0.0 U	8.1 U	8.5 U	12.0 U	**5.0 J**
1,1,2,2-Tetrachloroethane	79-34-5	560	2,800	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
1,1,2-Trichloroethane	79-00-5	1,100	5,300	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
1,1-Dichloroethane	75-34-3	3,300	17,000	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
1,1-Dichloroethene	75-35-4	240,000	1,100,000	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
1,2,4-Trichlorobenzene	120-82-1	22,000	99,000	NM	NM	NM	8.1 U	8.5 U	NM	NM
1,2-Dibromo-3-chloropropane	96-12-8	5.4	69	NM	NM	NM	8.1 U	8.5 U	NM	NM
1,2-Dibromoethane	106-93-4	34	170	NM	NM	NM	8.1 U	8.5 U	NM	NM
1,2-Dichlorobenzene	95-50-1	1,900,000	9,800,000	NM	NM	NM	8.1 U	8.5 U	NM	NM
1,2-Dichloroethane	107-06-2	430	2,200	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
1,2-Dichloropropane	78-87-5	890	4,500	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
1,3-Dichlorobenzene	541-73-1	2,400	12,000	NM	NM	NM	8.1 U	8.5 U	NM	NM
1,4-Dichlorobenzene	106-46-7	2,400	12,000	NM	NM	NM	8.1 U	8.5 U	NM	NM
2-Butanone (MEK)	78-93-3	28,000,000	200,000,000	**23.0 J**	**4.0 J**	**12.0 J**	**1.7 J**	**21**	12.0 U	11.0 U
2-Hexanone	591-78-6	210,000	1,400,000	NM	NM	NM	16.0 U	17.0 U	12.0 U	11.0 U
4-Methyl-2-pentanone	108-10-1	5,300,000	53,000,000	NM	NM	NM	16.0 U	17.0 U	12.0 U	11.0 U
Acetone	67-64-1	61,000,000	630,000,000	0.0 U	0.0 U	0.0 U	**26.0 J**	**180**	12.0 U	11.0 U
Benzene	71-43-2	1,100	5,400	NM	NM	NM	8.1 U	**1.0 J**	12.0 U	11.0 U
Bromoform	75-25-2	61,000	220,000	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
Bromomethane	74-83-9	7,300	32,000	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
Carbon disulfide	75-15-0	820,000	3,700,000	NM	NM	NM	16.0 U	**5.8 J**	12.0 U	11.0 U
Carbon tetrachloride	56-23-5	250	1,200	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
Chlorobenzene	108-90-7	290,000	1,400,000	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
Chloroethane	75-00-3	15,000,000	61,000,000	NM	NM	NM	16.0 U	17.0 U	12.0 U	11.0 U
Chloroform	67-66-3	290	1,500	NM	NM	NM	8.1 U	8.5 U	**2.0 J**	11.0 U
Chloromethane	74-87-3	120,000	500,000	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
cis/trans-1,2-Dichloroethene	540-59-0			NM	NM	NM	NM	NM	**3.0 J**	11.0 U
cis-1,2-Dichloroethene	156-59-2	780,000	10,000,000	NM	NM	NM	8.1 U	8.5 U	NM	NM
cis-1,3-Dichloropropene	10061-01-5	1,700	8,100	NM	NM	NM	8.1 U	8.5 U	**2.0 J**	11.0 U
Cyclohexane	110-82-7	7,000,000	29,000,000	NM	NM	NM	8.1 U	8.5 U	NM	NM
Dibromochloromethane	124-48-1	680	3,300	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
Dichlorobromomethane	75-27-4	270	1,400	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
Dichloromethane (Methylene chloride)	75-09-2	11,000	53,000	**100**	0.0 U	0.0 U	8.1 U	**0.74 J**	12.0 U	**8.0 J**
Ethyl benzene	100-41-4	5,400	27,000	0.0 U	0.0 U	0.0 U	8.1 U	8.5 U	12.0 U	11.0 U
Freon-11	75-69-4	790,000	3,400,000	NM	NM	NM	8.1 U	8.5 U	NM	NM
Freon-113	76-13-1	43,000,000	180,000,000	NM	NM	NM	8.1 U	8.5 U	NM	NM
Freon-12	75-71-8	180,000	780,000	NM	NM	NM	8.1 U	8.5 U	NM	NM
Isopropylbenzene	98-82-8	2,100,000	11,000,000	NM	NM	NM	8.1 U	8.5 U	NM	NM
m&p-Xylene	XYLMP			NM	NM	NM	8.1 U	8.5 U	NM	NM
Methyl acetate	79-20-9	78,000,000	1,000,000,000	NM	NM	NM	16.0 U	**1.8 J**	NM	NM
Methyl tertbutyl ether (MTBE)	1634-04-4	43,000	220,000	NM	NM	NM	8.1 U	8.5 U	NM	NM
Methylcyclohexane	108-87-2	7,000,000	29,000,000	NM	NM	NM	8.1 U	**1.8 J**	NM	NM
o-Xylene	95-47-6	3,800,000	19,000,000	NM	NM	NM	8.1 U	8.5 U	NM	NM
Styrene	100-42-5	6,300,000	36,000,000	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
Tetrachloroethene	127-18-4	550	2,600	NM	NM	NM	8.1 U	8.5 U	**1.0 J**	11.0 U

Appendix G-4-2
VOC Results for Shallow Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (µg/Kg)	Location ID Sample ID Date Units Depth Industrial RSL (µg/Kg)	ISA-X104 ISA-X104 12/14/1993 µg/Kg 0 - 0.833'	ISA-X105 ISA-X105 12/14/1993 µg/Kg 0 - 0.833'	ISA-X106 ISA-X106 12/14/1993 µg/Kg 0 - 0.833'	MW-301H OU1-SS-SB301-0-1 10/9/2007 µg/Kg 0 - 1'	MW-306S OU1-SS-SB306-0-1 10/16/2007 µg/Kg 0 - 1'	SSI-X103 SSI-X103 11/21/1991 µg/Kg 0 - 0.5'	SSI-X104 SSI-X104 11/21/1991 µg/Kg 0 - 0.5'
Toluene	108-88-3	5,000,000	45,000,000	0.0 U	0.0 U	0.0 U	8.1 U	**1.3 J**	**1.0 J**	**8.0 J**
trans-1,2-Dichloroethene	156-60-5	150,000	690,000	NM	NM	NM	8.1 U	8.5 U	NM	NM
trans-1,3-Dichloropropene	10061-02-6	1,700	8,100	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
Trichloroethene	79-01-6	2,800	14,000	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
Vinyl chloride	75-01-4	60	1,700	NM	NM	NM	8.1 U	8.5 U	12.0 U	11.0 U
Xylenes (unspecified)	XYLENES			0.0 U	**4.0 J**	**4.0 J**	NM	NM	12.0 U	**11.0 J**

Notes:

1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NM	Not Measured

Appendix G-4-2
VOC Results for Deep Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (µg/Kg)	Industrial RSL (µg/Kg)	Location ID Sample ID Date Units Depth MW-303H OU1-SS-SB303-89-90 10/11/2007 µg/Kg 89 - 90'	MW-304S OU1-SS-SB304-59-60 10/10/2007 µg/Kg 59 - 60'	SB-302 OU1-SS-SB302-10.5-11 10/9/2007 µg/Kg 10.5 - 11.5'	SB-307 OU1-SS-SB307-7-8 10/24/2007 µg/Kg 7 - 8'	SB-308 OU1-SS-SB308-36.5-37.5 10/17/2007 µg/Kg 36.5 - 37'	SB-309 OU1-SS-SB309-48-49 10/17/2007 µg/Kg 48 - 49'	SB-316 OU1-SS-SB316-2-4 39358 µg/Kg 2 - 4'
1,1,1-Trichloroethane	71-55-6	8,700,000	38,000,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
1,1,2,2-Tetrachloroethane	79-34-5	560	2,800	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
1,1,2-Trichloroethane	79-00-5	1,100	5,300	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
1,1-Dichloroethane	75-34-3	3,300	17,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
1,1-Dichloroethene	75-35-4	240,000	1,100,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
1,2,4-Trichlorobenzene	120-82-1	22,000	99,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
1,2-Dibromo-3-chloropropane	96-12-8	5.4	69	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
1,2-Dibromoethane	106-93-4	34	170	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
1,2-Dichlorobenzene	95-50-1	1,900,000	9,800,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
1,2-Dichloroethane	107-06-2	430	2,200	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
1,2-Dichloropropane	78-87-5	890	4,500	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
1,3-Dichlorobenzene	541-73-1	2,400	12,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
1,4-Dichlorobenzene	106-46-7	2,400	12,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
2-Butanone (MEK)	78-93-3	28,000,000	200,000,000	**29**	**2.8 J**	16.0 U	**3.6 J**	**6.6 J**	**4.0 J**	42.0 UJ
2-Hexanone	591-78-6	210,000	1,400,000	24.0 U	13.0 U	16.0 U	14.0 U	11.0 U	13.0 U	42.0 UJ
4-Methyl-2-pentanone	108-10-1	5,300,000	53,000,000	24.0 U	13.0 U	16.0 U	14.0 U	11.0 U	13.0 U	42.0 UJ
Acetone	67-64-1	61,000,000	630,000,000	**190**	**22.0 J**	**20.0 J**	**45**	**43**	**28.0 J**	60.0 U
Benzene	71-43-2	1,100	5,400	**0.94 J**	**4.6 J**	**3.4 J**	**1.4 J**	**0.73 J**	**1.5 J**	**3.6 J**
Bromoform	75-25-2	61,000	220,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Bromomethane	74-83-9	7,300	32,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Carbon disulfide	75-15-0	820,000	3,700,000	**47**	**2.2 J**	16.0 U	**49**	**44**	**0.66 J**	42.0 UJ
Carbon tetrachloride	56-23-5	250	1,200	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Chlorobenzene	108-90-7	290,000	1,400,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Chloroethane	75-00-3	15,000,000	61,000,000	24.0 U	13.0 U	16.0 U	14.0 U	11.0 U	13.0 U	42.0 UJ
Chloroform	67-66-3	290	1,500	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Chloromethane	74-87-3	120,000	500,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
cis-1,2-Dichloroethene	156-59-2	780,000	10,000,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
cis-1,3-Dichloropropene	10061-01-5	1,700	8,100	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Cyclohexane	110-82-7	7,000,000	29,000,000	**3.1 J**	**1.7 J**	**3.1 J**	**6.7 J**	**0.83 J**	**1.1 J**	**5.6 J**
Dibromochloromethane	124-48-1	680	3,300	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Dichlorobromomethane	75-27-4	270	1,400	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Dichloromethane (Methylene chloride)	75-09-2	11,000	53,000	**0.85 J**	**0.45 J**	**0.51 J**	**0.54 J**	**0.37 J**	**0.53 J**	15.0 U
Ethyl benzene	100-41-4	5,400	27,000	12.0 U	**0.83 J**	**0.72 J**	**1.2 J**	5.7 U	**0.43 J**	**1.8 J**
Freon-11	75-69-4	790,000	3,400,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Freon-113	76-13-1	43,000,000	180,000,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Freon-12	75-71-8	180,000	780,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Isopropylbenzene	98-82-8	2,100,000	11,000,000	12.0 U	6.4 U	8.0 U	**0.44 J**	5.7 U	6.7 U	21.0 UJ
m&p-Xylene	XYLMP			12.0 U	**1.8 J**	**1.5 J**	**3.1 J**	5.7 U	6.7 U	**2.9 J**
Methyl acetate	79-20-9	78,000,000	1,000,000,000	**4.3 J**	**1.1 J**	16.0 U	14.0 U	**0.84 J**	13.0 U	42.0 UJ
Methyl tertbutyl ether (MTBE)	1634-04-4	43,000	220,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Methylcyclohexane	108-87-2	7,000,000	29,000,000	**2.9 J**	**2.5 J**	**4.0 J**	**17**	**1.5 J**	**1.7 J**	**7.8 J**
o-Xylene	95-47-6	3,800,000	19,000,000	12.0 U	**0.91 J**	**0.72 J**	**1.9 J**	5.7 U	6.7 U	21.0 UJ
Styrene	100-42-5	6,300,000	36,000,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Tetrachloroethene	127-18-4	550	2,600	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Toluene	108-88-3	5,000,000	45,000,000	**0.94 J**	**4.4 J**	**3.7 J**	**2.4 J**	5.7 U	**1.5 J**	**5.8 J**
trans-1,2-Dichloroethene	156-60-5	150,000	690,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
trans-1,3-Dichloropropene	10061-02-6	1,700	8,100	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Trichloroethene	79-01-6	2,800	14,000	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ
Vinyl chloride	75-01-4	60	1,700	12.0 U	6.4 U	8.0 U	6.8 U	5.7 U	6.7 U	21.0 UJ

Notes:

1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NM	Not Measured

Appendix G-4-20
Other Inorganics Results for Sediment Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Depth	Pond Line 1 Pond Line 1 11/1/1994 mg/Kg 0'	Pond Line 1 Pond Line 1 DP 11/1/1994 mg/Kg 0'	Pond Line 2 Pond Line 2 11/1/1994 mg/Kg 0'	Pond Line 4 Pond Line 4 11/1/1994 mg/Kg 0'	SSI-X205 SSI-X205 11/21/1991 mg/Kg 0 - 0.667'	SSI-X206 SSI-X206 11/21/1991 mg/Kg 0 - 0.667'	UL-215 OU1-SE-UL215-071101 11/1/2007 mg/Kg 0'
Bicarbonate	71-52-3		**638**	**538**	**539**	**289**	NM	NM	NM
Calcium	7440-70-2		NM	NM	NM	NM	**243,000**	**194,000**	**13,900 J**
Carbonate	3812-32-6		**51.1**	**47.2**	**50**	**4.9**	NM	NM	NM
Magnesium	7439-95-4		NM	NM	NM	NM	**15,600**	**17,400**	**3,900**
Potassium	7440-09-7		NM	NM	NM	NM	**942 J**	**1,280 J**	**1,480 J**
Sodium	7440-23-5		NM	NM	NM	NM	**808 J**	**842 J**	**242 J**
Sulfate	14808-79-8		**719**	**967**	**1,240**	**25,800**	**161**	**191**	NM
Sulfide	18496-25-8		142 U	137 U	155 U	177 U	**140**	1.0 U	NM

Notes:

1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NM	Not Measured

Appendix G-4-20
Other Inorganics Results for Sediment Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID / Sample ID / Date / Units / Depth								
		ISA-X202 ISA-X202 12/14/1993 mg/Kg 0 - 0.25'	ISA-X203 ISA-X203 12/14/1993 mg/Kg 0'	ISA-X204 ISA-X204 12/14/1993 mg/Kg 0 - 0.5'	ISA-X205 ISA-X205 12/14/1993 mg/Kg 0 - 0.25'	LRS-412 OU1-SS-LRS412S-0908 8/11/2009 mg/Kg 0'	LRS-412 OU1-SS-LRS412T-0908 8/11/2009 mg/Kg 0'	LRS-412 OU1-SS-SB406-0908 8/11/2009 mg/Kg 0'	LRS-413 OU1-SS-LRS413S-0908 8/12/2009 mg/Kg 0'	LRS-413 OU1-SS-LRS413T-0908 8/12/2009 mg/Kg 0'
Calcium	7440-70-2	0.0 U	0.0 U	0.0 U	0.0 U	**32,300 J**	**140,000**	**9.8**	**35,600**	**123,000**
Magnesium	7439-95-4	NM	NM	NM	NM	**1,550**	**15,700**	**2.1**	**2,300**	**30,300**
Potassium	7440-09-7	0.0 U	**1,650**	**1,480**	0.0 U	**767 J**	**384 J**	**364**	**822 J**	**534 J**
Sodium	7440-23-5	0.0 U	0.0 U	0.0 U	0.0 U	**602 J**	**159 J**	**19.0 J+**	**565 J**	**180 J**
Sulfate	14808-79-8	NM	NM	NM	NM	NM	NM	NM	NM	NM
Sulfide	18496-25-8	NM	NM	NM	NM	NM	NM	NM	NM	NM

Analyte	CAS #	Location ID / Sample ID / Date / Units / Depth								
		LVR-201 OU1-SS-LVR406-071029 10/29/2007 mg/Kg 0'	LVR-201 OU1-SS-LVR201-071029 10/29/2007 mg/Kg 0'	LVR-202 OU1-SS-LVR202-071030 10/30/2007 mg/Kg 0'	LVR-203 OU1-SS-LVR203-071030 10/30/2007 mg/Kg 0'	LVR-204 OU1-SS-LVR204-071030 10/30/2007 mg/Kg 0'	LVR-205 LVR205-071030 10/30/2007 mg/Kg 0'	LVR-206 OU1-SS-LVR206-071030 10/30/2007 mg/Kg 0'	LVR-207 OU1-SS-LVR207-071030 10/30/2007 mg/Kg 0'	LVR-208 OU1-SS-LVR208-071030 10/30/2007 mg/Kg 0'
Calcium	7440-70-2	**154,000**	**58,900**	**57,300**	**87,300**	**105,000**	**10,000 J**	**21,100**	**44,000**	**126,000**
Magnesium	7439-95-4	**18,600**	**17,600**	**11,500**	**40,300**	**43,300**	**4,990**	**3,950**	**9,940**	**39,300**
Potassium	7440-09-7	**3,510**	**946 J**	**459 J**	**333 J**	**1,000 J**	**3,190**	**589 J**	**644 J**	**1,460 J**
Sodium	7440-23-5	**614 J**	**209 J**	**121 J**	**106 J**	**312 J**	**221 J**	**86.9 J**	**123 J**	**174 J**
Sulfate	14808-79-8	NM	NM	NM	NM	NM	NM	NM	NM	NM
Sulfide	18496-25-8	NM	NM	NM	NM	NM	NM	NM	NM	NM

Appendix G-4-20
Other Inorganics Results for Sediment Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID	LVR-209	LVR-210	LVR-211	LVR-212	LVR-401	LVR-401	LVR-401	LVR-402	LVR-402
		Sample ID	OU1-SS-LVR209-071031	OU1-SS-LVR210-071031	OU1-SS-LVR211-071031	OU1-SS-LVR212-071031	OU1-SE-LVR401C-0908	OU1-SE-LVR401E-0908	OU1-SE-LVR401W-0908	OU1-SE-LVR402C-0908	OU1-SE-LVR402E-0908
		Date	10/31/2007	10/31/2007	10/31/2007	10/31/2007	8/11/2009	8/11/2009	8/11/2009	8/12/2009	8/12/2009
		Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
		Depth	0'	0'	0'	0'	0'	0'	0'	0'	0'
Calcium	7440-70-2		**102,000**	**30,800**	**33,900**	**46,800**	**45,300**	**26,500**	**77,700 J**	**99,800**	**108,000**
Magnesium	7439-95-4		**10,400**	**6,940**	**5,830**	**16,600**	**9,690**	**8,490**	**24,300**	**31,200**	**33,000**
Potassium	7440-09-7		**692 J**	**699 J**	**2,470 J**	**655 J**	**288**	**445**	**472**	**552**	**564**
Sodium	7440-23-5		**156 J**	**129 J**	**195 J**	**120 J**	**131**	114 U	**160**	**157**	**480**
Sulfate	14808-79-8		NM	NM	NM	NM	NM	NM	NM	NM	NM
Sulfide	18496-25-8		NM	NM	NM	NM	NM	NM	NM	NM	NM

Analyte	CAS #	Location ID	LVR-402	LVR-403	LVR-403	LVR-403	LVR-404	LVR-404	LVR-404	LVR-405	LVR-405
		Sample ID	OU1-SE-LVR402W-0908	OU1-SE-LVR403C-0908	OU1-SE-LVR403E-0908	OU1-SE-LVR403W-0908	OU1-SE-LVR404C-0908	OU1-SE-LVR404E-0908	OU1-SE-LVR404W-0908	OU1-SE-LVR405C-0908	OU1-SE-LVR405E-0908
		Date	8/12/2009	8/12/2009	8/12/2009	8/12/2009	8/12/2009	8/12/2009	8/12/2009	8/13/2009	8/13/2009
		Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
		Depth	0'	0'	0'	0'	0'	0'	0'	0'	0'
Calcium	7440-70-2		**68,100**	**133,000**	**105,000**	**117,000**	**103,000**	**59,900 J**	**96,700**	**91,500**	**207,000**
Magnesium	7439-95-4		**15,900**	**32,700**	**25,400**	**23,700**	**23,700**	**20,000 J**	**30,400**	**20,800**	**53,700**
Potassium	7440-09-7		**472**	**567**	**449**	**412**	**281**	**326**	**404**	**1,110**	**618**
Sodium	7440-23-5		**138**	**178**	**213**	**167**	**178**	**183**	**125**	**137**	**158**
Sulfate	14808-79-8		NM	NM	NM	NM	NM	NM	NM	NM	NM
Sulfide	18496-25-8		NM	NM	NM	NM	NM	NM	NM	NM	NM

Appendix G-4-20
Other Inorganics Results for Sediment Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID / Sample ID / Date / Units / Depth								
		LVR-405 OU1-SE-LVR405W-0908 8/13/2009 mg/Kg 0'	LVR-406 OU1-SE-LVR406-0908 8/14/2009 mg/Kg 0'	LVR-407 OU1-SE-LVR407-0908 8/14/2009 mg/Kg 0'	LVR-408 OU1-SE-LVR408-0908 8/14/2009 mg/Kg 0'	SSI-X201 SSI-X201 11/21/1991 mg/Kg 0 - 0.583'	SSI-X202 SSI-X202 11/21/1991 mg/Kg 0 - 0.25'	SSI-X203 SSI-X203 11/21/1991 mg/Kg 0 - 0.667'	SSI-X204 SSI-X204 11/21/1991 mg/Kg 0 - 0.667'	SSI-X208 SSI-X208 11/20/1991 mg/Kg 0 - 0.667'
Calcium	7440-70-2	3.2 U	**30,300 J+**	**16,300 J+**	**17,800 J+**	**24,500**	**25,100**	**27,100**	**75,800**	**87,500**
Magnesium	7439-95-4	0.12 U	**7,060 J+**	**6,630 J+**	**6,330 J+**	**8,190**	**8,290**	**9,160**	**9,360**	**34,600**
Potassium	7440-09-7	**11,800**	**1,970 J+**	**1,320 J+**	**565 J+**	**1,490**	**3,350**	**812 J**	**1,280 J**	**733 J**
Sodium	7440-23-5	0.36 U	**147 J+**	147 U	137 U	**175 J**	**302 J**	**358 J**	**304 J**	**171 J**
Sulfate	14808-79-8	NM	NM	NM	NM	**125**	**250**	**267**	**238**	**265**
Sulfide	18496-25-8	NM	NM	NM	NM	1.0 U	**16**	1.0 U	1.0 U	1.0 U

Analyte	CAS #	Location ID / Sample ID / Date / Units / Depth				
		ISA-X201 ISA-X201 12/14/1993 mg/Kg 0 - 0.25'	LVR-409 OU1-SE-LVR409-0908 8/14/2009 mg/Kg 0'	LVR-213 OU1-SS-LVR213-071031 10/31/2007 mg/Kg 0'	LVR-214 OU1-SS-LVR213-071031 10/31/2007 mg/Kg 0'	QuarryBridge-07B QB-07B 11/8/1994 mg/Kg 0'
Calcium	7440-70-2	0.72 U	**0.71 J+**	**1.1 J**	**1.6**	**2.4**
Magnesium	7439-95-4	NM	**6,060 J+**	**7,460**	**12,500**	NM
Potassium	7440-09-7	**409 J**	**406 J+**	**1,590 J**	**791 J**	NM
Sodium	7440-23-5	0.0 U	120 U	**146 J**	**155 J**	NM
Sulfate	14808-79-8	NM	NM	NM	NM	NM
Sulfide	18496-25-8	NM	NM	NM	NM	NM

Notes:

1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J+	The analyte was positively identified; however, the associated numerical value is likely to be higher than the concentration of the analyte in the sample due to bias attributable to matrix
J-	The analyte was posively identified; however, the associated numerical value is likely to be lower than the concentration of the analyte in the sample due to bias attributable to matrix interference.
NM	Not Measured

Appendix G-4-21
TCLP Results for Sediment Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Depth USEPA TCLP Value (mg/L)	Pond Line 1 Pond Line 1 DP 11/1/1994 mg/L 0'	Pond Line 1 Pond Line 1 11/1/1994 mg/L 0'	Pond Line 2 Pond Line 2 11/1/1994 mg/L 0'	Pond Line 4 Pond Line 4 11/1/1994 mg/L 0'
Barium	7440-39-3	100	**0.65**	**1.6**	**0.76**	**0.13 J**
Cadmium	7440-43-9	1	0.0030 U	**0.0054**	0.0030 U	0.0030 U
Chromium	7440-47-3	5	**0.0092 J**	0.0050 U	**0.0080 J**	**0.023**
Iron	7439-89-6		0.050 U	0.050 U	**0.056 J**	0.050 U
Lead	7439-92-1	5	0.020 U	**0.021**	0.020 U	0.020 U
Manganese	7439-96-5		**147**	**1.8**	**125**	**454**
Mercury	7439-97-6	0.2	0.00020 U	0.00020 U	0.00020 U	0.00020 U
Nickel	7440-02-0		**0.19**	**0.24**	**0.16**	**0.33**
Zinc	7440-66-6		**0.12**	**0.49**	**0.09**	**0.087**

Notes:

1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NM	Not Measured

Appendix G-4-21
TCLP Results for Sediment Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Depth USEPA TCLP Value (mg/L)	5thSt-05B 5thSt 05B 11/8/1994 mg/L 0'	S/S1 S/S1 10/1/1992 mg/L 0'	S/S2 S/S2 10/1/1992 mg/L 0'	Section_Line_DP Sctn Line 11/11/1994 mg/L 0'	QB-07B QuarryBridge-07B 11/8/1994 mg/L 0'
Arsenic	7440-38-2	5	NM	**0.038**	**0.036**	NM	NM
Barium	7440-39-3	100	**0.82**	**0.45**	**1.5**	**0.68**	**0.83**
Cadmium	7440-43-9	1	**0.033**	**0.085**	0.0050 U	**0.005**	**0.0058**
Chromium	7440-47-3	5	0.0050 U	**0.029**	**0.022**	0.0050 U	0.0050 U
Cyanide	57-12-5		NM	0.25 U	0.25 U	NM	NM
Iron	7439-89-6		0.050 U	NM	NM	0.050 U	0.050 U
Lead	7439-92-1	5	**0.032**	**0.67**	**0.13**	**0.026**	0.020 U
Manganese	7439-96-5		**5**	NM	NM	**4.3**	**1.6**
Mercury	7439-97-6	0.2	0.00020 U	**0.002**	**0.002**	0.00020 U	0.00020 U
Nickel	7440-02-0		**0.04**	NM	NM	**0.028 J**	0.020 U
Selenium	7782-49-2	1	NM	0.0020 U	0.0020 U	NM	NM
Silver	7440-22-4	5	NM	0.010 U	**0.068**	NM	NM
Zinc	7440-66-6		**6.8**	NM	NM	**1.4**	**0.35**

Notes:

1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NM	Not Measured

Appendix G-4-22
SEP Results for Sediment Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Sample ID	Date Collected	Location	Parameter	Total	Exchangeable Bound Fraction	Organic Fraction	Carbonate Fraction	Non Crystalline Materials Fraction	Metal Hydroxide Bound Fraction	Sulfide Fraction	Residual Fraction
					SEP Step 1	SEP Step 2	SEP Step 3	SEP Step 4	SEP Step 5	SEP Step 6	SEP Step 7
OU1-SS-LRS412S-0908	8/11/2009	LRS-412	Arsenic	403	1.6 U	1.6 U	8.9	11.4	2.4 J	31.3	3.3
OU1-SS-LRS412S-0908	8/11/2009	LRS-412	Cadmium	9.5 J	0.79 U	1.7	0.37	0.96	1.0 J	3.6	0.26 U
OU1-SS-LRS412S-0908	8/11/2009	LRS-412	Chromium	28.3	1.6 U	1.6 U	0.95	2.8	4.7 U	7.1	52.7
OU1-SS-LRS412S-0908	8/11/2009	LRS-412	Copper	2190	4.1 U	98.2	185	458	99.1	2180	1570
OU1-SS-LRS412S-0908	8/11/2009	LRS-412	Lead	601	1.6 U	4.3	7.3	26.6	4.7 U	23.4	29.6
OU1-SS-LRS412S-0908	8/11/2009	LRS-412	Mercury	0.10 U	0.010 U	0.010 U	0.010 U	0.059	0.028 J	0.018	0.10 U
OU1-SS-LRS412S-0908	8/11/2009	LRS-412	Nickel	46.6	4.3 J	0.60 J	2.3	3.9	2.8 J	34.1	8.8
OU1-SS-LRS412S-0908	8/11/2009	LRS-412	Selenium	2.8 U	1.6 U	1.6 U	0.52 U	0.52 U	4.7 U	1	1.1 U
OU1-SS-LRS412S-0908	8/11/2009	LRS-412	Zinc	81,500 J	1.8 J	142 J	477	1,850 J	942	4730	3,160
OU1-SS-LRS413S-0908	8/12/2009	LRS-413	Arsenic	186	1.6 U	1.6 U	19.5	50.8	6	74.4	98.4
OU1-SS-LRS413S-0908	8/12/2009	LRS-413	Cadmium	6.3 J	0.79 U	0.91	0.35	1.2	0.36 J	0.66	1.6
OU1-SS-LRS413S-0908	8/12/2009	LRS-413	Chromium	38.6	1.6 U	1.6 U	1.1	3.3	4.8 U	6.8	299
OU1-SS-LRS413S-0908	8/12/2009	LRS-413	Copper	2130	4.1 U	63.2	107	501	109	980	2470
OU1-SS-LRS413S-0908	8/12/2009	LRS-413	Lead	59.7	1.6 U	2.5	11.6	49.3	4.8 U	41.4	233
OU1-SS-LRS413S-0908	8/12/2009	LRS-413	Mercury	0.15	0.011 U	0.011 U	0.011 U	0.074	0.04	0.014	0.11 U
OU1-SS-LRS413S-0908	8/12/2009	LRS-413	Nickel	394	4.2 J	5.6 J	45.4	70.5	40.4	110	397
OU1-SS-LRS413S-0908	8/12/2009	LRS-413	Selenium	3.1 U	1.6 U	1.6 U	0.53 U	0.53 U	4.8 U	0.53 U	0.53 U
OU1-SS-LRS413S-0908	8/12/2009	LRS-413	Zinc	6,170 J	13.1	263 J	517	2,060 J	759	3540	27000
OU1-SS-SB406-0908	8/11/2009	LRS-412	Arsenic	1.8	1.6 U	1.6 U	8.1	20.5	1.7 J	46.5	33.7
OU1-SS-SB406-0908	8/11/2009	LRS-412	Cadmium	0.68 J	0.79 U	0.41 J	0.26 U	0.12 J	2.4 U	0.26 U	0.12 J
OU1-SS-SB406-0908	8/11/2009	LRS-412	Chromium	34.3	1.6 U	1.6 U	0.55	1.1	4.7 U	3.8	82.1
OU1-SS-SB406-0908	8/11/2009	LRS-412	Copper	22.5	4.1 U	88.1	22.5	477	149	2110	1250
OU1-SS-SB406-0908	8/11/2009	LRS-412	Lead	0.53 U	1.6 U	5.1	2.8	59.7	4.7 U	119	126
OU1-SS-SB406-0908	8/11/2009	LRS-412	Mercury	0.11 U	NM	NM	NM	NM	NM	NM	NM
OU1-SS-SB406-0908	8/11/2009	LRS-412	Nickel	15	4.5 J	5.6 J	98.7	162	139	709	619
OU1-SS-SB406-0908	8/11/2009	LRS-412	Selenium	2.7 U	1.6 U	1.6 U	0.53 U	0.53 U	4.7 U	0.53 U	2.1 U
OU1-SS-SB406-0908	8/11/2009	LRS-412	Zinc	258 J	4.5	209 J	742	2,320 J	774	9380	5800

Notes:

J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NM	Not Measured

Appendix G-4-23
AVS-SEM Results for Sediment Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	Location ID Sample ID Date Units Depth CAS #	LVR-201 OU1-SS-LVR201-071029 10/29/2007 µM/g 0'	LVR-201 OU1-SS-LVR406-071029 10/29/2007 µM/g 0'	LVR-203 OU1-SS-LVR203-071030 10/30/2007 µM/g 0'	LVR-205 LVR205-071030 10/30/2007 µM/g 0'	LVR-207 OU1-SS-LVR207-071030 10/30/2007 µM/g 0'
Cadmium	7440-43-9	**0.07**	**0.045**	**0.018**	**0.12**	**0.0038**
Copper	7440-50-8	**6**	**1.7**	**1.2**	**0.13**	**0.028**
Lead	7439-92-1	**0.18**	**0.24**	**0.23**	**0.48**	**0.015**
Nickel	7440-02-0	**0.93**	**0.39**	**0.14**	**0.2**	**0.034**
Sulfide	18496-25-8	0.15 U	0.18 U	**0.99**	**1.1**	0.12 U
Zinc	7440-66-6	**35.6**	**19.1**	**40.8**	**36.2**	**0.36**

Notes:

1,000	Bold indicates a detection
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

Appendix G-4-24
Metals and Cyanide Results for Surface Water Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Surface Water ESV (µg/L)	Location ID: 5thstbridge Sample ID: 5th St. Bridge Date: 11/8/1994 Units: µg/L Total or Dissolved: T	ASO-411 OU1-GW-MW404-090814 8/14/2009 µg/L D	ASO-411 OU1-GW-MW404-090814 8/14/2009 µg/L T	ASO-411 OU1-SW-AS0411-090817 8/17/2009 µg/L D	ASO-411 OU1-SW-AS0411-090817 8/17/2009 µg/L T	ASO-411 OU1-SW-AS0411-090818 8/18/2009 µg/L D	ASO-411 OU1-SW-AS0411-090818 8/18/2009 µg/L T
Aluminum	7429-90-5	87	NM	14.9 U	14.9 U	14.9 U	14.9 U	14.9 U	14.9 U
Antimony	7440-36-0	320	NM	0.93 U	3.9 U	0.93 U	3.9 U	0.93 U	3.9 U
Arsenic	7440-38-2	190	NM	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Barium	7440-39-3	220	**115 J**	10.0 U	**24.1 J+**	**22**	**25**	**25**	**25**
Beryllium	7440-41-7	3.6	NM	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U
Cadmium	7440-43-9	1.18	3.0 U	10.0 U	**305 J+**	**280**	**300**	**303**	**298**
Chromium	7440-47-3	11	5.0 U	10.0 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
Cobalt	7440-48-4	24.00	NM	10.0 U	10.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Copper	7440-50-8	13.26	NM	10.0 U	**21.4 J+**	**21**	**22**	**23**	**31**
Cyanide	57-12-5	5.20	6.2 U	NM	NM	NM	NM	NM	NM
Iron	7439-89-6	1,000	**1,930**	100 U	100 U	31.7 U	31.7 U	31.7 U	31.7 U
Lead	7439-92-1	19.35	**2.0 J**	10.0 U	**79.1 J+**	**81**	**85**	**84**	**87**
Manganese	7439-96-5		**106**	10.0 U	**15.3 J+**	10.0 U	10.0 U	10.0 U	10.0 U
Mercury	7439-97-6	1.10	**0.22**	0.019 U	0.019 U	0.019 U	0.019 U	0.019 U	0.019 U
Nickel	7440-02-0	5.82	20.0 U	10.0 U	**70.0 J+**	**57**	**60**	**60**	**60**
Selenium	7782-49-2	5.00	NM	0.56 UJ	20.0 U	**11.0 J**	**11.6 J**	**11.7 J**	**11.9 J**
Silver	7440-22-4	0.12	NM	0.83 U	0.83 U	0.83 U	0.83 U	0.83 U	0.83 U
Thallium	7440-28-0	15.00	NM	1.0 U	1.0 U	1.0 U	**1.9 J**	1.0 U	1.0 U
Vanadium	7440-62-2	12.00	NM	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U
Zinc	7440-66-6	25.14	**96**	**21.0 J+**	**55,500 J+**	**56,500**	**57,100**	**61,000**	**58,800**

Analyte	CAS #	Surface Water ESV (µg/L)	Location ID: ASO-411 Sample ID: 1-SW-AS0411-0908 Date: 8/20/2009 Units: µg/L Total or Dissolved: T	ASO-411 OU1-SW-ASO411-0908 8/11/2009 µg/L D	ASO-411 OU1-SW-ASO411-0908 8/11/2009 µg/L T	ASO-411 OU1-SW-ASO411-090812 8/12/2009 µg/L D	ASO-411 OU1-SW-ASO411-090812 8/12/2009 µg/L T	ASO-411 OU1-SW-ASO411-090813 8/13/2009 µg/L D	ASO-411 OU1-SW-ASO411-090813 8/13/2009 µg/L T
Aluminum	7429-90-5	87	14.9 U	14.9 U	14.9 U	14.9 U	14.9 U	14.9 U	14.9 U
Antimony	7440-36-0	320	3.9 U	0.46 U	3.9 U	0.93 U	3.9 U	0.93 U	3.9 U
Arsenic	7440-38-2	190	2.5 U	1.3 U	1.3 U	2.5 U	2.5 U	2.5 U	2.5 U
Barium	7440-39-3	220	**24.1**	**24**	**23**	**23.6**	**23**	**22.6**	**23.6**
Beryllium	7440-41-7	3.6	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U
Cadmium	7440-43-9	1.18	**299**	**296**	**291**	**307**	**316**	**305**	**317**
Chromium	7440-47-3	11	1.8 U	10.0 U	10.0 U	1.8 U	1.8 U	1.8 U	1.8 U
Cobalt	7440-48-4	24.00	1.0 U	**1.2 J**	**1.1 J**	**1.4 J**	**1.3 J**	**1.1 J**	**1.2 J**
Copper	7440-50-8	13.26	**23**	**21.8 J+**	**21**	**21**	**22**	**22**	**23**
Cyanide	57-12-5	5.20	NM	NM	NM	NM	NM	NM	NM
Iron	7439-89-6	1,000	31.7 U	31.7 U	31.7 U	31.7 U	31.7 U	7.7 U	100 U
Lead	7439-92-1	19.35	**87**	**76**	**78**	**85**	**91**	**80**	**83**
Manganese	7439-96-5		10.0 U	**29.9 J+**	**30**	**27**	**27**	**24.6 J+**	**23.4 J+**
Mercury	7439-97-6	1.10	0.019 U	**0.021 J**	0.019 U	0.019 U	0.019 U	0.019 U	0.019 U
Nickel	7440-02-0	5.82	**59**	**63**	**62**	**60**	**63**	**62**	**66**
Selenium	7782-49-2	5.00	**10.9 J**	**12**	**12**	**11.5 J**	**11.4 J**	**11.9 J**	**13.2 J**
Silver	7440-22-4	0.12	0.83 U	0.83 U	0.83 U	0.83 U	0.83 U	0.83 U	**0.84 J**
Thallium	7440-28-0	15.00	1.0 U	0.51 U	0.51 U	1.0 U	1.0 U	1.0 U	1.0 U
Vanadium	7440-62-2	12.00	5.5 U	2.7 U	2.7 U	5.5 U	5.5 U	5.5 U	5.5 U
Zinc	7440-66-6	25.14	**59,500**	**62,100**	**62,000**	**62,300**	**62,200**	**61,900**	**62,400**

Appendix G-4-24
Metals and Cyanide Results for Surface Water Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Total or Dissolved Surface Water ESV (µg/L)	ASO-411 OU1-SW-ASO411-090814 8/14/2009 µg/L D	ASO-411 OU1-SW-ASO411-090814 8/14/2009 µg/L T	ASO-411 SW-ASO411-090820 DISSOI 8/20/2009 µg/L D	CSO-410 OU1-SW-CS0410-0908 8/11/2009 µg/L D	CSO-410 OU1-SW-CS0410-0908 8/11/2009 µg/L T	CSO-410 OU1-SW-CS0410-090810 8/10/2009 µg/L D	CSO-410 OU1-SW-CS0410-090810 8/10/2009 µg/L T
Aluminum	7429-90-5	87	14.9 U	14.9 U	14.9 U	14.9 U	**22.9 J**	14.9 U	14.9 U
Antimony	7440-36-0	320	0.93 U	3.9 U	0.93 U	0.46 U	3.9 U	0.46 U	3.9 U
Arsenic	7440-38-2	190	2.5 U	2.5 U	2.5 U	1.3 U	1.3 U	1.3 U	1.3 U
Barium	7440-39-3	220	**23.4 J+**	**22.5 J+**	**24.9**	**15.5**	**15.6**	**15.6**	**16.1**
Beryllium	7440-41-7	3.6	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U
Cadmium	7440-43-9	1.18	**300 J+**	**294 J+**	**296**	**199**	**197**	**193**	**203**
Chromium	7440-47-3	11	1.8 U	1.8 U	1.8 U	10.0 U	10.0 U	10.0 U	10.0 U
Cobalt	7440-48-4	24.00	10.0 U	10.0 U	1.0 U	**8.8**	**8.5**	**7.8**	**8.4**
Copper	7440-50-8	13.26	**21.0 J+**	**21.0 J+**	**24**	**110 J+**	**117**	**116 J+**	**129**
Cyanide	57-12-5	5.20	NM	NM	NM	NM	NM	NM	NM
Iron	7439-89-6	1,000	100 U	100 U	31.7 U	31.7 U	**51.2 J**	31.7 U	31.7 U
Lead	7439-92-1	19.35	**77.7 J+**	**77.9 J+**	**84**	**13**	**15**	**14**	**16**
Manganese	7439-96-5		**15.3 J+**	**15.7 J+**	10.0 U	**424**	**429**	**385**	**399**
Mercury	7439-97-6	1.10	0.019 U	0.019 U	0.019 U	0.019 U	0.019 U	**0.031 J**	0.019 U
Nickel	7440-02-0	5.82	**67.2 J+**	**67.6 J+**	**59**	**75**	**74**	**70**	**75**
Selenium	7782-49-2	5.00	20.0 U	20.0 U	**11.9 J**	**4.1 J**	**4.1 J**	**4.0 J**	**4.4 J**
Silver	7440-22-4	0.12	0.83 U	0.83 U	0.83 U	0.83 U	0.83 U	0.83 U	0.83 U
Thallium	7440-28-0	15.00	1.0 U	1.0 U	1.0 U	0.51 U	0.51 U	0.51 U	0.51 U
Vanadium	7440-62-2	12.00	5.5 U	5.5 U	5.5 U	2.7 U	2.7 U	2.7 U	2.7 U
Zinc	7440-66-6	25.14	**58,000 J+**	**57,900 J+**	**57,900**	**69,200**	**69,000**	**66,300**	**68,300**

Analyte	CAS #	Location ID Sample ID Date Units Total or Dissolved Surface Water ESV (µg/L)	CSO-410 OU1-SW-CS0410-090817 8/17/2009 µg/L D	CSO-410 OU1-SW-CS0410-090817 8/17/2009 µg/L T	LVR-201 OU1-SW-LV201-071029 10/29/2007 µg/L T	LVR-201 OU1-SW-LV406-071029 10/29/2007 µg/L T	LVR-203 OU1-SW-LVR203-071030 10/30/2007 µg/L T	LVR-205 OU1-SW-LVR205-071030 10/30/2007 µg/L T	LVR-207 OU1-SW-LVR207-071030 10/30/2007 µg/L T
Aluminum	7429-90-5	87	14.9 U	**205**	**223**	**330**	**460**	**274**	**3,000**
Antimony	7440-36-0	320	0.93 U	3.9 U	7.9 U	7.9 U	7.9 U	7.9 U	7.9 U
Arsenic	7440-38-2	190	2.5 U	2.5 U	**0.34 J**	**0.31 J**	**0.42 J**	**1.1**	**0.43 J**
Barium	7440-39-3	220	**16.3**	**16.5**	**76.2**	**77.3**	**76.4**	**77**	**86.4**
Beryllium	7440-41-7	3.6	0.14 U	0.14 U	0.075 U	0.075 U	0.075 U	0.075 U	0.075 U
Cadmium	7440-43-9	1.18	**172**	**169**	**6.4**	**6.5**	**7.1**	0.11 U	0.11 U
Chromium	7440-47-3	11	**2.1 J**	**2.4 J**	**1.1 J**	**1.2 J**	**1.4 J**	**0.59 J**	**3.7**
Cobalt	7440-48-4	24.00	**6.5 J**	**6.6 J**	**1.3**	**1.3**	**1.5**	**0.42 J**	**1**
Copper	7440-50-8	13.26	**86**	**120**	**2.5 J**	**2.5 J**	**2.8 J**	**1.5 J**	**2.6 J**
Cyanide	57-12-5	5.20	NM	NM	10.0 U	10.0 U	NM	10.0 U	NM
Iron	7439-89-6	1,000	31.7 U	**182**	**362**	**482**	**494**	**271**	**2,220**
Lead	7439-92-1	19.35	**13**	**19**	**0.35 J**	**0.36 J**	**0.39 J**	**0.28 J**	**1.2**
Manganese	7439-96-5		**290**	**282**	**74**	**75**	**72**	**21.5**	**44.5**
Mercury	7439-97-6	1.10	0.019 U	0.019 U	0.014 U	0.014 U	0.014 U	0.014 U	**0.018 J**
Nickel	7440-02-0	5.82	**60**	**58**	**8**	**8**	**9**	**3.7**	**6.1**
Selenium	7782-49-2	5.00	**3.9 J**	**3.4 J**	**0.84 J**	**0.92 J**	**0.99 J**	**0.66 J**	**0.68 J**
Silver	7440-22-4	0.12	0.83 U	0.83 U	0.74 U	0.74 U	0.74 U	0.74 U	0.74 U
Thallium	7440-28-0	15.00	1.0 U	1.0 U	0.042 U	0.042 U	0.042 U	**0.064 J**	0.042 U
Vanadium	7440-62-2	12.00	5.5 U	5.5 U	0.098 U	0.098 U	0.098 U	**1.1**	**1.8**
Zinc	7440-66-6	25.14	**56,600**	**56,100**	**1,790**	**1,830**	**1,960**	**22.9**	**8.4 J**

Appendix G-4-24
Metals and Cyanide Results for Surface Water Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Surface Water ESV (µg/L)	Location ID	LVR-209	LVR-211	LVR-401	LVR-401	LVR-401	LVR-401	LVR-401	LVR-401
			Sample ID	OU1-SW-LVR209-071031	OU1-SW-LVR211-071031	OU1-SW-LVR401C-0908	OU1-GW-MW404-0908	OU1-GW-MW404-0908	OU1-SW-LVR401C-0908	OU1-SW-LVR401E-0908	OU1-SW-LVR401E-0908
			Date	10/31/2007	10/31/2007	8/11/2009	8/11/2009	8/11/2009	8/11/2009	8/11/2009	8/11/2009
			Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
			Total or Dissolved	T	T	D	D	T	T	D	T
Aluminum	7429-90-5	87		**2,440**	**5,050**	14.9 U	**32.1 J**	**670**	**728**	14.9 U	**733**
Antimony	7440-36-0	320		7.9 U	7.9 U	0.46 U	0.46 U	3.9 U	3.9 U	0.46 U	3.9 U
Arsenic	7440-38-2	190		**0.88 J**	**1.5**	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U
Barium	7440-39-3	220		**84.7**	**91.9**	**84.4**	**83**	**86**	**88.5**	**84.4**	**88.7**
Beryllium	7440-41-7	3.6		0.075 U	**0.12 J**	0.14 U	0.14 U	0.14 U	**0.17**	0.14 U	0.14 U
Cadmium	7440-43-9	1.18		0.11 U	**0.48 J**	0.16 U	**0.17 J**	**0.31 J**	**0.29 J**	0.16 U	**0.26 J**
Chromium	7440-47-3	11		**3.0 J**	**5**	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Cobalt	7440-48-4	24.00		**0.88 J**	**2**	**0.32 J**	**0.39 J**	**0.56 J**	**0.52 J**	**0.40 J**	**0.50 J**
Copper	7440-50-8	13.26		**2.2 J**	**3.8 J**	5.0 U	5.0 U	**1.9 J**	**2.1 J**	5.0 U	**2.1 J**
Cyanide	57-12-5	5.20		10.0 U	NM	NM	NM	NM	NM	NM	NM
Iron	7439-89-6	1,000		**1,580**	**3,430**	100 U	31.7 U	**597**	**599**	31.7 U	**601**
Lead	7439-92-1	19.35		**0.77 J**	**2.9**	0.13 U	0.13 U	5.0 U	**1.1 J**	0.13 U	5.0 U
Manganese	7439-96-5			**37.1**	**69.3**	**39.0 J+**	**38.3 J+**	**64**	**64.7**	**39.4 J+**	**62.7**
Mercury	7439-97-6	1.10		0.014 U	0.014 U	0.019 U	0.019 U	0.019 U	0.019 U	0.019 U	0.019 U
Nickel	7440-02-0	5.82		**5.7**	**8.2**	**4.2 J**	**4.1 J**	**4.5 J**	**3.9 J**	**4.1 J**	**4.1 J**
Selenium	7782-49-2	5.00		**1.3**	**1.4**	**0.67 J**	**0.72 J**	**0.68 J**	**0.58 J**	**0.53 J**	**0.65 J**
Silver	7440-22-4	0.12		0.74 U	0.74 U	0.83 U	0.83 U	0.83 U	0.83 U	0.83 U	0.83 U
Thallium	7440-28-0	15.00		0.042 U	**0.043 J**	0.51 U	0.51 U	0.51 U	**0.72 J**	0.51 U	0.51 U
Vanadium	7440-62-2	12.00		**1.7**	**4.3**	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U
Zinc	7440-66-6	25.14		**9.8 J**	**45.6**	**97.8**	**102**	**139**	**145**	**99.2**	**137**

Analyte	CAS #	Surface Water ESV (µg/L)	Location ID	LVR-401	LVR-401	LVR-402	LVR-402	LVR-402	LVR-402	LVR-402	LVR-402
			Sample ID	OU1-SW-LVR401W-0908	OU1-SW-LVR401W-0908	OU1-SW-LVR402C-0908	OU1-SW-LVR402C-0908	OU1-SW-LVR402E-0908	OU1-SW-LVR402E-0908	OU1-SW-LVR402W-0908	OU1-SW-LVR402W-0908
			Date	8/11/2009	8/11/2009	8/12/2009	8/12/2009	8/12/2009	8/12/2009	8/12/2009	8/12/2009
			Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
			Total or Dissolved	D	T	D	T	D	T	D	T
Aluminum	7429-90-5	87		14.9 U	**816**	14.9 U	**531**	14.9 U	**673**	14.9 U	**504**
Antimony	7440-36-0	320		0.46 U	3.9 U	0.93 U	3.9 U	0.93 U	3.9 U	0.93 U	3.9 U
Arsenic	7440-38-2	190		1.3 U	1.3 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Barium	7440-39-3	220		**83.9**	**85.4**	**86.3**	**90.2**	**86.5**	**94.3**	**85.9**	**91**
Beryllium	7440-41-7	3.6		0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U
Cadmium	7440-43-9	1.18		0.16 U	**0.22 J**	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
Chromium	7440-47-3	11		10.0 U	10.0 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
Cobalt	7440-48-4	24.00		**0.31 J**	**0.37 J**	**0.65 J**	**0.62 J**	**0.49 J**	**0.72 J**	**0.50 J**	**0.65 J**
Copper	7440-50-8	13.26		5.0 U	**1.8 J**	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Cyanide	57-12-5	5.20		NM	NM	NM	NM	NM	NM	NM	NM
Iron	7439-89-6	1,000		31.7 U	**674**	31.7 U	**626**	31.7 U	**755**	31.7 U	**604**
Lead	7439-92-1	19.35		0.13 U	5.0 U	0.26 U	**1.2**	10.0 U	**1.5**	0.26 U	**1.3**
Manganese	7439-96-5			**39.1 J+**	**65.9**	**37.9**	**67.9**	**39.8**	**74.8**	**37.5**	**65.6**
Mercury	7439-97-6	1.10		0.019 U	0.019 U	0.019 U	0.019 U	0.019 U	0.019 U	**0.022 J**	0.019 U
Nickel	7440-02-0	5.82		**3.5 J**	**3.8 J**	**5**	**4.2**	**4.2**	**4.6**	**4.4**	**4.1**
Selenium	7782-49-2	5.00		**0.64 J**	**0.62 J**	0.56 U	0.56 U	0.56 U	0.56 U	0.56 U	0.56 U
Silver	7440-22-4	0.12		0.83 U	0.83 U	0.83 U	0.83 U	0.83 U	0.83 U	0.83 U	0.83 U
Thallium	7440-28-0	15.00		0.51 U	0.51 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vanadium	7440-62-2	12.00		2.7 U	2.7 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U
Zinc	7440-66-6	25.14		**102**	**141**	**130**	**180**	**130**	**186**	**157**	**176**

Appendix G-4-24
Metals and Cyanide Results for Surface Water Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID / Sample ID / Date / Units / Total or Dissolved / Surface Water ESV (µg/L)	LVR-403 OU1-SW-LVR403C-0908 8/12/2009 µg/L D	LVR-403 OU1-SW-LVR403C-0908 8/12/2009 µg/L T	LVR-403 OU1-SW-LVR403E-0908 8/12/2009 µg/L D	LVR-403 OU1-SW-LVR403E-0908 8/12/2009 µg/L T	LVR-403 OU1-SW-LVR403W-0908 8/12/2009 µg/L D	LVR-403 OU1-SW-LVR403W-0908 8/12/2009 µg/L T	LVR-404 OU1-SW-LVR404C-0908 8/12/2009 µg/L D
Aluminum	7429-90-5	87	14.9 U	**465**	14.9 U	**451**	14.9 U	**549**	14.9 U
Antimony	7440-36-0	320	0.93 U	3.9 U	0.93 U	3.9 U	0.93 U	3.9 U	0.93 U
Arsenic	7440-38-2	190	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Barium	7440-39-3	220	**88.7**	**89.2**	**84.4**	**89.7**	**89.6**	**90.2**	**82.1**
Beryllium	7440-41-7	3.6	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U
Cadmium	7440-43-9	1.18	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
Chromium	7440-47-3	11	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
Cobalt	7440-48-4	24.00	**0.40 J**	**0.61 J**	**0.40 J**	**0.60 J**	**0.42 J**	**0.64 J**	**0.59 J**
Copper	7440-50-8	13.26	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Cyanide	57-12-5	5.20	NM	NM	NM	NM	NM	NM	NM
Iron	7439-89-6	1,000	31.7 U	**564**	31.7 U	**545**	31.7 U	**641**	31.7 U
Lead	7439-92-1	19.35	10.0 U	**1.2**	10.0 U	**1.4**	10.0 U	**1.4**	0.26 U
Manganese	7439-96-5		**40.6**	**67.7**	**41.8**	**66.9**	**42.7**	**70**	**34.6**
Mercury	7439-97-6	1.10	**0.044 J**	0.019 U	**0.039 J**	0.019 U	0.019 U	0.019 U	0.019 U
Nickel	7440-02-0	5.82	**3.8**	**4.1**	**3.8**	**4.3**	**4.1**	**4.3**	**4**
Selenium	7782-49-2	5.00	0.56 U	0.56 U	**0.67 J**	**0.79 J**	0.56 U	0.56 U	0.56 U
Silver	7440-22-4	0.12	0.83 U	0.83 U	0.83 U	0.83 U	0.83 U	0.83 U	0.83 U
Thallium	7440-28-0	15.00	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vanadium	7440-62-2	12.00	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U
Zinc	7440-66-6	25.14	**160**	**177**	**164**	**178**	**180**	**180**	**156**

Analyte	CAS #	Location ID / Sample ID / Date / Units / Total or Dissolved / Surface Water ESV (µg/L)	LVR-404 OU1-SW-LVR404C-0908 8/12/2009 µg/L T	LVR-404 OU1-SW-LVR404E-0908 8/12/2009 µg/L D	LVR-404 OU1-SW-LVR404E-0908 8/12/2009 µg/L T	LVR-404 OU1-SW-LVR404W-0908 8/12/2009 µg/L D	LVR-404 OU1-SW-LVR404W-0908 8/12/2009 µg/L T	LVR-405 OU1-SW-LVR405C-0908 8/13/2009 µg/L D	LVR-405 OU1-SW-LVR405C-0908 8/13/2009 µg/L T
Aluminum	7429-90-5	87	**557**	14.9 U	**483**	14.9 U	**719**	**72.4 J**	**502**
Antimony	7440-36-0	320	3.9 U	0.93 U	3.9 U	0.93 U	3.9 U	0.93 U	3.9 U
Arsenic	7440-38-2	190	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Barium	7440-39-3	220	**88.9**	**85.8**	**90.4**	**87.3**	**91.1**	**82.5**	**82.3**
Beryllium	7440-41-7	3.6	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U
Cadmium	7440-43-9	1.18	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
Chromium	7440-47-3	11	1.8 U	**9.7 J**	1.8 U	1.8 U	10.0 U	1.8 U	1.8 U
Cobalt	7440-48-4	24.00	**0.88 J**	**0.47 J**	**0.74 J**	**0.51 J**	**0.75 J**	10.0 U	10.0 U
Copper	7440-50-8	13.26	10.0 U	10.0 U	10.0 U	10.0 U	**2.9 J+**	10.0 U	10.0 U
Cyanide	57-12-5	5.20	NM	NM	NM	NM	NM	NM	NM
Iron	7439-89-6	1,000	**610**	**19.8 J**	**598**	**17.8 J**	**797**	100 U	**539 J+**
Lead	7439-92-1	19.35	**1.4**	10.0 U	**1.4**	10.0 U	**1.6 J+**	0.26 U	10.0 U
Manganese	7439-96-5		**57.3**	**33.4**	**58.1**	**36.8**	**66.8**	**33.4 J+**	**52.7 J+**
Mercury	7439-97-6	1.10	0.019 U	0.019 U	0.019 U	0.019 U	0.019 U	**0.035 J**	**0.019 J**
Nickel	7440-02-0	5.82	**4.2**	**8.7**	**4.1**	**4.4**	**4.6**	10.0 U	10.0 U
Selenium	7782-49-2	5.00	0.56 U	**0.78 J**	**0.78 J**	**0.96 J**	**0.80 J**	**0.76 J**	**0.67 J**
Silver	7440-22-4	0.12	0.83 U	0.83 U	0.83 U	0.83 U	**0.93 J**	0.83 U	0.83 U
Thallium	7440-28-0	15.00	1.0 U	10.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vanadium	7440-62-2	12.00	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U
Zinc	7440-66-6	25.14	**218**	**122**	**194**	**153**	**214**	**39.9 J+**	**53.5 J+**

Appendix G-4-24
Metals and Cyanide Results for Surface Water Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Surface Water ESV (µg/L)	Location ID Sample ID Date Units Total or Dissolved	LVR-405 OU1-SW-LVR405E-0908 8/13/2009 µg/L D	LVR-405 OU1-SW-LVR405E-0908 8/13/2009 µg/L T	LVR-405 OU1-SW-LVR405W-0908 8/13/2009 µg/L D	LVR-405 OU1-SW-LVR405W-0908 8/13/2009 µg/L T	LVR-408 OU1-SW-LVR408-0908 8/14/2009 µg/L D	LVR-408 OU1-SW-LVR408-0908 8/14/2009 µg/L T	Section_Line_DP Section Line 11/8/1994 µg/L T	Section_Line_DP Section Line DP 11/8/1994 µg/L T
Aluminum	7429-90-5	87		14.9 U	**475**	14.9 U	**464**	14.9 U	**702**	NM	NM
Antimony	7440-36-0	320		0.93 U	3.9 U	0.93 U	3.9 U	0.93 U	3.9 U	NM	NM
Arsenic	7440-38-2	190		2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	NM	NM
Barium	7440-39-3	220		**81.2**	**86.2**	**83.6**	**84.4**	**82.9 J+**	**87.0 J+**	**113 J**	**113 J**
Beryllium	7440-41-7	3.6		0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	NM	NM
Cadmium	7440-43-9	1.18		0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	3.0 U	3.0 U
Chromium	7440-47-3	11		1.8 U	**2.3 J**	**2.1 J**	**2.0 J**	10.0 U	**23.5**	5.0 U	5.0 U
Cobalt	7440-48-4	24.00		10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	NM	NM
Copper	7440-50-8	13.26		10.0 U	10.0 U	10.0 U	10.0 U	0.0 J	10.0 U	NM	NM
Cyanide	57-12-5	5.20		NM	NM	NM	NM	NM	NM	**8**	**10**
Iron	7439-89-6	1,000		100 U	**438 J+**	100 U	**508 J+**	100 U	**735**	**3,180**	**3,540**
Lead	7439-92-1	19.35		0.26 U	10.0 U	0.26 U	10.0 U	10.0 U	10.0 U	**7.6**	**2.2 J**
Manganese	7439-96-5			**33.5 J+**	**49.3 J+**	**31.0 J+**	**51.0 J+**	**34.3 J+**	**55.0 J+**	**1,240**	**1,770**
Mercury	7439-97-6	1.10		**0.031 J**	**0.020 J**	0.019 U	0.019 U	**0.026 J**	0.019 UJ	0.20 U	0.20 U
Nickel	7440-02-0	5.82		10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	20.0 U	**28.4 J**
Selenium	7782-49-2	5.00		**0.97 J**	**0.83 J**	**0.79 J**	**0.68 J**	0.56 U	0.56 U	NM	NM
Silver	7440-22-4	0.12		0.83 U	**0.95 J**	**1.0 J**	0.83 U	0.83 U	0.83 U	NM	NM
Thallium	7440-28-0	15.00		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NM	NM
Vanadium	7440-62-2	12.00		5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	5.5 U	NM	NM
Zinc	7440-66-6	25.14		**39.7 J+**	**35.9 J+**	**33.9 J+**	**49.0 J+**	20.0 U	20.0 U	**88.7**	**116**

Analyte	CAS #	Surface Water ESV (µg/L)	Location ID Sample ID Date Units Total or Dissolved	LVR-213 OU1-SW-LVR213-071031 10/31/2007 µg/L T	LVR-214 OU1-SW-LVR214-071031 10/31/2007 µg/L T	LVR-409 OU1-SW-LVR409-0908 8/14/2009 µg/L D	LVR-409 OU1-SW-LVR409-0908 8/14/2009 µg/L T
Aluminum	7429-90-5	87		**331**	**1,380**	14.9 U	**769**
Antimony	7440-36-0	320		7.9 U	7.9 U	0.93 U	3.9 U
Arsenic	7440-38-2	190		**0.48 J**	**0.53 J**	2.5 U	2.5 U
Barium	7440-39-3	220		**81.5**	**78.6**	**75.8 J+**	**80.3 J+**
Beryllium	7440-41-7	3.6		0.075 U	0.075 U	0.14 U	0.14 U
Cadmium	7440-43-9	1.18		0.11 U	0.11 U	10.0 U	0.33 U
Chromium	7440-47-3	11		**1.5 J**	**2.4 J**	10.0 U	10.0 U
Cobalt	7440-48-4	24.00		**0.49 J**	**0.64 J**	10.0 U	10.0 U
Copper	7440-50-8	13.26		**1.6 J**	**1.6 J**	10.0 U	10.0 U
Cyanide	57-12-5	5.20		10.0 U	10.0 U	NM	NM
Iron	7439-89-6	1,000		**333**	**904**	100 U	**710**
Lead	7439-92-1	19.35		**0.25 J**	**0.35 J**	10.0 U	0.99 J
Manganese	7439-96-5			**20.3**	**21.7**	**25.7 J+**	**46.1 J+**
Mercury	7439-97-6	1.10		0.014 U	**0.015 J**	**0.032 J**	0.019 UJ
Nickel	7440-02-0	5.82		**4.3**	**4.8**	10.0 U	**4.7 J+**
Selenium	7782-49-2	5.00		**0.78 J**	**1.0**	20.0 U	20.0 U
Silver	7440-22-4	0.12		0.74 U	0.74 U	0.83 U	0.83 U
Thallium	7440-28-0	15.00		0.042 U	0.042 U	1.0 U	1.0 U
Vanadium	7440-62-2	12.00		0.098 U	**0.48 J**	5.5 U	5.5 U
Zinc	7440-66-6	25.14		**4.7 J**	**4.9 J**	20.0 U	20.0 U

Notes:

	Exceedance of Surface Water Ecological Screening Value (ESV)
1,000	Bold indicates a detection
J+	The analyte was positively identified; however, the associated numerical value is likely to be higher than the
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation
NM	Not Measured
T	Total
D	Dissolved

Appendix G-4-25
VOC Results for Surface Water Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Total or Dissolved Surface Water ESV (µg/L)	LVR-201 OU1-SW-LV201-071029 10/29/2007 µg/L T	LVR-201 OU1-SW-LV406-071029 10/29/2007 µg/L T	LVR-205 OU1-SW-LVR205-071030 10/30/2007 µg/L T	LVR-209 OU1-SW-LVR209-071031 10/31/2007 µg/L T	LVR-213 OU1-SW-LVR213-071031 10/31/2007 µg/L T	LVR-214 OU1-SW-LVR214-071031 10/31/2007 µg/L T
1,1,1-Trichloroethane	71-55-6	390	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	79-34-5	140	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	79-00-5	4,400	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	75-34-3	2,000	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	75-35-4	240	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2,4-Trichlorobenzene	120-82-1	72	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane	96-12-8	190	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2-Dibromoethane	106-93-4		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	95-50-1	170	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	107-06-2	4,500	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	78-87-5	380	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	541-73-1	200	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	106-46-7	620	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Butanone (MEK)	78-93-3	26,000	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Hexanone	591-78-6	950	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone	108-10-1	1,400	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	67-64-1	120,000	10.0 U	10.0 U	**2.0 J**	10.0 U	**1.7 J**	**2.7 J**
Benzene	71-43-2	860	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	75-25-2	230	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	74-83-9	16	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Carbon disulfide	75-15-0	20	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	56-23-5	280	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	108-90-7	79	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	75-00-3	1,000	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Chloroform	67-66-3	150	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloromethane	74-87-3	1,300	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
cis-1,2-Dichloroethene	156-59-2	970	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	10061-01-5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	110-82-7		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloromethane	124-48-1		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorobromomethane	75-27-4	1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dichloromethane (Methylene c	75-09-2	1,400	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethyl benzene	100-41-4	14	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Freon-11	75-69-4		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Freon-113	76-13-1		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Freon-12	75-71-8		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Isopropylbenzene	98-82-8		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
m&p-Xylene	179601-23-1	360	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methyl acetate	79-20-9		10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Methyl tertbutyl ether (MTBE)	1634-04-4	5,400	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methylcyclohexane	108-87-2		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
o-Xylene	95-47-6	360	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	100-42-5	200	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	127-18-4	150	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	108-88-3	600	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Appendix G-4-25
VOC Results for Surface Water Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Total or Dissolved Surface Water ESV (µg/L)	LVR-201 OU1-SW-LV201-071029 10/29/2007 µg/L T	LVR-201 OU1-SW-LV406-071029 10/29/2007 µg/L T	LVR-205 OU1-SW-LVR205-071030 10/30/2007 µg/L T	LVR-209 OU1-SW-LVR209-071031 10/31/2007 µg/L T	LVR-213 OU1-SW-LVR213-071031 10/31/2007 µg/L T	LVR-214 OU1-SW-LVR214-071031 10/31/2007 µg/L T
trans-1,2-Dichloroethene	156-60-5	970	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	10061-02-6		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	79-01-6	940	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl chloride	75-01-4	1,700	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Notes:

1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is
U	The analyte was analyzed for, but was not detected above the reported
T	Total
D	Dissolved

Appendix G-4-26
SVOC Results for Surface Water Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Total or Dissolved Surface	LVR-201 OU1-SW-LV201-071029 10/29/2007 µg/L T	LVR-201 OU1-SW-LV406-071029 10/29/2007 µg/L T	LVR-205 OU1-SW-LVR205-071030 10/30/2007 µg/L T	LVR-209 OU1-SW-LVR209-071031 10/31/2007 µg/L T	LVR-213 OU1-SW-LVR213-071031 10/31/2007 µg/L T	LVR-214 OU1-SW-LVR214-071031 10/31/2007 µg/L T
1,1-Biphenyl	92-52-4	NA	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
2,2'-Oxybis(1-Chloropropane)	108-60-1	NA	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
2,4,5-Trichlorophenol	95-95-4	6.3	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
2,4,6-Trichlorophenol	88-06-2	6.3	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
2,4-Dichlorophenol	120-83-2	83	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
2,4-Dimethylphenol	105-67-9	220	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
2,4-Dinitrophenol	51-28-5	4.1	47.0 U	47.0 U	47.0 U	50.0 U	48.0 U	47.0 U
2,4-Dinitrotoluene	121-14-2	320	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
2,6-Dinitrotoluene	606-20-2	150	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
2-Chloronaphthalene	91-58-7	30	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
2-Chlorophenol	95-57-8	41	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
2-Methylnaphthalene	91-57-6	12	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
2-Methylphenol	95-48-7	370	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
2-Nitroaniline	88-74-4	200	47.0 U	47.0 U	47.0 U	50.0 U	48.0 U	47.0 U
2-Nitrophenol	88-75-5	540	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
3,3'-Dichlorobenzidine	91-94-1	4.5	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
3-Nitroaniline	99-09-2	120	47.0 U	47.0 U	47.0 U	50.0 U	48.0 U	47.0 U
4,6-Dinitro-2-methylphenol	534-52-1	2.3	47.0 U	47.0 U	47.0 U	50.0 U	48.0 U	47.0 U
4-Bromophenyl-phenylether	101-55-3	2.9	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
4-Chloro-3-methylphenol	59-50-7	25	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
4-Chloroaniline	106-47-8	0.2	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
4-Chlorophenyl-phenylether	7005-72-3	2.9	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
4-Methylphenol	106-44-5	120	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
4-Nitroaniline	100-01-6	120	47.0 U	47.0 U	47.0 U	50.0 U	48.0 U	47.0 U
4-Nitrophenol	100-02-7	1,900	47.0 U	47.0 U	47.0 U	50.0 U	48.0 U	47.0 U
Acenaphthene	83-32-9	62	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Acenaphthylene	208-96-8	15	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Acetophenone	98-86-2	NA	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Anthracene	120-12-7	0.53	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Atrazine	1912-24-9	9	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Benzaldehyde	100-52-7	14,000	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Benzo(a)anthracene	56-55-3	0.025	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Benzo(a)pyrene	50-32-8	0.014	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Benzo(b)fluoranthene	205-99-2	9.07	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Benzo(g,h,i)perylene	191-24-2	7.64	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Benzo(k)fluoranthene	207-08-9	0.014	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
bis(2-Chloroethoxy) methane	111-91-1	NA	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
bis(2-Chloroethyl) ether	111-44-4	1,900	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
bis(2-Ethylhexyl) phthalate	117-81-7	380	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Butylbenzylphthalate	85-68-7	23	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Caprolactam	105-60-2	NA	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Carbazole	86-74-8	7.4	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Chrysene	218-01-9	0.014	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Dibenzo(a,h)anthracene	53-70-3	0.014	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Dibenzofuran	132-64-9	15	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Diethylphthalate	84-66-2	250	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Dimethylphthalate	131-11-3	260	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Di-n-butylphthalate	84-74-2	48	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Di-n-octylphthalate	117-84-0	30	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Fluoranthene	206-44-0	1.8	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Fluorene	86-73-7	16	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Hexachlorobenzene	118-74-1	0.0003	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Hexachlorobutadiene	87-68-3	2.8	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Hexachlorocyclopentadiene	77-47-4	0.1	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Hexachloroethane	67-72-1	31	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U

Appendix G-4-26
SVOC Results for Surface Water Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Total or Dissolved Surface	LVR-201 OU1-SW-LV201-071029 10/29/2007 µg/L T	LVR-201 OU1-SW-LV406-071029 10/29/2007 µg/L T	LVR-205 OU1-SW-LVR205-071030 10/30/2007 µg/L T	LVR-209 OU1-SW-LVR209-071031 10/31/2007 µg/L T	LVR-213 OU1-SW-LVR213-071031 10/31/2007 µg/L T	LVR-214 OU1-SW-LVR214-071031 10/31/2007 µg/L T
Indeno(1,2,3-cd)pyrene	193-39-5	4.31	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Isophorone	78-59-1	960	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Naphthalene	91-20-3	68	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Nitrobenzene	98-95-3	8,500	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
N-Nitroso-di-n-propylamine	621-64-7	NA	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
N-	86-30-6	NA	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Pentachlorophenol	87-86-5	13	47.0 U	47.0 U	47.0 U	50.0 U	48.0 U	47.0 U
Phenanthrene	85-01-8	3.7	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Phenol	108-95-2	180	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U
Pyrene	129-00-0	0.3	9.4 U	9.4 U	9.4 U	10.0 U	9.6 U	9.4 U

Notes:

U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
T	Total
NA	None available

Appendix G-4-27
PCB Results for Surface Water Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Total or Dissolved Surface Water ESV (µg/L)	LVR-201 OU1-SW-LV201-071029 10/29/2007 µg/L T	LVR-201 OU1-SW-LV406-071029 10/29/2007 µg/L T	LVR-205 OU1-SW-LVR205-071030 10/30/2007 µg/L T	LVR-209 OU1-SW-LVR209-071031 10/31/2007 µg/L T	LVR-213 OU1-SW-LVR213-071031 10/31/2007 µg/L T	LVR-214 OU1-SW-LVR214-071031 10/31/2007 µg/L T
Aroclor 1016	12674-11-2	0.014	1.1 U	1.0 U	0.94 U	1.0 U	0.96 U	0.94 U
Aroclor 1221	11104-28-2	0.014	2.1 U	2.1 U	1.9 U	2.0 U	1.9 U	1.9 U
Aroclor 1232	11141-16-5	0.014	1.1 U	1.0 U	0.94 U	1.0 U	0.96 U	0.94 U
Aroclor 1242	53469-21-9	0.014	1.1 U	1.0 U	0.94 U	1.0 U	0.96 U	0.94 U
Aroclor 1248	12672-29-6	0.014	1.1 U	1.0 U	0.94 U	1.0 U	0.96 U	0.94 U
Aroclor 1254	11097-69-1	0.014	1.1 U	1.0 U	0.94 U	1.0 U	0.96 U	0.94 U
Aroclor 1260	11096-82-5	0.014	1.1 U	1.0 U	0.94 U	1.0 U	0.96 U	0.94 U

Notes:

U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
T	Total

Appendix G-4-28
Pesticides Results for Surface Water Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Total or Dissolved Surface Water ESV (µg/L)	LVR-201 OU1-SW-LV201-071029 10/29/2007 µg/L T	LVR-201 OU1-SW-LV406-071029 10/29/2007 µg/L T	LVR-205 OU1-SW-LVR205-071030 10/30/2007 µg/L T	LVR-207 OU1-SW-LVR207-071030 10/30/2007 µg/L T	LVR-209 OU1-SW-LVR209-071031 10/31/2007 µg/L T	LVR-213 OU1-SW-LVR213-071031 10/31/2007 µg/L T	LVR-214 OU1-SW-LVR214-071031 10/31/2007 µg/L T
4,4'-DDD	72-54-8		0.11 U	0.10 U	0.094 U	0.095 U	0.10 U	0.096 U	0.094 U
4,4'-DDE	72-55-9	4.51E-09	0.11 U	0.10 U	0.094 U	0.095 U	0.10 U	0.096 U	0.094 U
4,4'-DDT	50-29-3	0.000001	0.11 U	0.10 U	0.094 U	0.095 U	0.10 U	0.096 U	0.094 U
Aldrin	309-00-2	0.017	0.053 U	0.052 U	0.047 U	0.048 U	0.050 U	0.048 U	0.047 U
alpha-BHC	319-84-6	2.5	0.053 U	0.052 U	0.047 U	0.048 U	0.050 U	0.048 U	0.047 U
alpha-Chlordane	5103-71-9	0.0043	0.053 U	0.052 U	0.047 U	0.048 U	0.050 U	0.048 U	0.047 U
beta-BHC	319-85-7	0.495	0.053 U	0.052 U	0.047 U	0.048 U	0.050 U	0.048 U	0.047 U
delta-BHC	319-86-8	667	0.053 U	0.052 U	0.047 U	0.048 U	0.050 U	0.048 U	0.047 U
Dieldrin	60-57-1	0.056	0.11 U	0.10 U	0.094 U	0.095 U	0.10 U	0.096 U	0.094 U
Endosulfan I	959-98-8	0.0056	0.053 U	0.052 U	0.047 U	0.048 U	0.050 U	0.048 U	0.047 U
Endosulfan II	33213-65-9	0.0056	0.11 U	0.10 U	0.094 U	0.095 U	0.10 U	0.096 U	0.094 U
Endosulfan sulfate	1031-07-8	0.0056	0.11 U	0.10 U	0.094 U	0.095 U	0.10 U	0.096 U	0.094 U
Endrin	72-20-8	0.033	0.11 U	0.10 U	0.094 U	0.095 U	0.10 U	0.096 U	0.094 U
Endrin Aldehyde	7421-93-4	0.033	0.11 U	0.10 U	0.094 U	0.095 U	0.10 U	0.096 U	0.094 U
Endrin ketone	53494-70-5	0.033	0.11 U	0.10 U	0.094 U	0.095 U	0.10 U	0.096 U	0.094 U
gamma-BHC (Lindane)	58-89-9	0.95	0.053 U	0.052 U	0.047 U	0.048 U	0.050 U	0.048 U	0.047 U
gamma-Chlordane	5566-34-7	0.0043	0.053 U	0.052 U	0.047 U	0.048 U	0.050 U	0.048 U	0.047 U
Heptachlor	76-44-8	0.0038	0.053 U	0.052 U	0.047 U	0.048 U	0.050 U	0.048 U	0.047 U
Heptachlor epoxide	1024-57-3	0.0038	0.053 U	0.052 U	0.047 U	0.048 U	0.050 U	0.048 U	0.047 U
Methoxychlor	72-43-5	0.02	0.53 U	0.52 U	0.47 U	0.48 U	0.50 U	0.48 U	0.47 U
Toxaphene	8001-35-2	0.0002	1.1 U	1.0 U	0.94 U	0.95 U	1.0 U	0.96 U	0.94 U

Notes:

U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
T	Total

Appendix G-4-29
Other Inorganics Results for Surface Water Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Total or Dissolved	5thstbridge 5th St. Bridge 34,646 µg/L T	ASO-411 OU1-SW-ASO411-0908 8/11/2009 µg/L D	ASO-411 OU1-SW-ASO411-0908 8/11/2009 µg/L T	ASO-411 OU1-SW-ASO411-090812 8/12/2009 µg/L D	ASO-411 OU1-SW-ASO411-090812 8/12/2009 µg/L T	ASO-411 OU1-SW-ASO411-090813 8/13/2009 µg/L D	ASO-411 OU1-SW-ASO411-090813 8/13/2009 µg/L T
Bicarbonate	71-52-3		**246,000**	NM	NM	NM	NM	NM	NM
Calcium	7440-70-2		NM	**469,000**	**455,000**	**444,000**	**475,000**	**446,000**	**542,000**
Carbonate	3812-32-6		**3,050**	NM	NM	NM	NM	NM	NM
Magnesium	7439-95-4		NM	**55,700**	**56,100**	**57,700**	**58,700**	**55,900**	**53,800**
Potassium	7440-09-7		NM	**26,600**	**26,000**	**24,300**	**24,900**	**24,200**	**22,800**
Sodium	7440-23-5		NM	**33,900**	**32,200**	**32,600**	**33,800**	**32,600**	**31,200**
Sulfate	14808-79-8		**40,400**	NM	NM	NM	NM	NM	NM
Sulfide	18496-25-8		1,000 U	NM	NM	NM	NM	NM	NM

Analyte	CAS #	Location ID Sample ID Date Units Total or Dissolved	ASO-411 OU1-GW-MW404-090814 8/14/2009 µg/L D	ASO-411 OU1-GW-MW404-090814 8/14/2009 µg/L T	ASO-411 OU1-SW-ASO411-090814 8/14/2009 µg/L D	ASO-411 OU1-SW-ASO411-090814 8/14/2009 µg/L T	ASO-411 OU1-SW-AS0411-090817 8/17/2009 µg/L D	ASO-411 OU1-SW-AS0411-090817 8/17/2009 µg/L T	ASO-411 OU1-SW-AS0411-090818 8/18/2009 µg/L D
Bicarbonate	71-52-3		NM	NM	NM	NM	NM	NM	NM
Calcium	7440-70-2		1,000 U	**426,000 J+**	**419,000 J+**	**40,500 J+**	**423,000**	**474,000**	**445,000**
Carbonate	3812-32-6		NM	NM	NM	NM	NM	NM	NM
Magnesium	7439-95-4		9.8 UJ	**59,700 J+**	**60,600 J+**	**60,000 J+**	**55,900**	**58,300**	**59,900**
Potassium	7440-09-7		**78.7 J**	**23,500 J+**	**23,200 J+**	**22,900 J+**	**23,300**	**23,800**	**23,600**
Sodium	7440-23-5		1,000 U	**30,900 J+**	**30,500 J+**	**30,200 J+**	**31,500**	**31,700**	**31,600**
Sulfate	14808-79-8		NM	NM	NM	NM	NM	NM	NM
Sulfide	18496-25-8		NM	NM	NM	NM	NM	NM	NM

Appendix G-4-29
Other Inorganics Results for Surface Water Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID / Sample ID / Date / Units / Total or Dissolved	ASO-411 OU1-SW-AS0411-090818 8/18/2009 µg/L T	ASO-411 OU1-SW-AS0411-090820 8/20/2009 µg/L T	ASO-411 OU1-SW-ASO411-090820 DISSOLVED 8/20/2009 µg/L D	CSO-410 OU1-SW-CS0410-0908 8/11/2009 µg/L D	CSO-410 OU1-SW-CS0410-0908 8/11/2009 µg/L T	CSO-410 OU1-SW-CS0410-090810 8/10/2009 µg/L D	CSO-410 OU1-SW-CS0410-090810 8/10/2009 µg/L T
Bicarbonate	71-52-3		NM	NM	NM	NM	NM	NM	NM
Calcium	7440-70-2		**439,000**	**463,000**	**429,000**	**500,000**	**476,000**	**474,000**	**485,000**
Carbonate	3812-32-6		NM	NM	NM	NM	NM	NM	NM
Magnesium	7439-95-4		**59,700**	**60,000**	**58,900**	**55,800**	**57,500**	**54,300**	**56,300**
Potassium	7440-09-7		**24,900**	**25,100**	**24,100**	**54,100**	**51,800**	**50,600**	**51,000**
Sodium	7440-23-5		**33,500**	**33,600**	**32,200**	**49,900**	**47,900**	**47,000**	**47,400**
Sulfate	14808-79-8		NM	NM	NM	NM	NM	NM	NM
Sulfide	18496-25-8		NM	NM	NM	NM	NM	NM	NM

Analyte	CAS #	Location ID / Sample ID / Date / Units / Total or Dissolved	CSO-410 OU1-SW-CS0410-090817 8/17/2009 µg/L D	CSO-410 OU1-SW-CS0410-090817 8/17/2009 µg/L T	LVR-201 OU1-SW-LV201-071029 10/29/2007 µg/L T	LVR-201 OU1-SW-LV406-071029 10/29/2007 µg/L T	LVR-203 OU1-SW-LVR203-071030 10/30/2007 µg/L T	LVR-205 OU1-SW-LVR205-071030 10/30/2007 µg/L T	LVR-207 OU1-SW-LVR207-071030 10/30/2007 µg/L T
Bicarbonate	71-52-3		NM	NM	NM	NM	NM	NM	NM
Calcium	7440-70-2		**425,000**	**419,000**	**88,200**	**88,900**	**87,600**	**81,900**	**89,200**
Carbonate	3812-32-6		NM	NM	NM	NM	NM	NM	NM
Magnesium	7439-95-4		**50,900**	**48,500**	**40,100**	**40,500**	**40,500**	**39,500**	**42,600**
Potassium	7440-09-7		**47,000**	**43,000**	**5,770**	**5,820**	**5,530**	**3,990**	**5,100**
Sodium	7440-23-5		**44,500**	**40,200**	**47,100**	**47,500**	**45,300**	**44,700**	**46,100**
Sulfate	14808-79-8		NM	NM	NM	NM	NM	NM	NM
Sulfide	18496-25-8		NM	NM	NM	NM	NM	NM	NM

Appendix G-4-29
Other Inorganics Results for Surface Water Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID / Sample ID / Date / Units / Total or Dissolved	LVR-209 OU1-SW-LVR209-071031 10/31/2007 µg/L T	LVR-211 OU1-SW-LVR211-071031 10/31/2007 µg/L T	LVR-401 OU1-SW-LVR401C-0908 8/11/2009 µg/L D	LVR-401 OU1-GW-MW404-0908 8/11/2009 µg/L D	LVR-401 OU1-GW-MW404-0908 8/11/2009 µg/L T	LVR-401 OU1-SW-LVR401C-0908 8/11/2009 µg/L T	LVR-401 OU1-SW-LVR401E-0908 8/11/2009 µg/L D
Bicarbonate	71-52-3		NM	NM	NM	NM	NM	NM	NM
Calcium	7440-70-2		**79,500**	**81,600**	**79,100**	**81,600**	**80,000**	**82,200**	**82,200**
Carbonate	3812-32-6		NM	NM	NM	NM	NM	NM	NM
Magnesium	7439-95-4		**39,100**	**39,700**	**34,600**	**34,300**	**34,700**	**34,300**	**35,100**
Potassium	7440-09-7		**5,030**	**5,860**	**3,510**	**3,620**	**3,660**	**3,820**	**3,640**
Sodium	7440-23-5		**53,300**	**53,500**	**36,100**	**37,600**	**36,600**	**37,300**	**37,500**
Sulfate	14808-79-8		NM	NM	NM	NM	NM	NM	NM
Sulfide	18496-25-8		NM	NM	NM	NM	NM	NM	NM

Analyte	CAS #	Location ID / Sample ID / Date / Units / Total or Dissolved	LVR-401 OU1-SW-LVR401E-0908 8/11/2009 µg/L T	LVR-401 OU1-SW-LVR401W-0908 8/11/2009 µg/L D	LVR-401 OU1-SW-LVR401W-0908 8/11/2009 µg/L T	LVR-402 OU1-SW-LVR402C-0908 8/12/2009 µg/L D	LVR-402 OU1-SW-LVR402C-0908 8/12/2009 µg/L T	LVR-402 OU1-SW-LVR402E-0908 8/12/2009 µg/L D	LVR-402 OU1-SW-LVR402E-0908 8/12/2009 µg/L T
Bicarbonate	71-52-3		NM	NM	NM	NM	NM	NM	NM
Calcium	7440-70-2		**82,900**	**81,000**	**79,700**	**81,600**	**82,300**	**81,800**	**83,000**
Carbonate	3812-32-6		NM	NM	NM	NM	NM	NM	NM
Magnesium	7439-95-4		**34,900**	**35,400**	**35,200**	**36,700**	**37,900**	**38,200**	**38,300**
Potassium	7440-09-7		**3,800**	**3,570**	**3,710**	**3,280**	**3,430**	**3,280**	**3,430**
Sodium	7440-23-5		**37,300**	**37,400**	**36,500**	**36,800**	**36,600**	**37,000**	**37,100**
Sulfate	14808-79-8		NM	NM	NM	NM	NM	NM	NM
Sulfide	18496-25-8		NM	NM	NM	NM	NM	NM	NM

Appendix G-4-29
Other Inorganics Results for Surface Water Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID / Sample ID / Date / Units / Total or Dissolved	LVR-402 / OU1-SW-LVR402W-0908 / 8/12/2009 / µg/L / D	LVR-402 / OU1-SW-LVR402W-0908 / 8/12/2009 / µg/L / T	LVR-403 / OU1-SW-LVR403C-0908 / 8/12/2009 / µg/L / D	LVR-403 / OU1-SW-LVR403C-0908 / 8/12/2009 / µg/L / T	LVR-403 / OU1-SW-LVR403E-0908 / 8/12/2009 / µg/L / D	LVR-403 / OU1-SW-LVR403E-0908 / 8/12/2009 / µg/L / T	LVR-403 / OU1-SW-LVR403W-0908 / 8/12/2009 / µg/L / D
Bicarbonate	71-52-3		NM	NM	NM	NM	NM	NM	NM
Calcium	7440-70-2		**80,200**	**80,700**	**82,200**	**82,300**	**85,600**	**80,400**	**86,300**
Carbonate	3812-32-6		NM	NM	NM	NM	NM	NM	NM
Magnesium	7439-95-4		**36,800**	**36,900**	**36,000**	**37,600**	**37,400**	**38,000**	**37,800**
Potassium	7440-09-7		**3,470**	**3,320**	**3,230**	**3,400**	**3,430**	**3,340**	**3,350**
Sodium	7440-23-5		**36,400**	**35,700**	**37,500**	**37,300**	**38,900**	**36,300**	**38,800**
Sulfate	14808-79-8		NM	NM	NM	NM	NM	NM	NM
Sulfide	18496-25-8		NM	NM	NM	NM	NM	NM	NM

Analyte	CAS #	Location ID / Sample ID / Date / Units / Total or Dissolved	LVR-403 / OU1-SW-LVR403W-0908 / 8/12/2009 / µg/L / T	LVR-404 / OU1-SW-LVR404C-0908 / 8/12/2009 / µg/L / D	LVR-404 / OU1-SW-LVR404C-0908 / 8/12/2009 / µg/L / T	LVR-404 / OU1-SW-LVR404E-0908 / 8/12/2009 / µg/L / D	LVR-404 / OU1-SW-LVR404E-0908 / 8/12/2009 / µg/L / T	LVR-404 / OU1-SW-LVR404W-0908 / 8/12/2009 / µg/L / D	LVR-404 / OU1-SW-LVR404W-0908 / 8/12/2009 / µg/L / T
Bicarbonate	71-52-3		NM	NM	NM	NM	NM	NM	NM
Calcium	7440-70-2		**81,800**	**85,000**	**84,200**	**77,800**	**85,100**	**83,400**	**82,800**
Carbonate	3812-32-6		NM	NM	NM	NM	NM	NM	NM
Magnesium	7439-95-4		**37,600**	**39,000**	**38,200**	**35,500**	**39,100**	**38,100**	**37,600**
Potassium	7440-09-7		**3,330**	**3,130**	**3,280**	**2,880**	**3,250**	**3,210**	**3,290**
Sodium	7440-23-5		**36,900**	**35,500**	**35,000**	**32,500**	**35,100**	**35,000**	**34,300**
Sulfate	14808-79-8		NM	NM	NM	NM	NM	NM	NM
Sulfide	18496-25-8		NM	NM	NM	NM	NM	NM	NM

Appendix G-4-29
Other Inorganics Results for Surface Water Samples Collected from the Little Vermilion River
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Total or Dissolved	LVR-405 OU1-SW-LVR405C-0908 8/13/2009 µg/L D	LVR-405 OU1-SW-LVR405C-0908 8/13/2009 µg/L T	LVR-405 OU1-SW-LVR405E-0908 8/13/2009 µg/L D	LVR-405 OU1-SW-LVR405E-0908 8/13/2009 µg/L T	LVR-405 OU1-SW-LVR405W-0908 8/13/2009 µg/L D	LVR-405 OU1-SW-LVR405W-0908 8/13/2009 µg/L T	LVR-408 OU1-SW-LVR408-0908 8/14/2009 µg/L D	LVR-408 OU1-SW-LVR408-0908 8/14/2009 µg/L T
Bicarbonate	71-52-3		NM	NM	NM	NM	NM	NM	NM	NM
Calcium	7440-70-2		**83,700**	**80,600**	**81,600**	**81,800**	**82,500**	**84,400**	**80,300 J+**	**79,600 J+**
Carbonate	3812-32-6		NM	NM	NM	NM	NM	NM	NM	NM
Magnesium	7439-95-4		**39,700**	**37,300**	**38,700**	**38,600**	**38,900**	**39,600**	**40,300 J+**	**39,500 J+**
Potassium	7440-09-7		**2,990**	**2,950**	**2,900**	**2,940**	**2,970**	**3,090**	**2,840 J+**	**2,880 J+**
Sodium	7440-23-5		**33,600**	**31,800**	**32,600**	**32,500**	**32,900**	**33,400**	**30,900 J+**	**29,500 J+**
Sulfate	14808-79-8		NM	NM	NM	NM	NM	NM	NM	NM
Sulfide	18496-25-8		NM	NM	NM	NM	NM	NM	NM	NM

Analyte	CAS #	Location ID Sample ID Date Units Total or Dissolved	Section_Line_DP Section Line 11/8/1994 µg/L T	Section_Line_DP Section Line DP 11/8/1994 µg/L T	LVR-213 OU1-SW-LVR213-071031 10/31/2007 µg/L T	LVR-214 OU1-SW-LVR214-071031 10/31/2007 µg/L T	LVR-409 OU1-SW-LVR409-0908 8/14/2009 µg/L D	LVR-409 OU1-SW-LVR409-0908 8/14/2009 µg/L T
Bicarbonate	71-52-3		**246,000**	**251,000**	NM	NM	NM	NM
Calcium	7440-70-2		NM	NM	**82,400**	**75,500**	**76,800 J+**	**76,800 J+**
Carbonate	3812-32-6		**3,190**	**3,330**	NM	NM	NM	NM
Magnesium	7439-95-4		NM	NM	**40,200**	**38,800**	**38,900 J+**	**38,600 J+**
Potassium	7440-09-7		NM	NM	**3,980**	**4,370**	**2,650 J+**	**2,830 J+**
Sodium	7440-23-5		NM	NM	**45,000**	**47,200**	**31,900 J+**	**31,900 J+**
Sulfate	14808-79-8		**38,600**	**39,100**	NM	NM	NM	NM
Sulfide	18496-25-8		1,000 U	1,000 U	NM	NM	NM	NM

Notes:

1,000	Bold indicates a detection
J+	The analyte was positively identified; however, the associated numerical value is likely to be higher than the concentration of the analyte in the sample due to bias attributable to matrix interference.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
NM	Not Measured
T	Total
D	Dissolved

Appendix G-4-3
SVOC Results for Shallow Soil Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (µg/Kg)	Location ID Sample ID Date Units Depth Industrial RSL (µg/Kg)	C-10 C-10 11/10/1993 µg/Kg 0'	SB-311 OU1-SS-SB311-0-1 10/3/2007 µg/Kg 0 - 1'	SB-315 OU1-SS-SB315-0-1 10/3/2007 µg/Kg 0 - 1'	SB-319 OU1-SS-SB319-0-1 10/3/2007 µg/Kg 0 - 1'	SSI-X102 SSI-X102 11/20/1991 µg/Kg 0'	SSI-X105 SSI-X105 11/20/1991 µg/Kg 0 - 0.667'	SSI-X207 SSI-X207 11/20/1991 µg/Kg 0 - 0.25'
1,1-Biphenyl	92-52-4	3,900,000	51,000,000	NM	420 U	380 U	400 U	NM	NM	NM
1,2,4-Trichlorobenzene	120-82-1	22,000	99,000	400 U	NM	NM	NM	430 U	420 U	410 U
1,2-Dichlorobenzene	95-50-1	1,900,000	9,800,000	400 U	NM	NM	NM	430 U	420 U	410 U
1,3-Dichlorobenzene	541-73-1	2,400	12,000	400 U	NM	NM	NM	430 U	420 U	410 U
1,4-Dichlorobenzene	106-46-7	2,400	12,000	400 U	NM	NM	NM	430 U	420 U	410 U
2,2'-Oxybis(1-Chloropropane)	108-60-1	4,600	22,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
2,4,5-Trichlorophenol	95-95-4	6,100,000	62,000,000	980 U	420 U	380 U	400 U	1,000 U	1,000 U	1,000 U
2,4,6-Trichlorophenol	88-06-2	44,000	160,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
2,4-Dichlorophenol	120-83-2	180,000	1,800,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
2,4-Dimethylphenol	105-67-9	1,200,000	12,000,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
2,4-Dinitrophenol	51-28-5	120,000	1,200,000	980 U	2,100 U	1,900 U	2,000 U	1,000 U	1,000 U	1,000 U
2,4-Dinitrotoluene	121-14-2	1,600	5,500	400 U	420 U	380 U	400 U	430 U	420 U	410 U
2,6-Dinitrotoluene	606-20-2	61,000	620,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
2-Chloronaphthalene	91-58-7	6,300,000	82,000,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
2-Chlorophenol	95-57-8	390,000	5,100,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
2-Methylnaphthalene	91-57-6	310,000	4,100,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
2-Methylphenol	95-48-7	3,100,000	31,000,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
2-Nitroaniline	88-74-4	610,000	6,000,000	980 U	2,100 U	1,900 U	2,000 U	1,000 U	1,000 U	1,000 U
2-Nitrophenol	88-75-5	120,000	1,200,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
3,3'-Dichlorobenzidine	91-94-1	1,100	3,800	400 U	420 U	380 U	400 U	430 U	420 U	410 U
3-Nitroaniline	99-09-2	24,000	86,000	980 U	2,100 U	1,900 U	2,000 U	1,000 U	1,000 U	1,000 U
4,6-Dinitro-2-methylphenol	534-52-1	6,100	62,000	980 U	2,100 U	1,900 U	2,000 U	1,000 U	1,000 U	1,000 U
4-Bromophenyl-phenylether	101-55-3	7,800	100,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
4-Chloro-3-methylphenol	59-50-7	6,100,000	62,000,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
4-Chloroaniline	106-47-8	2,400	8,600	400 U	420 U	380 U	400 U	430 U	420 U	410 U
4-Chlorophenyl-phenylether	7005-72-3	7,800	100,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
4-Methylphenol	106-44-5	310,000	3,100,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
4-Nitroaniline	100-01-6	24,000	86,000	980 U	2,100 U	1,900 U	2,000 U	1,000 U	1,000 U	1,000 U
4-Nitrophenol	100-02-7	120,000	1,200,000	980 U	2,100 U	1,900 U	2,000 U	1,000 U	1,000 U	1,000 U
Acenaphthene	83-32-9	3,400,000	33,000,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
Acenaphthylene	208-96-8	3,400,000	33,000,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
Acetophenone	98-86-2	7,800,000	100,000,000	NM	420 U	380 U	400 U	NM	NM	NM
Anthracene	120-12-7	17,000,000	170,000,000	400 U	**89.0 J**	380 U	400 U	430 U	420 U	410 U
Atrazine	1912-24-9	2,100	7,500	NM	420 U	380 U	400 U	NM	NM	NM
Benzaldehyde	100-52-7	7,800,000	100,000,000	NM	420 U	380 U	400 U	NM	NM	NM
Benzo(a)anthracene	56-55-3	150	2,100	400 U	**740**	**110 J**	400 U	**720**	420 U	410 U
Benzo(a)pyrene	50-32-8	15	210	400 U	**1,000**	**130 J**	400 U	**400 J**	420 U	410 U
Benzo(b)fluoranthene	205-99-2	150	2,100	**41.0 J**	**1,200**	**150 J**	400 U	**970**	420 U	410 U
Benzo(g,h,i)perylene	191-24-2	150	2,100	400 U	**760**	**64.0 J**	400 U	430 U	420 U	410 U
Benzo(k)fluoranthene	207-08-9	1,500	21,000	**35.0 J**	**940**	**130 J**	400 U	**450**	420 U	410 U
bis(2-Chloroethoxy) methane	111-91-1	180,000	1,800,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
bis(2-Chloroethyl) ether	111-44-4	210	1,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
bis(2-Ethylhexyl) phthalate	117-81-7	35,000	120,000	**230 J**	**97.0 J**	380 U	400 U	**600**	420 U	**120 J**
Butylbenzylphthalate	85-68-7	260,000	910,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
Caprolactam	105-60-2	31,000,000	310,000,000	NM	420 U	380 U	400 U	NM	NM	NM
Carbazole	86-74-8	17,000,000	170,000,000	400 U	**88.0 J**	380 U	400 U	430 U	420 U	410 U

Appendix G-4-3
SVOC Results for Shallow Soil Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (µg/Kg)	Location ID Sample ID Date Units Depth Industrial RSL (µg/Kg)	C-10 C-10 11/10/1993 µg/Kg 0'	SB-311 OU1-SS-SB311-0-1 10/3/2007 µg/Kg 0 - 1'	SB-315 OU1-SS-SB315-0-1 10/3/2007 µg/Kg 0 - 1'	SB-319 OU1-SS-SB319-0-1 10/3/2007 µg/Kg 0 - 1'	SSI-X102 SSI-X102 11/20/1991 µg/Kg 0'	SSI-X105 SSI-X105 11/20/1991 µg/Kg 0 - 0.667'	SSI-X207 SSI-X207 11/20/1991 µg/Kg 0 - 0.25'
Chrysene	218-01-9	15,000	210,000	400 U	**1,100**	**180 J**	400 U	**620**	420 U	410 U
Dibenzo(a,h)anthracene	53-70-3	15	210	400 U	**200 J**	380 U	400 U	430 U	420 U	410 U
Dibenzofuran	132-64-9	78,000	1,000,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
Diethylphthalate	84-66-2	49,000,000	490,000,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
Dimethylphthalate	131-11-3	49,000,000	490,000,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
Di-n-butylphthalate	84-74-2	6,100,000	62,000,000	**71.0 J**	420 U	380 U	400 U	430 U	420 U	410 U
Di-n-octylphthalate	117-84-0	35,000	120,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
Fluoranthene	206-44-0	2,300,000	22,000,000	**39.0 J**	**2,100**	**310 J**	400 U	**1,200**	420 U	410 U
Fluorene	86-73-7	2,300,000	22,000,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
Hexachlorobenzene	118-74-1	300	1,100	400 U	420 U	380 U	400 U	430 U	420 U	410 U
Hexachlorobutadiene	87-68-3	6,200	22,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
Hexachlorocyclopentadiene	77-47-4	370,000	3,700,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
Hexachloroethane	67-72-1	35,000	120,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
Indeno(1,2,3-cd)pyrene	193-39-5	150	2,100	400 U	**690**	**59.0 J**	400 U	**300 J**	420 U	410 U
Isophorone	78-59-1	510,000	1,800,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
Naphthalene	91-20-3	3,600	18,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
Nitrobenzene	98-95-3	4,800	24,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
N-Nitroso-di-n-propylamine	621-64-7	69	250	400 U	420 U	380 U	400 U	430 U	420 U	410 U
N-Nitrosodiphenylamine/Diphenylamine	86-30-6	99,000	350,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
Pentachlorophenol	87-86-5	3,000	9,000	980 U	2,100 U	1,900 U	2,000 U	1,000 U	1,000 U	1,000 U
Phenanthrene	85-01-8	17,000,000	170,000,000	400 U	**680**	**160 J**	400 U	**800**	420 U	410 U
Phenol	108-95-2	18,000,000	180,000,000	400 U	420 U	380 U	400 U	430 U	420 U	410 U
Pyrene	129-00-0	1,700,000	17,000,000	**46.0 J**	**1,500**	**230 J**	400 U	**1,200**	**170 J**	410 U

Notes:

	Exceedance of Industrial and Residential RSLs
	Exceedance of Residential RSL
1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NM	Not Measured

Appendix G-4-3
SVOC Results for Deep Soil Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (µg/Kg)	Location ID Sample ID Date Units Depth Industrial RSL (µg/Kg)	C-5 C-5-12 11/12/1993 µg/Kg 12'	C-7 C-7-6 11/12/1993 µg/Kg 6'	C-10 C-10 11/10/1993 µg/Kg 7'	SB-312 OU1-SS-SB312-2-4 10/3/2007 µg/Kg 2 - 4'
1,1-Biphenyl	92-52-4	3,900,000	51,000,000	NM	NM	NM	390 U
1,2,4-Trichlorobenzene	120-82-1	22,000	99,000	NM	NM	400 U	NM
1,2-Dichlorobenzene	95-50-1	1,900,000	9,800,000	NM	NM	400 U	NM
1,3-Dichlorobenzene	541-73-1	2,400	12,000	NM	NM	400 U	NM
1,4-Dichlorobenzene	106-46-7	2,400	12,000	NM	NM	400 U	NM
2,2'-Oxybis(1-Chloropropane)	108-60-1	4,600	22,000	NM	NM	400 U	390 U
2,4,5-Trichlorophenol	95-95-4	6,100,000	62,000,000	NM	NM	980 U	390 U
2,4,6-Trichlorophenol	88-06-2	44,000	160,000	NM	NM	400 U	390 U
2,4-Dichlorophenol	120-83-2	180,000	1,800,000	NM	NM	400 U	390 U
2,4-Dimethylphenol	105-67-9	1,200,000	12,000,000	NM	NM	400 U	390 U
2,4-Dinitrophenol	51-28-5	120,000	1,200,000	NM	NM	980 U	2,000 U
2,4-Dinitrotoluene	121-14-2	1,600	5,500	NM	NM	400 U	390 U
2,6-Dinitrotoluene	606-20-2	61,000	620,000	NM	NM	400 U	390 U
2-Chloronaphthalene	91-58-7	6,300,000	82,000,000	NM	NM	400 U	390 U
2-Chlorophenol	95-57-8	390,000	5,100,000	NM	NM	400 U	390 U
2-Methylnaphthalene	91-57-6	310,000	4,100,000	NM	NM	400 U	390 U
2-Methylphenol	95-48-7	3,100,000	31,000,000	NM	NM	400 U	390 U
2-Nitroaniline	88-74-4	610,000	6,000,000	NM	NM	980 U	2,000 U
2-Nitrophenol	88-75-5	120,000	1,200,000	NM	NM	400 U	390 U
3,3'-Dichlorobenzidine	91-94-1	1,100	3,800	NM	NM	400 U	390 U
3-Nitroaniline	99-09-2	24,000	86,000	NM	NM	980 U	2,000 U
4,6-Dinitro-2-methylphenol	534-52-1	6,100	62,000	NM	NM	980 U	2,000 U
4-Bromophenyl-phenylether	101-55-3	7,800	100,000	NM	NM	400 U	390 U
4-Chloro-3-methylphenol	59-50-7	6,100,000	62,000,000	NM	NM	400 U	390 U
4-Chloroaniline	106-47-8	2,400	8,600	NM	NM	400 U	390 U
4-Chlorophenyl-phenylether	7005-72-3	7,800	100,000	NM	NM	400 U	390 U
4-Methylphenol	106-44-5	310,000	3,100,000	NM	NM	400 U	390 U
4-Nitroaniline	100-01-6	24,000	86,000	NM	NM	980 U	2,000 U
4-Nitrophenol	100-02-7	120,000	1,200,000	NM	NM	980 U	2,000 U
Acenaphthene	83-32-9	3,400,000	33,000,000	29.0 U	30.0 U	400 U	390 U
Acenaphthylene	208-96-8	3,400,000	33,000,000	29.0 U	30.0 U	400 U	390 U
Acetophenone	98-86-2	7,800,000	100,000,000	NM	NM	NM	390 U
Anthracene	120-12-7	17,000,000	170,000,000	29.0 U	30.0 U	400 U	390 U
Atrazine	1912-24-9	2,100	7,500	NM	NM	NM	390 U
Benzaldehyde	100-52-7	7,800,000	100,000,000	NM	NM	NM	390 U
Benzo(a)anthracene	56-55-3	150	2,100	5.7 U	6.1 U	400 U	390 U
Benzo(a)pyrene	50-32-8	15	210	11.0 U	12.0 U	400 U	390 U
Benzo(b)fluoranthene	205-99-2	150	2,100	9.2 U	9.8 U	400 U	390 U
Benzo(g,h,i)perylene	191-24-2	150	2,100	40.0 U	43.0 U	400 U	390 U
Benzo(k)fluoranthene	207-08-9	1,500	21,000	9.2 U	9.8 U	400 U	390 U
bis(2-Chloroethoxy) methane	111-91-1	180,000	1,800,000	NM	NM	400 U	390 U
bis(2-Chloroethyl) ether	111-44-4	210	1,000	NM	NM	400 U	390 U
bis(2-Ethylhexyl) phthalate	117-81-7	35,000	120,000	NM	NM	**58.0 J**	390 U
Butylbenzylphthalate	85-68-7	260,000	910,000	NM	NM	400 U	390 U
Caprolactam	105-60-2	31,000,000	310,000,000	NM	NM	NM	390 U
Carbazole	86-74-8	17,000,000	170,000,000	NM	NM	400 U	390 U

Appendix G-4-3
SVOC Results for Deep Soil Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (µg/Kg)	Location ID Sample ID Date Units Depth Industrial RSL (µg/Kg)	C-5 C-5-12 11/12/1993 µg/Kg 12'	C-7 C-7-6 11/12/1993 µg/Kg 6'	C-10 C-10 11/10/1993 µg/Kg 7'	SB-312 OU1-SS-SB312-2-4 10/3/2007 µg/Kg 2 - 4'
Chrysene	218-01-9	15,000	210,000	29.0 U	30.0 U	400 U	390 U
Dibenzo(a,h)anthracene	53-70-3	15	210	17.0 U	18.0 U	400 U	390 U
Dibenzofuran	132-64-9	78,000	1,000,000	NM	NM	400 U	390 U
Diethylphthalate	84-66-2	49,000,000	490,000,000	NM	NM	400 U	390 U
Dimethylphthalate	131-11-3	49,000,000	490,000,000	NM	NM	400 U	390 U
Di-n-butylphthalate	84-74-2	6,100,000	62,000,000	NM	NM	**97.0 J**	390 U
Di-n-octylphthalate	117-84-0	35,000	120,000	NM	NM	400 U	390 U
Fluoranthene	206-44-0	2,300,000	22,000,000	29.0 U	30.0 U	400 U	390 U
Fluorene	86-73-7	2,300,000	22,000,000	29.0 U	30.0 U	400 U	390 U
Hexachlorobenzene	118-74-1	300	1,100	NM	NM	400 U	390 U
Hexachlorobutadiene	87-68-3	6,200	22,000	NM	NM	400 U	390 U
Hexachlorocyclopentadiene	77-47-4	370,000	3,700,000	NM	NM	400 U	390 U
Hexachloroethane	67-72-1	35,000	120,000	NM	NM	400 U	390 U
Indeno(1,2,3-cd)pyrene	193-39-5	150	2,100	23.0 U	24.0 U	400 U	390 U
Isophorone	78-59-1	510,000	1,800,000	NM	NM	400 U	390 U
Naphthalene	91-20-3	3,600	18,000	29.0 U	30.0 U	400 U	390 U
Nitrobenzene	98-95-3	4,800	24,000	NM	NM	400 U	390 U
N-Nitroso-di-n-propylamine	621-64-7	69	250	NM	NM	400 U	390 U
N-Nitrosodiphenylamine/Diphenylamine	86-30-6	99,000	350,000	NM	NM	400 U	390 U
Pentachlorophenol	87-86-5	3,000	9,000	NM	NM	980 U	2,000 U
Phenanthrene	85-01-8	17,000,000	170,000,000	29.0 U	30.0 U	400 U	390 U
Phenol	108-95-2	18,000,000	180,000,000	NM	NM	400 U	390 U
Pyrene	129-00-0	1,700,000	17,000,000	29.0 U	30.0 U	400 U	390 U

Notes:

J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NM	Not Measured

Appendix G-4-3
SVOC Results for Shallow Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (µg/Kg)	Location ID Sample ID Date Units Depth Industrial RSL (µg/Kg)	ISA-X104 ISA-X104 12/14/1993 µg/Kg 0 - 0.833'	ISA-X105 ISA-X105 12/14/1993 µg/Kg 0 - 0.833'	ISA-X106 ISA-X106 12/14/1993 µg/Kg 0 - 0.833'	MW-301H OU1-SS-SB301-0-1 10/9/2007 µg/Kg 0 - 1'	MW-306S OU1-SS-SB306-0-1 10/16/2007 µg/Kg 0 - 1'	SSI-X103 SSI-X103 11/21/1991 µg/Kg 0 - 0.5'	SSI-X104 SSI-X104 11/21/1991 µg/Kg 0 - 0.5'
1,1-Biphenyl	92-52-4	3,900,000	51,000,000	NM	NM	NM	470 U	430 U	NM	NM
1,2,4-Trichlorobenzene	120-82-1	22,000	99,000	NM	NM	NM	NM	NM	400 U	380 U
1,2-Dichlorobenzene	95-50-1	1,900,000	9,800,000	NM	NM	NM	NM	NM	400 U	380 U
1,3-Dichlorobenzene	541-73-1	2,400	12,000	NM	NM	NM	NM	NM	400 U	380 U
1,4-Dichlorobenzene	106-46-7	2,400	12,000	NM	NM	NM	NM	NM	400 U	380 U
2,2'-Oxybis(1-Chloropropane)	108-60-1	4,600	22,000	NM	NM	NM	470 U	430 U	400 U	380 U
2,4,5-Trichlorophenol	95-95-4	6,100,000	62,000,000	NM	NM	NM	470 U	430 U	980 U	920 U
2,4,6-Trichlorophenol	88-06-2	44,000	160,000	NM	NM	NM	470 U	430 U	400 U	380 U
2,4-Dichlorophenol	120-83-2	180,000	1,800,000	NM	NM	NM	470 U	430 U	400 U	380 U
2,4-Dimethylphenol	105-67-9	1,200,000	12,000,000	NM	NM	NM	470 U	430 U	400 U	380 U
2,4-Dinitrophenol	51-28-5	120,000	1,200,000	NM	NM	NM	2,400 U	2,200 U	980 U	920 U
2,4-Dinitrotoluene	121-14-2	1,600	5,500	NM	NM	NM	470 U	430 U	400 U	380 U
2,6-Dinitrotoluene	606-20-2	61,000	620,000	NM	NM	NM	470 U	430 U	400 U	380 U
2-Chloronaphthalene	91-58-7	6,300,000	82,000,000	NM	NM	NM	470 U	430 U	400 U	380 U
2-Chlorophenol	95-57-8	390,000	5,100,000	NM	NM	NM	470 U	430 U	400 U	380 U
2-Methylnaphthalene	91-57-6	310,000	4,100,000	0.0 U	0.0 U	0.0 U	470 U	430 U	400 U	380 U
2-Methylphenol	95-48-7	3,100,000	31,000,000	NM	NM	NM	470 U	430 U	400 U	380 U
2-Nitroaniline	88-74-4	610,000	6,000,000	NM	NM	NM	2,400 U	2,200 U	980 U	920 U
2-Nitrophenol	88-75-5	120,000	1,200,000	NM	NM	NM	470 U	430 U	400 U	380 U
3,3'-Dichlorobenzidine	91-94-1	1,100	3,800	NM	NM	NM	470 U	430 U	400 U	380 U
3-Nitroaniline	99-09-2	24,000	86,000	NM	NM	NM	2,400 U	2,200 U	980 U	920 U
4,6-Dinitro-2-methylphenol	534-52-1	6,100	62,000	NM	NM	NM	2,400 U	2,200 U	980 U	920 U
4-Bromophenyl-phenylether	101-55-3	7,800	100,000	NM	NM	NM	470 U	430 U	400 U	380 U
4-Chloro-3-methylphenol	59-50-7	6,100,000	62,000,000	NM	NM	NM	470 U	430 U	400 U	380 U
4-Chloroaniline	106-47-8	2,400	8,600	NM	NM	NM	470 U	430 U	400 U	380 U
4-Chlorophenyl-phenylether	7005-72-3	7,800	100,000	NM	NM	NM	470 U	430 U	400 U	380 U
4-Methylphenol	106-44-5	310,000	3,100,000	NM	NM	NM	**21.0 J**	430 U	400 U	380 U
4-Nitroaniline	100-01-6	24,000	86,000	NM	NM	NM	2,400 U	2,200 U	980 U	920 U
4-Nitrophenol	100-02-7	120,000	1,200,000	NM	NM	NM	2,400 U	2,200 U	980 U	920 U
Acenaphthene	83-32-9	3,400,000	33,000,000	NM	NM	NM	470 U	430 U	400 U	380 U
Acenaphthylene	208-96-8	3,400,000	33,000,000	NM	NM	NM	470 U	430 U	400 U	380 U
Acetophenone	98-86-2	7,800,000	100,000,000	NM	NM	NM	470 U	430 U	NM	NM
Anthracene	120-12-7	17,000,000	170,000,000	NM	NM	NM	470 U	430 U	400 U	380 U
Atrazine	1912-24-9	2,100	7,500	NM	NM	NM	470 U	430 U	NM	NM
Benzaldehyde	100-52-7	7,800,000	100,000,000	NM	NM	NM	470 U	430 U	NM	NM
Benzo(a)anthracene	56-55-3	150	2,100	0.0 U	0.0 U	0.0 U	470 U	**110 J**	400 U	380 U
Benzo(a)pyrene	50-32-8	15	210	0.0 U	0.0 U	0.0 U	470 U	**96.0 J**	400 U	380 U
Benzo(b)fluoranthene	205-99-2	150	2,100	0.0 U	0.0 U	0.0 U	470 U	**100 J**	400 U	380 U
Benzo(g,h,i)perylene	191-24-2	150	2,100	NM	NM	NM	470 U	**92.0 J**	400 U	380 U
Benzo(k)fluoranthene	207-08-9	1,500	21,000	NM	NM	NM	470 U	**98.0 J**	400 U	380 U
bis(2-Chloroethoxy) methane	111-91-1	180,000	1,800,000	NM	NM	NM	470 U	430 U	400 U	380 U
bis(2-Chloroethyl) ether	111-44-4	210	1,000	NM	NM	NM	470 U	430 U	400 U	380 U
bis(2-Ethylhexyl) phthalate	117-81-7	35,000	120,000	NM	NM	NM	470 U	430 U	**110 J**	**130 J**
Butylbenzylphthalate	85-68-7	260,000	910,000	NM	NM	NM	470 U	430 U	400 U	380 U
Caprolactam	105-60-2	31,000,000	310,000,000	NM	NM	NM	470 U	430 U	NM	NM
Carbazole	86-74-8	17,000,000	170,000,000	NM	NM	NM	470 U	430 U	400 U	380 U

Appendix G-4-3
SVOC Results for Shallow Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (µg/Kg)	Location ID Sample ID Date Units Depth Industrial RSL (µg/Kg)	ISA-X104 ISA-X104 12/14/1993 µg/Kg 0 - 0.833'	ISA-X105 ISA-X105 12/14/1993 µg/Kg 0 - 0.833'	ISA-X106 ISA-X106 12/14/1993 µg/Kg 0 - 0.833'	MW-301H OU1-SS-SB301-0-1 10/9/2007 µg/Kg 0 - 1'	MW-306S OU1-SS-SB306-0-1 10/16/2007 µg/Kg 0 - 1'	SSI-X103 SSI-X103 11/21/1991 µg/Kg 0 - 0.5'	SSI-X104 SSI-X104 11/21/1991 µg/Kg 0 - 0.5'
Chrysene	218-01-9	15,000	210,000	0.0 U	0.0 U	0.0 U	**33.0 J**	**120 J**	400 U	380 U
Dibenzo(a,h)anthracene	53-70-3	15	210	NM	NM	NM	470 U	430 U	400 U	380 U
Dibenzofuran	132-64-9	78,000	1,000,000	0.0 U	0.0 U	0.0 U	470 U	430 U	400 U	380 U
Diethylphthalate	84-66-2	49,000,000	490,000,000	NM	NM	NM	470 U	430 U	400 U	380 U
Dimethylphthalate	131-11-3	49,000,000	490,000,000	NM	NM	NM	470 U	430 U	400 U	380 U
Di-n-butylphthalate	84-74-2	6,100,000	62,000,000	NM	NM	NM	470 U	430 U	400 U	380 U
Di-n-octylphthalate	117-84-0	35,000	120,000	NM	NM	NM	470 U	430 U	400 U	380 U
Fluoranthene	206-44-0	2,300,000	22,000,000	0.0 U	0.0 U	**96.0 J**	**81.0 J**	**180 J**	400 U	380 U
Fluorene	86-73-7	2,300,000	22,000,000	NM	NM	NM	470 U	430 U	400 U	380 U
Hexachlorobenzene	118-74-1	300	1,100	0.0 U	0.0 U	**7,300**	470 U	430 U	400 U	380 U
Hexachlorobutadiene	87-68-3	6,200	22,000	NM	NM	NM	470 U	430 U	400 U	380 U
Hexachlorocyclopentadiene	77-47-4	370,000	3,700,000	NM	NM	NM	470 U	430 U	400 U	380 U
Hexachloroethane	67-72-1	35,000	120,000	NM	NM	NM	470 U	430 U	400 U	380 U
Indeno(1,2,3-cd)pyrene	193-39-5	150	2,100	NM	NM	NM	470 U	**72.0 J**	400 U	380 U
Isophorone	78-59-1	510,000	1,800,000	NM	NM	NM	470 U	430 U	400 U	380 U
Naphthalene	91-20-3	3,600	18,000	0.0 U	0.0 U	0.0 U	**140 J**	430 U	400 U	380 U
Nitrobenzene	98-95-3	4,800	24,000	NM	NM	NM	470 U	430 U	400 U	380 U
N-Nitroso-di-n-propylamine	621-64-7	69	250	NM	NM	NM	470 U	430 U	400 U	380 U
N-Nitrosodiphenylamine/Diphenylamine	86-30-6	99,000	350,000	NM	NM	NM	470 U	430 U	400 U	380 U
Pentachlorophenol	87-86-5	3,000	9,000	0.0 U	0.0 U	0.0 U	2,400 U	2,200 U	980 U	920 U
Phenanthrene	85-01-8	17,000,000	170,000,000	0.0 U	0.0 U	**83.0 J**	**210 J**	**94.0 J**	400 U	380 U
Phenol	108-95-2	18,000,000	180,000,000	NM	NM	NM	470 U	430 U	400 U	380 U
Pyrene	129-00-0	1,700,000	17,000,000	0.0 U	0.0 U	**89.0 J**	**56.0 J**	**170 J**	400 U	380 U

Notes:

	Exceedance of Industrial and Residential RSLs
	Exceedance of Residential RSL
1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NM	Not Measured

Appendix G-4-3
SVOC Results for Deep Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (µg/Kg)	Location ID Sample ID Date Units Depth Industrial RSL (µg/Kg)	MW-303H OU1-SS-SB303-89-90 10/11/2007 µg/Kg 89 - 90'	MW-304S OU1-SS-SB304-59-60 10/10/2007 µg/Kg 59 - 60'	SB-302 OU1-SS-SB302-10.5-11 10/9/2007 µg/Kg 10.5 - 11.5'	SB-307 OU1-SS-SB307-7-8 10/24/2007 µg/Kg 7 - 8'	SB-308 OU1-SS-SB308-36.5-37.5 10/17/2007 µg/Kg 36.5 - 37'
1,1-Biphenyl	92-52-4	3,900,000	51,000,000	440 U	380 U	410 U	**100 J**	370 U
2,2'-Oxybis(1-Chloropropane)	108-60-1	4,600	22,000	440 U	380 U	410 U	390 U	370 U
2,4,5-Trichlorophenol	95-95-4	6,100,000	62,000,000	440 U	380 U	410 U	390 U	370 U
2,4,6-Trichlorophenol	88-06-2	44,000	160,000	440 U	380 U	410 U	390 U	370 U
2,4-Dichlorophenol	120-83-2	180,000	1,800,000	440 U	380 U	410 U	390 U	370 U
2,4-Dimethylphenol	105-67-9	1,200,000	12,000,000	440 U	380 U	410 U	390 U	370 U
2,4-Dinitrophenol	51-28-5	120,000	1,200,000	2,300 U	2,000 U	2,100 U	2,000 U	1,900 U
2,4-Dinitrotoluene	121-14-2	1,600	5,500	440 U	380 U	410 U	390 U	370 U
2,6-Dinitrotoluene	606-20-2	61,000	620,000	440 U	380 U	410 U	390 U	370 U
2-Chloronaphthalene	91-58-7	6,300,000	82,000,000	440 U	380 U	410 U	390 U	370 U
2-Chlorophenol	95-57-8	390,000	5,100,000	440 U	380 U	410 U	390 U	370 U
2-Methylnaphthalene	91-57-6	310,000	4,100,000	440 U	380 U	410 U	**1,100**	370 U
2-Methylphenol	95-48-7	3,100,000	31,000,000	440 U	380 U	410 U	390 U	370 U
2-Nitroaniline	88-74-4	610,000	6,000,000	2,300 U	2,000 U	2,100 U	2,000 U	1,900 U
2-Nitrophenol	88-75-5	120,000	1,200,000	440 U	380 U	410 U	390 U	370 U
3,3'-Dichlorobenzidine	91-94-1	1,100	3,800	440 U	380 U	410 U	390 U	370 U
3-Nitroaniline	99-09-2	24,000	86,000	2,300 U	2,000 U	2,100 U	2,000 U	1,900 U
4,6-Dinitro-2-methylphenol	534-52-1	6,100	62,000	2,300 U	2,000 U	2,100 U	2,000 U	1,900 U
4-Bromophenyl-phenylether	101-55-3	7,800	100,000	440 U	380 U	410 U	390 U	370 U
4-Chloro-3-methylphenol	59-50-7	6,100,000	62,000,000	440 U	380 U	410 U	390 U	370 U
4-Chloroaniline	106-47-8	2,400	8,600	440 U	380 U	410 U	390 U	370 U
4-Chlorophenyl-phenylether	7005-72-3	7,800	100,000	440 U	380 U	410 U	390 U	370 U
4-Methylphenol	106-44-5	310,000	3,100,000	440 U	380 U	410 U	390 U	370 U
4-Nitroaniline	100-01-6	24,000	86,000	2,300 U	2,000 U	2,100 U	2,000 U	1,900 U
4-Nitrophenol	100-02-7	120,000	1,200,000	2,300 U	2,000 U	2,100 U	2,000 U	1,900 U
Acenaphthene	83-32-9	3,400,000	33,000,000	440 U	380 U	410 U	390 U	370 U
Acenaphthylene	208-96-8	3,400,000	33,000,000	440 U	380 U	410 U	390 U	370 U
Acetophenone	98-86-2	7,800,000	100,000,000	440 U	380 U	410 U	390 U	370 U
Anthracene	120-12-7	17,000,000	170,000,000	440 U	380 U	410 U	**120 J**	**73.0 J**
Atrazine	1912-24-9	2,100	7,500	440 U	380 U	410 U	390 U	370 U
Benzaldehyde	100-52-7	7,800,000	100,000,000	440 U	380 U	410 U	390 U	370 U
Benzo(a)anthracene	56-55-3	150	2,100	**72.0 J**	380 U	410 U	**240 J**	**140 J**
Benzo(a)pyrene	50-32-8	15	210	**81.0 J**	380 U	410 U	**140 J**	**110 J**
Benzo(b)fluoranthene	205-99-2	150	2,100	**64.0 J**	380 U	410 U	**190 J**	**93.0 J**
Benzo(g,h,i)perylene	191-24-2	150	2,100	**49.0 J**	380 U	410 U	**110 J**	**79.0 J**
Benzo(k)fluoranthene	207-08-9	1,500	21,000	**63.0 J**	380 U	410 U	**130 J**	**88.0 J**
bis(2-Chloroethoxy) methane	111-91-1	180,000	1,800,000	440 U	380 U	410 U	390 U	370 U
bis(2-Chloroethyl) ether	111-44-4	210	1,000	440 U	380 U	410 U	390 U	370 U
bis(2-Ethylhexyl) phthalate	117-81-7	35,000	120,000	440 U	380 U	410 U	390 U	370 U
Butylbenzylphthalate	85-68-7	260,000	910,000	440 U	380 U	410 U	390 U	370 U
Caprolactam	105-60-2	31,000,000	310,000,000	440 U	380 U	410 U	390 U	370 U
Carbazole	86-74-8	17,000,000	170,000,000	440 U	380 U	410 U	**77.0 J**	370 U
Chrysene	218-01-9	15,000	210,000	**78.0 J**	380 U	410 U	**300 J**	**140 J**
Dibenzo(a,h)anthracene	53-70-3	15	210	440 U	380 U	410 U	**36.0 J**	**26.0 J**
Dibenzofuran	132-64-9	78,000	1,000,000	440 U	380 U	410 U	**380 J**	370 U
Diethylphthalate	84-66-2	49,000,000	490,000,000	440 U	380 U	410 U	390 U	370 U
Dimethylphthalate	131-11-3	49,000,000	490,000,000	440 U	380 U	410 U	390 U	370 U
Di-n-butylphthalate	84-74-2	6,100,000	62,000,000	**36.0 J**	380 U	410 U	390 U	370 U
Di-n-octylphthalate	117-84-0	35,000	120,000	440 U	380 U	410 U	390 U	370 U

Appendix G-4-3
SVOC Results for Deep Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (µg/Kg)	Location ID Sample ID Date Units Depth Industrial RSL (µg/Kg)	MW-303H OU1-SS-SB303-89-90 10/11/2007 µg/Kg 89 - 90'	MW-304S OU1-SS-SB304-59-60 10/10/2007 µg/Kg 59 - 60'	SB-302 OU1-SS-SB302-10.5-11 10/9/2007 µg/Kg 10.5 - 11.5'	SB-307 OU1-SS-SB307-7-8 10/24/2007 µg/Kg 7 - 8'	SB-308 OU1-SS-SB308-36.5-37.5 10/17/2007 µg/Kg 36.5 - 37'
Fluoranthene	206-44-0	2,300,000	22,000,000	**130 J**	380 U	410 U	**890**	**320 J**
Fluorene	86-73-7	2,300,000	22,000,000	440 U	380 U	410 U	390 U	370 U
Hexachlorobenzene	118-74-1	300	1,100	440 U	380 U	410 U	390 U	370 U
Hexachlorobutadiene	87-68-3	6,200	22,000	440 U	380 U	410 U	390 U	370 U
Hexachlorocyclopentadiene	77-47-4	370,000	3,700,000	440 U	380 U	410 U	390 U	370 U
Hexachloroethane	67-72-1	35,000	120,000	440 U	380 U	410 U	390 U	370 U
Indeno(1,2,3-cd)pyrene	193-39-5	150	2,100	**45.0 J**	380 U	410 U	**85.0 J**	**68.0 J**
Isophorone	78-59-1	510,000	1,800,000	440 U	380 U	410 U	390 U	370 U
Naphthalene	91-20-3	3,600	18,000	440 U	380 U	410 U	**580**	370 U
Nitrobenzene	98-95-3	4,800	24,000	440 U	380 U	410 U	390 U	370 U
N-Nitroso-di-n-propylamine	621-64-7	69	250	440 U	380 U	410 U	390 U	370 U
N-Nitrosodiphenylamine/Diphenylan	86-30-6	99,000	350,000	440 U	380 U	410 U	390 U	370 U
Pentachlorophenol	87-86-5	3,000	9,000	2,300 U	2,000 U	2,100 U	2,000 U	1,900 U
Phenanthrene	85-01-8	17,000,000	170,000,000	**100 J**	380 U	410 U	**1,700**	**310 J**
Phenol	108-95-2	18,000,000	180,000,000	440 U	380 U	410 U	390 U	370 U
Pyrene	129-00-0	1,700,000	17,000,000	**130 J**	380 U	410 U	**570**	**310 J**

Notes:

	Exceedance of Industrial and Residential RSLs
	Exceedance of Residential RSL
1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NM	Not Measured

Appendix G-4-3
SVOC Results for Deep Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (µg/Kg)	Location ID Sample ID Date Units Depth Industrial RSL (µg/Kg)	SB-309 OU1-SS-SB309-48-49 10/17/2007 µg/Kg 48 - 49'	SB-316 OU1-SS-SB316-2-4 10/3/2007 µg/Kg 2 - 4'
1,1-Biphenyl	92-52-4	3,900,000	51,000,000	380 U	380 U
2,2'-Oxybis(1-Chloropropane)	108-60-1	4,600	22,000	380 U	380 U
2,4,5-Trichlorophenol	95-95-4	6,100,000	62,000,000	380 U	380 U
2,4,6-Trichlorophenol	88-06-2	44,000	160,000	380 U	380 U
2,4-Dichlorophenol	120-83-2	180,000	1,800,000	380 U	380 U
2,4-Dimethylphenol	105-67-9	1,200,000	12,000,000	380 U	380 U
2,4-Dinitrophenol	51-28-5	120,000	1,200,000	2,000 U	1,900 U
2,4-Dinitrotoluene	121-14-2	1,600	5,500	380 U	380 U
2,6-Dinitrotoluene	606-20-2	61,000	620,000	380 U	380 U
2-Chloronaphthalene	91-58-7	6,300,000	82,000,000	380 U	380 U
2-Chlorophenol	95-57-8	390,000	5,100,000	380 U	380 U
2-Methylnaphthalene	91-57-6	310,000	4,100,000	380 U	**37.0 J**
2-Methylphenol	95-48-7	3,100,000	31,000,000	380 U	380 U
2-Nitroaniline	88-74-4	610,000	6,000,000	2,000 U	1,900 U
2-Nitrophenol	88-75-5	120,000	1,200,000	380 U	380 U
3,3'-Dichlorobenzidine	91-94-1	1,100	3,800	380 U	380 U
3-Nitroaniline	99-09-2	24,000	86,000	2,000 U	1,900 U
4,6-Dinitro-2-methylphenol	534-52-1	6,100	62,000	2,000 U	1,900 U
4-Bromophenyl-phenylether	101-55-3	7,800	100,000	380 U	380 U
4-Chloro-3-methylphenol	59-50-7	6,100,000	62,000,000	380 U	380 U
4-Chloroaniline	106-47-8	2,400	8,600	380 U	380 U
4-Chlorophenyl-phenylether	7005-72-3	7,800	100,000	380 U	380 U
4-Methylphenol	106-44-5	310,000	3,100,000	380 U	380 U
4-Nitroaniline	100-01-6	24,000	86,000	2,000 U	1,900 U
4-Nitrophenol	100-02-7	120,000	1,200,000	2,000 U	1,900 U
Acenaphthene	83-32-9	3,400,000	33,000,000	380 U	**25.0 J**
Acenaphthylene	208-96-8	3,400,000	33,000,000	380 U	**60.0 J**
Acetophenone	98-86-2	7,800,000	100,000,000	380 U	380 U
Anthracene	120-12-7	17,000,000	170,000,000	380 U	**130 J**
Atrazine	1912-24-9	2,100	7,500	380 U	380 U
Benzaldehyde	100-52-7	7,800,000	100,000,000	380 U	380 U
Benzo(a)anthracene	56-55-3	150	2,100	380 U	**390**
Benzo(a)pyrene	50-32-8	15	210	380 U	**390**
Benzo(b)fluoranthene	205-99-2	150	2,100	380 U	**360 J**
Benzo(g,h,i)perylene	191-24-2	150	2,100	380 U	**210 J**
Benzo(k)fluoranthene	207-08-9	1,500	21,000	380 U	**320 J**
bis(2-Chloroethoxy) methane	111-91-1	180,000	1,800,000	380 U	380 U
bis(2-Chloroethyl) ether	111-44-4	210	1,000	380 U	380 U
bis(2-Ethylhexyl) phthalate	117-81-7	35,000	120,000	380 U	380 U
Butylbenzylphthalate	85-68-7	260,000	910,000	380 U	380 U
Caprolactam	105-60-2	31,000,000	310,000,000	380 U	380 U
Carbazole	86-74-8	17,000,000	170,000,000	380 U	**50.0 J**
Chrysene	218-01-9	15,000	210,000	380 U	**420**
Dibenzo(a,h)anthracene	53-70-3	15	210	380 U	**73.0 J**
Dibenzofuran	132-64-9	78,000	1,000,000	380 U	**34.0 J**
Diethylphthalate	84-66-2	49,000,000	490,000,000	380 U	380 U
Dimethylphthalate	131-11-3	49,000,000	490,000,000	380 U	380 U
Di-n-butylphthalate	84-74-2	6,100,000	62,000,000	380 U	380 U
Di-n-octylphthalate	117-84-0	35,000	120,000	380 U	380 U

Appendix G-4-3
SVOC Results for Deep Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (µg/Kg)	Location ID Sample ID Date Units Depth Industrial RSL (µg/Kg)	SB-309 OU1-SS-SB309-48-49 10/17/2007 µg/Kg 48 - 49'	SB-316 OU1-SS-SB316-2-4 10/3/2007 µg/Kg 2 - 4'
Fluoranthene	206-44-0	2,300,000	22,000,000	380 U	**850**
Fluorene	86-73-7	2,300,000	22,000,000	380 U	**37.0 J**
Hexachlorobenzene	118-74-1	300	1,100	380 U	380 U
Hexachlorobutadiene	87-68-3	6,200	22,000	380 U	380 U
Hexachlorocyclopentadiene	77-47-4	370,000	3,700,000	380 U	380 U
Hexachloroethane	67-72-1	35,000	120,000	380 U	380 U
Indeno(1,2,3-cd)pyrene	193-39-5	150	2,100	380 U	**190 J**
Isophorone	78-59-1	510,000	1,800,000	380 U	380 U
Naphthalene	91-20-3	3,600	18,000	380 U	**37.0 J**
Nitrobenzene	98-95-3	4,800	24,000	380 U	380 U
N-Nitroso-di-n-propylamine	621-64-7	69	250	380 U	380 U
N-Nitrosodiphenylamine/Diphenylan	86-30-6	99,000	350,000	380 U	380 U
Pentachlorophenol	87-86-5	3,000	9,000	2,000 U	1,900 U
Phenanthrene	85-01-8	17,000,000	170,000,000	380 U	**480**
Phenol	108-95-2	18,000,000	180,000,000	380 U	380 U
Pyrene	129-00-0	1,700,000	17,000,000	380 U	**610**

Notes:

	Exceedance of Industrial and Residential RSLs
	Exceedance of Residential RSL
1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NM	Not Measured

Appendix G-4-4
PCB Results for Shallow Soil Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (µg/Kg)	Location ID Sample ID Date Units Depth Industrial RSL (µg/Kg)	C-10 C-10 11/10/1993 µg/Kg 0'	SB-311 OU1-SS-SB311-0-1 10/3/2007 µg/Kg 0 - 1'	SB-315 OU1-SS-SB315-0-1 10/3/2007 µg/Kg 0 - 1'	SSI-X102 SSI-X102 11/20/1991 µg/Kg 0'	SSI-X105 SSI-X105 11/20/1991 µg/Kg 0 - 0.667'
Aroclor 1016	12674-11-2	3,900	21,000	40.0 U	42.0 U	38.0 U	430 U	42.0 U
Aroclor 1221	11104-28-2	140	540	82.0 U	84.0 U	76.0 U	870 U	86.0 U
Aroclor 1232	11141-16-5	140	540	40.0 U	42.0 U	38.0 U	430 U	42.0 U
Aroclor 1242	53469-21-9	220	740	40.0 U	42.0 U	38.0 U	430 U	42.0 U
Aroclor 1248	12672-29-6	220	740	40.0 U	42.0 U	38.0 U	430 U	42.0 U
Aroclor 1254	11097-69-1	220	740	**120 J**	**61**	38.0 U	**2,800**	**220**
Aroclor 1260	11096-82-5	220	740	40.0 U	42.0 U	38.0 U	**1,100**	**170**

Notes:

	Exceedance of Industrial and Residential RSLs
1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

Appendix G-4-4
PCB Results for Deep Soil Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (µg/Kg)	Location ID Sample ID Date Units Depth Industrial RSL (µg/Kg)	C-10 C-10 11/10/1993 µg/Kg 7'	SB-312 OU1-SS-SB312-2-4 10/3/2007 µg/Kg 2 - 4'
Aroclor 1016	12674-11-2	3,900	21,000	40.0 U	39.0 U
Aroclor 1221	11104-28-2	140	540	82.0 U	80.0 U
Aroclor 1232	11141-16-5	140	540	40.0 U	39.0 U
Aroclor 1242	53469-21-9	220	740	40.0 U	39.0 U
Aroclor 1248	12672-29-6	220	740	40.0 U	39.0 U
Aroclor 1254	11097-69-1	220	740	**11.0 J**	39.0 U
Aroclor 1260	11096-82-5	220	740	40.0 U	39.0 U

Notes:

1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

Appendix G-4-4
PCB Results for Shallow Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (µg/Kg)	Location ID Sample ID Date Units Depth Industrial RSL (µg/Kg)	ISA-X104 ISA-X104 12/14/1993 µg/Kg 0 - 0.833'	ISA-X105 ISA-X105 12/14/1993 µg/Kg 0 - 0.833'	ISA-X106 ISA-X106 12/14/1993 µg/Kg 0 - 0.833'	MW-301H OU1-SS-SB301-0-1 10/9/2007 µg/Kg 0 - 1'	MW-303H OU1-SS-SB303-0-1 10/11/2007 µg/Kg 0 - 1'	MW-305H OU1-SS-SB305-0-1 10/18/2007 µg/Kg 0 - 1'	SB-307 OU1-SS-SB307-0-1 10/24/2007 µg/Kg 0 - 1'	SB-309 OU1-SS-SB309-0-1 10/17/2007 µg/Kg 0 - 1'	SSI-X103 SSI-X103 11/21/1991 µg/Kg 0 - 0.5'	SSI-X104 SSI-X104 11/21/1991 µg/Kg 0 - 0.5'
Aroclor 1016	12674-11-2	3900	21000	NM	NM	NM	47.0 U	55.0 U	43.0 U	37.0 U	40.0 U	40.0 U	38.0 U
Aroclor 1221	11104-28-2	140	540	NM	NM	NM	96.0 U	110 U	88.0 U	75.0 U	81.0 U	82.0 U	77.0 U
Aroclor 1232	11141-16-5	140	540	NM	NM	NM	47.0 U	55.0 U	43.0 U	37.0 U	40.0 U	40.0 U	38.0 U
Aroclor 1242	53469-21-9	220	740	0.0 U	0.0 U	0.0 U	47.0 U	55.0 U	43.0 U	37.0 U	40.0 U	40.0 U	38.0 U
Aroclor 1248	12672-29-6	220	740	NM	NM	NM	47.0 U	55.0 U	43.0 U	37.0 U	40.0 U	40.0 U	38.0 U
Aroclor 1254	11097-69-1	220	740	0.0 U	**25.0 J**	**88**	47.0 U	55.0 U	43.0 U	37.0 U	40.0 U	40.0 U	38.0 U
Aroclor 1260	11096-82-5	220	740	0.0 U	0.0 U	**130**	47.0 U	**73**	43.0 U	37.0 U	40.0 U	40.0 U	38.0 U

Notes:

1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NM	Not Measured

Appendix G-4-4
PCB Results for Deep Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (µg/Kg)	Location ID Sample ID Date Units Depth Industrial RSL (µg/Kg)	SB-316 OU1-SS-SB316-2-4 10/3/2007 µg/Kg 2 - 4'
Aroclor 1016	12674-11-2	3,900	21,000	38.0 U
Aroclor 1221	11104-28-2	140	540	77.0 U
Aroclor 1232	11141-16-5	140	540	38.0 U
Aroclor 1242	53469-21-9	220	740	38.0 U
Aroclor 1248	12672-29-6	220	740	38.0 U
Aroclor 1254	11097-69-1	220	740	38.0 U
Aroclor 1260	11096-82-5	220	740	38.0 U

Notes:

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

Appendix G-4-5
Pesticides Results for Shallow Soil Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (µg/Kg)	Location ID Sample ID Date Units Depth Industrial RSL (µg/Kg)	C-10 C-10 11/10/1993 µg/Kg 0'	SB-311 OU1-SS-SB311-0-1 10/3/2007 µg/Kg 0 - 1'	SB-315 OU1-SS-SB315-0-1 10/3/2007 µg/Kg 0 - 1'	SB-319 OU1-SS-SB319-0-1 10/3/2007 µg/Kg 0 - 1'	SSI-X102 SSI-X102 11/20/1991 µg/Kg 0'	SSI-X105 SSI-X105 11/20/1991 µg/Kg 0 - 0.667'
4,4'-DDD	72-54-8	2,000	7,200	4.0 U	4.2 U	3.8 U	4.0 U	43.0 U	4.2 U
4,4'-DDE	72-55-9	1,400	5,100	4.0 U	4.2 U	3.8 U	4.0 U	43.0 U	4.2 U
4,4'-DDT	50-29-3	1,700	7,000	4.0 U	4.2 U	3.8 U	4.0 U	43.0 U	4.2 U
Aldrin	309-00-2	29	100	2.1 U	2.1 U	1.9 U	2.0 U	22.0 U	2.2 U
alpha-BHC	319-84-6	77	270	2.1 U	2.1 U	1.9 U	2.0 U	22.0 U	2.2 U
alpha-Chlordane	5103-71-9	1,600	6,500	2.1 U	2.1 U	1.9 U	2.0 U	22.0 U	2.2 U
beta-BHC	319-85-7	270	960	2.1 U	2.1 U	1.9 U	2.0 U	22.0 U	2.2 U
delta-BHC	319-86-8	77	270	2.1 U	2.1 U	1.9 U	2.0 U	22.0 U	2.2 U
Dieldrin	60-57-1	30	110	4.0 U	4.2 U	3.8 U	4.0 U	43.0 U	4.2 U
Endosulfan I	959-98-8	370,000	3,700,000	2.1 U	2.1 U	1.9 U	2.0 U	22.0 U	2.2 U
Endosulfan II	33213-65-9	370,000	3,700,000	4.0 U	4.2 U	3.8 U	4.0 U	43.0 U	4.2 U
Endosulfan sulfate	1031-07-8	370,000	3,700,000	4.0 U	4.2 U	3.8 U	4.0 U	43.0 U	4.2 U
Endrin	72-20-8	18,000	180,000	4.0 U	4.2 U	3.8 U	4.0 U	43.0 U	4.2 U
Endrin Aldehyde	7421-93-4	18,000	180,000	4.0 U	4.2 U	3.8 U	4.0 U	43.0 U	4.2 U
Endrin ketone	53494-70-5	18,000	180,000	4.0 U	4.2 U	3.8 U	4.0 U	43.0 U	4.2 U
gamma-BHC (Lindane)	58-89-9	520	2,100	2.1 U	2.1 U	1.9 U	2.0 U	22.0 U	2.2 U
gamma-Chlordane	5566-34-7	1,600	6,500	2.1 U	2.1 U	1.9 U	2.0 U	22.0 U	2.2 U
Heptachlor	76-44-8	110	380	2.1 U	2.1 U	1.9 U	2.0 U	22.0 U	2.2 U
Heptachlor epoxide	1024-57-3	53	190	2.1 U	2.1 U	1.9 U	2.0 U	22.0 U	2.2 U
Methoxychlor	72-43-5	310,000	3,100,000	21.0 U	21.0 U	19.0 U	20.0 U	220 U	22.0 U
Toxaphene	8001-35-2	440	1,600	210 U	42.0 U	38.0 U	40.0 U	2,200 U	220 U

Notes:

U — The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

Appendix G-4-5
Pesticides Results for Deep Soil Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (µg/Kg)	Location ID Sample ID Date Units Depth Industrial RSL (µg/Kg)	C-10 C-10 11/10/1993 µg/Kg 7'	SB-312 OU1-SS-SB312-2-4 10/3/2007 µg/Kg 2 - 4'
4,4'-DDD	72-54-8	2,000	7,200	4.0 U	3.9 U
4,4'-DDE	72-55-9	1,400	5,100	4.0 U	3.9 U
4,4'-DDT	50-29-3	1,700	7,000	4.0 U	3.9 U
Aldrin	309-00-2	29	100	2.1 U	2.0 U
alpha-BHC	319-84-6	77	270	2.1 U	2.0 U
alpha-Chlordane	5103-71-9	1,600	6,500	2.1 U	2.0 U
beta-BHC	319-85-7	270	960	2.1 U	2.0 U
delta-BHC	319-86-8	77	270	2.1 U	2.0 U
Dieldrin	60-57-1	30	110	4.0 U	3.9 U
Endosulfan I	959-98-8	370,000	3,700,000	2.1 U	2.0 U
Endosulfan II	33213-65-9	370,000	3,700,000	4.0 U	3.9 U
Endosulfan sulfate	1031-07-8	370,000	3,700,000	4.0 U	3.9 U
Endrin	72-20-8	18,000	180,000	4.0 U	3.9 U
Endrin Aldehyde	7421-93-4	18,000	180,000	4.0 U	3.9 U
Endrin ketone	53494-70-5	18,000	180,000	4.0 U	3.9 U
gamma-BHC (Lindane)	58-89-9	520	2,100	2.1 U	2.0 U
gamma-Chlordane	5566-34-7	1,600	6,500	2.1 U	2.0 U
Heptachlor	76-44-8	110	380	2.1 U	2.0 U
Heptachlor epoxide	1024-57-3	53	190	2.1 U	2.0 U
Methoxychlor	72-43-5	310,000	3,100,000	21.0 U	20.0 U
Toxaphene	8001-35-2	440	1,600	210 U	39.0 U

Notes:

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

Appendix G-4-5
Pesticides Results for Shallow Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (µg/Kg)	Location ID Sample ID Date Units Depth Industrial RSL (µg/Kg)	ISA-X104 ISA-X104 12/14/1993 µg/Kg 0 - 0.833'	ISA-X105 ISA-X105 12/14/1993 µg/Kg 0 - 0.833'	ISA-X106 ISA-X106 12/14/1993 µg/Kg 0 - 0.833'	MW-301H OU1-SS-SB301-0-1 10/9/2007 µg/Kg 0 - 1'	MW-303H OU1-SS-SB303-0-1 10/11/2007 µg/Kg 0 - 1'	MW-305H OU1-SS-SB305-0-1 10/18/2007 µg/Kg 0 - 1'	SB-307 OU1-SS-SB307-0-1 10/24/2007 µg/Kg 0 - 1'	SB-309 OU1-SS-SB309-0-1 10/17/2007 µg/Kg 0 - 1'	SSI-X103 SSI-X103 11/21/1991 µg/Kg 0 - 0.5'	SSI-X104 SSI-X104 11/21/1991 µg/Kg 0 - 0.5'
4,4'-DDD	72-54-8	2,000	7,200	0.0 U	0.0 U	**5**	4.7 U	5.5 U	4.3 U	3.7 U	4.0 U	4.0 U	3.8 U
4,4'-DDE	72-55-9	1,400	5,100	0.0 U	0.0 U	**7**	4.7 U	5.5 U	4.3 U	3.7 U	4.0 U	4.0 U	3.8 U
4,4'-DDT	50-29-3	1,700	7,000	0.0 U	0.0 U	**14**	4.7 U	5.5 U	4.3 U	3.7 U	4.0 U	4.0 U	3.8 U
Aldrin	309-00-2	29	100	0.0 U	**0.64 J**	0.0 U	2.4 U	2.8 U	2.2 U	1.9 U	2.1 U	2.1 U	2.0 U
alpha-BHC	319-84-6	77	270	0.0 U	0.0 U	0.0 U	2.4 U	2.8 U	2.2 U	1.9 U	2.1 U	2.1 U	2.0 U
alpha-Chlordane	5103-71-9	1,600	6,500	0.0 U	0.0 U	0.0 U	2.4 U	2.8 U	2.2 U	1.9 U	2.1 U	2.1 U	2.0 U
beta-BHC	319-85-7	270	960	0.0 U	0.0 U	**35**	2.4 U	2.8 U	2.2 U	1.9 U	2.1 U	2.1 U	2.0 U
delta-BHC	319-86-8	77	270	0.0 U	0.0 U	**3.1**	2.4 U	2.8 U	2.2 U	1.9 U	2.1 U	2.1 U	2.0 U
Dieldrin	60-57-1	30	110	0.0 U	0.0 U	**20**	4.7 U	5.5 U	4.3 U	3.7 U	4.0 U	4.0 U	3.8 U
Endosulfan I	959-98-8	370,000	3,700,000	0.0 U	0.0 U	0.0 U	2.4 U	2.8 U	2.2 U	1.9 U	2.1 U	2.1 U	2.0 U
Endosulfan II	33213-65-9	370,000	3,700,000	0.0 U	0.0 U	**3.9 J**	4.7 U	5.5 U	4.3 U	3.7 U	4.0 U	4.0 U	3.8 U
Endosulfan sulfate	1031-07-8	370,000	3,700,000	NM	NM	NM	4.7 U	5.5 U	4.3 U	3.7 U	4.0 U	4.0 U	3.8 U
Endrin	72-20-8	18,000	180,000	0.0 U	**5**	**14**	4.7 U	5.5 U	4.3 U	3.7 U	4.0 U	4.0 U	3.8 U
Endrin Aldehyde	7421-93-4	18,000	180,000	0.0 U	0.0 U	0.0 U	4.7 U	5.5 U	4.3 U	3.7 U	4.0 U	4.0 U	3.8 U
Endrin ketone	53494-70-5	18,000	180,000	0.0 U	**4.0 J**	**35**	4.7 U	5.5 U	4.3 U	3.7 U	4.0 U	4.0 U	3.8 U
gamma-BHC (Lindane)	58-89-9	520	2,100	NM	NM	NM	2.4 U	2.8 U	2.2 U	1.9 U	2.1 U	2.1 U	2.0 U
gamma-Chlordane	5566-34-7	1,600	6,500	0.0 U	**0.68 J**	**3**	2.4 U	2.8 U	2.2 U	1.9 U	2.1 U	2.1 U	2.0 U
Heptachlor	76-44-8	110	380	NM	NM	NM	2.4 U	2.8 U	2.2 U	1.9 U	2.1 U	2.1 U	2.0 U
Heptachlor epoxide	1024-57-3	53	190	NM	NM	NM	2.4 U	2.8 U	2.2 U	1.9 U	2.1 U	2.1 U	2.0 U
Methoxychlor	72-43-5	310,000	3,100,000	**1.2**	0.0 U	0.0 U	24.0 U	28.0 U	22.0 U	19.0 U	21.0 U	21.0 U	20.0 U
Toxaphene	8001-35-2	440	1,600	0.0 U	**220**	0.0 U	47.0 U	55.0 U	43.0 U	37.0 U	40.0 U	210 U	200 U

Notes:

1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NM	Not Measured

Appendix G-4-5
Pesticides Results for Deep Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Residential RSL (µg/Kg)	Location ID Sample ID Date Units Depth Industrial RSL (µg/Kg)	SB-316 OU1-SS-SB316-2-4 10/3/2007 µg/Kg 2 - 4'
4,4'-DDD	72-54-8	2,000	7,200	3.8 U
4,4'-DDE	72-55-9	1,400	5,100	3.8 U
4,4'-DDT	50-29-3	1,700	7,000	3.8 U
Aldrin	309-00-2	29	100	1.9 U
alpha-BHC	319-84-6	77	270	1.9 U
alpha-Chlordane	5103-71-9	1,600	6,500	1.9 U
beta-BHC	319-85-7	270	960	1.9 U
delta-BHC	319-86-8	77	270	1.9 U
Dieldrin	60-57-1	30	110	3.8 U
Endosulfan I	959-98-8	370,000	3,700,000	1.9 U
Endosulfan II	33213-65-9	370,000	3,700,000	3.8 U
Endosulfan sulfate	1031-07-8	370,000	3,700,000	3.8 U
Endrin	72-20-8	18,000	180,000	3.8 U
Endrin Aldehyde	7421-93-4	18,000	180,000	3.8 U
Endrin ketone	53494-70-5	18,000	180,000	3.8 U
gamma-BHC (Lindane)	58-89-9	520	2,100	1.9 U
gamma-Chlordane	5566-34-7	1,600	6,500	1.9 U
Heptachlor	76-44-8	110	380	1.9 U
Heptachlor epoxide	1024-57-3	53	190	1.9 U
Methoxychlor	72-43-5	310,000	3,100,000	19.0 U
Toxaphene	8001-35-2	440	1,600	38.0 U

Notes:

U — The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

Appendix G-4-6
Other Inorganics Results for Shallow Soil Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID / Sample ID / Date / Units / Depth	C-8 / C-8 / 11/11/1993 / mg/Kg / 0'	C-9 / C-9 / 11/9/1993 / mg/Kg / 0'	C-10 / C-10 / 11/10/1993 / mg/Kg / 0'	C-11 / C-11 / 11/9/1993 / mg/Kg / 0'	SB-311 / OU1-SS-SB311-0-1 / 10/3/2007 / mg/Kg / 0 - 1'	SB-312 / OU1-SS-SB312-0-1 / 10/3/2007 / mg/Kg / 0 - 1'	SB-313 / OU1-SS-SB313-0-1 / 10/3/2007 / mg/Kg / 0 - 1'	SB-314 / OU1-SS-SB314-0-1 / 10/3/2007 / mg/Kg / 0 - 1'	SB-315 / OU1-SS-SB315-0-1 / 10/3/2007 / mg/Kg / 0 - 1'	SB-317 / OU1-SS-SB317-0-1 / 10/3/2007 / mg/Kg / 0 - 1'	SB-318 / OU1-SS-SB318-0-1 / 10/3/2007 / mg/Kg / 0 - 1'	SB-319 / OU1-SS-SB319-0-1 / 10/3/2007 / mg/Kg / 0 - 1'	SSI-X102 / SSI-X102 / 11/20/1991 / mg/Kg / 0'	SSI-X105 / SSI-X105 / 11/20/1991 / mg/Kg / 0 - 0.667'	SSI-X207 / SSI-X207 / 11/20/1991 / mg/Kg / 0 - 0.25'
Calcium	7440-70-2		**66,200**	**62,300**	**36,400**	**16,300**	**192,000**	**3,300**	**97,600**	**105,000**	**10,400**	**168,000**	**44,800**	**6,230**	**64,400**	**48,900**	**67,400**
Magnesium	7439-95-4		**36,300**	**12,000**	**10,100**	**5,190**	**106,000**	**3,650**	**57,400**	**10,700**	**829**	**96,900**	**19,900**	**5,630**	**35,600**	**19,700**	**34,400**
Potassium	9/7/7440		**1,250**	**3,010**	**4,670**	**1,470**	**972 J**	**1,700 J**	**850 J**	**4,400**	**1,520 J**	**597 J**	**1,100 J**	**1,450 J**	0.0 U	**13,500**	**6,570**
Sodium	7440-23-5		203 U	203 U	**572 J**	**334 J**	**177 J**	**4,530**	**220 J**	**2,590**	**256 J**	**295 J**	**307 J**	**1,000**	NM	**5,670**	**3,960**
Sulfate	14808-79-8		**1,070**	**767**	**637**	**10,800**	NM	NM	NM	NM	NM	NM	NM	NM	**254**	**296**	**88**
Sulfide	18496-25-8		**20**	5.7 U	5.6 U	**6**	NM	NM	NM	NM	NM	NM	NM	NM	NM	1.0 U	1.0 U

Notes:

1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NM	Not Measured

Appendix G-4-6
Other Inorganics Results for Deep Soil Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID / Sample ID / Date / Units / Depth	C-5 / C-5 / 11/11/1993 / mg/Kg / 3'	C-9 / C-9 / 11/9/1993 / mg/Kg / 7'	C-10 / C-10 / 11/10/1993 / mg/Kg / 7'	C-11 / C-11 / 11/9/1993 / mg/Kg / 10'	C-11 / C-11 / 11/9/1993 / mg/Kg / 15'	G-03 / G-03 / 11/9/1993 / mg/Kg / 15'	G-03 / G-03 / 11/9/1993 / mg/Kg / 5'	SB-311 / OU1-SS-SB311-2-4 / 10/3/2007 / mg/Kg / 2 - 4'	SB-312 / OU1-SS-SB312-2-4 / 10/3/2007 / mg/Kg / 2 - 4'	SB-313 / OU1-SS-SB313-2-4 / 10/3/2007 / mg/Kg / 2 - 4'	SB-314 / OU1-SS-SB314-2-4 / 10/3/2007 / mg/Kg / 2 - 4'	SB-315 / OU1-SS-SB315-2-4 / 10/3/2007 / mg/Kg / 2 - 4'	SB-317 / OU1-SS-SB317-2-4 / 10/3/2007 / mg/Kg / 2 - 4'	SB-318 / OU1-SS-SB318-2-4 / 10/3/2007 / mg/Kg / 2 - 4'	SB-319 / OU1-SS-SB319-2-4 / 10/3/2007 / mg/Kg / 2 - 4'
Calcium	7440-70-2		**56,700**	**20,200**	**38,600**	**25,500**	**103,000**	**78,800**	**38,100**	**72,200**	**3,620**	**78,600**	**8,430**	**73,900**	**3,200**	**45,900**	**153,000**
Magnesium	7439-95-4		**12,400**	**693 J**	**6,580**	**2,390**	**1,080**	**11,700**	**10,600**	**34,100**	**2,310**	**18,200**	**6,920**	**21,500**	**1,660**	**8,020**	**21,700**
Potassium	9/7/7440		**2,210**	**5,330**	**3,010**	**572 J**	**2,570**	**2,320**	**2,740**	**1,450 J**	**2,310**	**4,550**	**5,710**	**5,730**	**1,320 J**	**3,470**	**1,860 J**
Sodium	7440-23-5		213 U	**1,050 J**	**356 J**	**1,130**	**591 J**	**336 J**	210 U	**229 J**	**1,150**	**512 J**	**1,120**	**260 J**	**664**	**564 J**	**266 J**
Sulfate	14808-79-8		**479**	**8,640**	**503**	**4,160**	**1,830**	**527**	**498**	NM	NM	NM	NM	NM	NM	NM	NM
Sulfide	18496-25-8		8.4 U	**16.7**	5.7 U	**6**	5.6 U	**5.7**	8.4 U	NM	NM	NM	NM	NM	NM	NM	NM

Notes:

1,000 Bold indicates a detection

J The analyte was positively identified; the associated numerical value is the approximate concentration of

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NM Not Measured

Appendix G-4-6
Other Inorganics Results for Shallow Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID / Sample ID / Date / Units / Depth	ISA-X104 / ISA-X104 / 12/14/1993 / mg/Kg / 0 - 0.833'	ISA-X105 / ISA-X105 / 12/14/1993 / mg/Kg / 0 - 0.833'	ISA-X106 / ISA-X106 / 12/14/1993 / mg/Kg / 0 - 0.833'	MW-301H / OU1-SS-SB301-0-1 / 10/9/2007 / mg/Kg / 0 - 1'	MW-303H / OU1-SS-SB303-0-1 / 10/11/2007 / mg/Kg / 0 - 1'	MW-304S / OU1-SS-SB304-0-1 / 10/10/2007 / mg/Kg / 0 - 1'	MW-305H / OU1-SS-SB305-0-1 / 10/18/2007 / mg/Kg / 0 - 1'	MW-306S / OU1-SS-SB306-0-1 / 10/16/2007 / mg/Kg / 0 - 1'	SB-302 / OU1-SS-SB302-0-1 / 10/9/2007 / mg/Kg / 0 - 1'	SB-307 / OU1-SS-SB307-0-1 / 10/24/2007 / mg/Kg / 0 - 1'
Calcium	7440-70-2		0.0 U	**33,400**	**50,700**	**7,070**	**115,000**	**14,600**	**13,200**	**7,730 J**	**22,200**	**40,000**
Magnesium	7439-95-4		NM	NM	NM	**5,910**	**4,580**	**991**	**3,590**	**2,970**	**1,110**	**20,500**
Potassium	9/7/7440		**8,100**	0.0 U	0.0 U	**330**	**15,900**	**892**	**3,170**	**2,340**	**3,620**	**845**
Sodium	7440-23-5		**1,440**	**1,190**	**790 J**	**437**	**370**	**507**	**1,260**	**126 J**	**1,690**	**399 J**
Sulfate	14808-79-8		NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Sulfide	18496-25-8		NM	NM	NM	NM	NM	NM	NM	NM	NM	NM

Analyte	CAS #	Location ID / Sample ID / Date / Units / Depth	SB-308 / OU1-SS-SB308-0-1 / 10/17/2007 / mg/Kg / 0 - 1'	SB-309 / OU1-SS-SB309-0-1 / 10/17/2007 / mg/Kg / 0 - 1'	SB-316 / OU1-SS-SB316-0-1 / 10/3/2007 / mg/Kg / 0 - 1'	SLP-415 / OU1-SS-SLP415S-0908 / 8/13/2009 / mg/Kg / 0'	SLP-415 / OU1-SS-SLP415T-0908 / 8/13/2009 / mg/Kg / 0'	SSI-X103 / SSI-X103 / 11/21/1991 / mg/Kg / 0 - 0.5'	SSI-X104 / SSI-X104 / 11/21/1991 / mg/Kg / 0 - 0.5'
Calcium	7440-70-2		**11,600**	**13,700**	**23,500**	**38,600**	**2,490**	**32,200**	**12,400**
Magnesium	7439-95-4		**3,680**	**627**	**5,270**	**607 J**	**862 J**	**1,220**	**1,520**
Potassium	9/7/7440		**1,420**	**727**	**2,160 J**	**1,390 J**	**650 J**	**5,090**	**1,380**
Sodium	7440-23-5		**564**	**520**	**242 J**	**335 J**	**464 J**	**916 J**	**815 J**
Sulfate	14808-79-8		NM	NM	NM	NM	NM	**274**	**90**
Sulfide	18496-25-8		NM	NM	NM	NM	NM	1.0 U	1.0 U

Notes:

1,000 Bold indicates a detection

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

NM Not Measured

Appendix G-4-6
Other Inorganics Results for Deep Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID / Sample ID / Date / Units / Depth	MW-301H OU1-SS-SB301-40-41 10/9/2007 mg/Kg 40 - 41'	MW-301H OU1-SS-SB301-44-50 10/9/2007 mg/Kg 44 - 50'	MW-303H OU1-SS-SB303-108-109 10/11/2007 mg/Kg 108 - 109'	MW-303H OU1-SS-SB303-85-86 10/11/2007 mg/Kg 85 - 86'	MW-303H OU1-SS-SB303-89-90 10/11/2007 mg/Kg 89 - 90'	MW-304S OU1-SS-SB304-58-59 10/10/2007 mg/Kg 58 - 59'	MW-304S OU1-SS-SB304-59-60 10/10/2007 mg/Kg 59 - 60'	MW-305H OU1-SS-SB305-89-90 10/18/2007 mg/Kg 89 - 90'	MW-305H OU1-SS-SB305-90-91 10/18/2007 mg/Kg 90 - 91'	MW-306S OU1-SS-SB306-66-67 10/16/2007 mg/Kg 66 - 67'
Bicarbonate	71-52-3		NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Calcium	7440-70-2		**26,900**	**45,300**	**142,000**	**1,180 J**	**15,600**	**28,500**	**216,000**	**9,100**	**6,080**	**25,500 J**
Carbonate	3812-32-6		NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Magnesium	7439-95-4		**1,120**	**7,490**	**20,000**	1,260 U	**1,460**	**1,110**	**5,900**	**2,090**	**5,870**	**715**
Potassium	9/7/7440		**157 J**	**4,060**	**741**	**2,110 J**	**1,810**	**773**	**1,940**	**4,700**	**3,460**	**1,210**
Sodium	7440-23-5		**978**	**1,120**	**305**	**413 J**	**1,200**	**380**	**245**	**696**	**614**	**1,880**
Sulfate	14808-79-8		NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
Sulfide	18496-25-8		NM	NM	NM	NM	NM	NM	NM	NM	NM	NM

Analyte	CAS #	Location ID / Sample ID / Date / Units / Depth	MW-306S OU1-SS-SB306-67-68 10/16/2007 mg/Kg 67 - 68'	P-1 P-1 10/3/1994 mg/Kg 21'	P-1 P-1 10/3/1994 mg/Kg 80'	P-2 P-2 10/3/1994 mg/Kg 19'	P-2 P-2 DP 10/4/1994 mg/Kg 42'	P-2 P-2 10/4/1994 mg/Kg 42'	P-15A P-15A 9/29/1994 mg/Kg 20'	P-17 P-17 9/10/1994 mg/Kg 10'	P-17 P-17 9/10/1994 mg/Kg 42'	P-18 P-18 9/28/1994 mg/Kg 39'
Bicarbonate	71-52-3		NM	**90.4**	**470**	**374**	**96**	**93.2**	**773**	**376**	**909**	**191**
Calcium	7440-70-2		**127,000 J**	NM	NM	NM	NM	NM	NM	NM	NM	NM
Carbonate	3812-32-6		NM	**0.009**	**0.003**	**1.5**	**0.001**	**0.001**	**7.3**	**11.2**	**17.5**	**0.52**
Magnesium	7439-95-4		**5,350**	NM	NM	NM	NM	NM	NM	NM	NM	NM
Potassium	9/7/7440		**2,950**	NM	NM	NM	NM	NM	NM	NM	NM	NM
Sodium	7440-23-5		**457 J**	NM	NM	NM	NM	NM	NM	NM	NM	NM
Sulfate	14808-79-8		NM	**23,200**	**19,800**	**5,990**	**12,100**	**12,500**	**176**	**289**	**774**	**3,080**
Sulfide	18496-25-8		NM	24.0 U	21.3 U	22.8 U	23.4 U	**23**	**547**	20.9 U	**380**	21.6 U

Appendix G-4-6
Other Inorganics Results for Deep Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Depth	P-19 P-19 9/29/1994 mg/Kg 20'	P-19 P-19 9/29/1994 mg/Kg 42'	P-21 P-21 9/30/1994 mg/Kg 21'	P-21 P-21 9/30/1994 mg/Kg 41'	P-21 P-21 9/30/1994 mg/Kg 60'	P-21 P-21 10/3/1994 mg/Kg 2.5'	P-22 P-22 10/4/1994 mg/Kg 41'	P-22 P-22 10/5/1994 mg/Kg 106'	SB-302 OU1-SS-SB302-10.5-11 10/9/2007 mg/Kg 10.5 - 11.5'
Bicarbonate	71-52-3		**193**	**957**	**479**	**183**	**185**	**191**	**1,050**	**2,610**	NM
Calcium	7440-70-2		NM	NM	NM	NM	NM	NM	NM	NM	**15,800**
Carbonate	3812-32-6		**0.052**	**0.73**	**0.057**	**0.014**	**0.025**	**0.021**	**0.12**	**302**	NM
Magnesium	7439-95-4		NM	NM	NM	NM	NM	NM	NM	NM	**3,530**
Potassium	9/7/7440		NM	NM	NM	NM	NM	NM	NM	NM	**1,790**
Sodium	7440-23-5		NM	NM	NM	NM	NM	NM	NM	NM	**172**
Sulfate	14808-79-8		**3,580**	**3,990**	**11,500**	**12,900**	**9,300**	**3,100**	**6,120**	**472**	NM
Sulfide	18496-25-8		**24**	**129**	**78**	**13**	**23.9**	23.0 U	**20.8**	22.4 U	NM

Analyte	CAS #	Location ID Sample ID Date Units Depth	SB-302 OU1-SS-SB302-12-13 10/9/2007 mg/Kg 12 - 13'	SB-307 OU1-SS-SB307-7-8 10/24/2007 mg/Kg 7 - 8'	SB-307 OU1-SS-SB307-8-9 10/24/2007 mg/Kg 8 - 9'	SB-308 OU1-SS-SB308-26.5-27.5 10/17/2007 mg/Kg 26.5 - 27'	SB-308 OU1-SS-SB308-36.5-37.5 10/17/2007 mg/Kg 36.5 - 37'	SB-309)U1-SS-SB309-18.25-19.2 10/17/2007 mg/Kg 18.25 - 19.25'	SB-309 OU1-SS-SB309-28.25-29.25 10/17/2007 mg/Kg 28.25 - 29'	SB-309 OU1-SS-SB309-48-49 10/17/2007 mg/Kg 48 - 49'	SB-316 OU1-SS-SB316-2-4 10/3/2007 mg/Kg 2 - 4'
Bicarbonate	71-52-3		NM	NM	NM	NM	NM	NM	NM	NM	NM
Calcium	7440-70-2		**121,000**	**6,130**	**7,550**	**11,200**	**49,900**	**17,800**	**40,600**	**122,000**	**71,300**
Carbonate	3812-32-6		NM	NM	NM	NM	NM	NM	NM	NM	NM
Magnesium	7439-95-4		**66,600**	**634**	**1,040**	**1,890**	**16,100**	**871**	**2,540**	**17,600**	**25,400**
Potassium	9/7/7440		**830**	**726**	**1,430**	**742**	**828 J**	**808**	**945**	**1,120**	**1,530 J**
Sodium	7440-23-5		**140**	**338 J**	**367 J**	**326**	**514 J**	**614**	**391**	**228**	**196 J**
Sulfate	14808-79-8		NM	NM	NM	NM	NM	NM	NM	NM	NM
Sulfide	18496-25-8		NM	NM	NM	NM	NM	NM	NM	NM	NM

Notes:

	Exceedance of Residential RSL
1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NM	Not Measured

Appendix G-4-7
TCLP Results for Shallow Soil Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Depth USEPA TCLP Value (mg/L)	BH-3 B3/S1 10/1/1992 mg/L 0'	BH-6 B6/S1 10/1/1992 mg/L 0'	C-8 C-8 11/11/1993 mg/L 0'	C-9 C-9 11/9/1993 mg/L 0'	C-10 C-10 11/10/1993 mg/L 0'	C-11 C-11 11/9/1993 mg/L 0'
Aluminum	7429-90-5		NM	NM	0.10 U	0.10 U	0.10 U	0.10 U
Antimony	7440-36-0		NM	NM	0.025 U	0.025 U	0.025 U	0.025 U
Arsenic	7440-38-2	5	0.0010 U	0.0010 U	0.050 U	0.050 U	0.050 U	0.050 U
Barium	7440-39-3	100	**0.26**	**1.1**	**0.52**	**1.3**	**0.55**	**0.18 J**
Beryllium	7440-41-7		NM	NM	0.0010 U	0.0010 U	0.0010 U	0.0010 U
Cadmium	7440-43-9	1	**1.2**	**0.62**	**0.0053**	0.0040 U	**0.016**	**0.45**
Calcium	7440-70-2		NM	NM	**557**	**684**	**0.55**	**790**
Chromium	7440-47-3	5	0.010 U	0.010 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U
Cobalt	7440-48-4		NM	NM	**0.014 J**	**0.0072 J**	0.0050 U	0.0050 U
Copper	7440-50-8		NM	NM	0.0050 U	0.0050 U	0.0050 U	**0.012 J**
Iron	7439-89-6		NM	NM	0.075 U	0.075 U	0.075 U	**0.075**
Lead	7439-92-1	5	**0.38**	**0.43**	0.030 U	0.030 U	0.030 U	**1.8**
Magnesium	7439-95-4		NM	NM	**84**	**30.9**	**14.6**	**31.1**
Manganese	7439-96-5		NM	NM	**2.6**	**6.6**	**0.035**	**5.9**
Mercury	7439-97-6	0.2	0.0020 U	0.0020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
Nickel	7440-02-0		NM	NM	**0.033**	0.010 U	**0.012**	**0.011**
Potassium	7440-09-7		NM	NM	**7.5**	**43.5**	**66**	**14.6**
Selenium	7782-49-2	1	0.0020 U	0.0020 U	0.050 U	0.050 U	0.050 U	0.050 U
Silver	7440-22-4	5	**0.016**	**0.023**	0.050 U	0.0050 U	0.0050 U	0.0050 U
Thallium	7440-28-0		NM	NM	0.10 U	**0.0061 J**	0.10 U	**0.0052 J**
Vanadium	7440-62-2		NM	NM	**0.0060 J**	0.0050 U	0.050 U	0.0050 U
Zinc	7440-66-6		NM	NM	**0.12**	**0.088**	**1.6**	**69.1**

Notes:

	Exceedance of USEPA TCLP Value
1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

Appendix G-4-7
TCLP Results for Deep Soil Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Depth USEPA TCLP Value (mg/L)	C-5 C-5-12 11/12/1993 mg/L 12'	C-5 C-5 11/11/1993 mg/L 3'	C-7 C-7-6 11/12/1993 mg/L 6'	C-9 C-9 11/9/1993 mg/L 7'	C-10 C-10 11/10/1993 mg/L 7'	C-11 C-11 11/9/1993 mg/L 10'	C-11 C-11 11/9/1993 mg/L 15'	G-03 G-03 11/9/1993 mg/L 15'	G-03 G-03 11/9/1993 mg/L 5'
Aluminum	7429-90-5		NM	0.10 U	NM	**4.7**	0.10 U	**1**	0.10 U	0.10 U	0.10 U
Antimony	7440-36-0		NM	0.025 U	NM	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
Arsenic	7440-38-2	5	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
Barium	7440-39-3	100	1.7 U	**0.81**	**1.4**	**0.083**	**1.6**	**126 J**	**0.086 J**	**0.42**	**2.4**
Beryllium	7440-41-7		NM	0.0010 U	NM	**0.0043 J**	0.0010 U	**0.0017 J**	0.0010 U	0.0010 U	0.0010 U
Cadmium	7440-43-9	1	0.0040 U	0.0040 U	0.0040 U	**0.11**	**0.083**	**0.13**	**0.0075**	0.0040 U	0.0040 U
Calcium	7440-70-2		NM	**691**	NM	**637**	**576**	**287**	**190**	**684**	**677**
Chromium	7440-47-3	5	0.0050 U	0.0050 U	0.0050 U	**0.0055**	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U
Cobalt	7440-48-4		NM	0.0050 U	NM	**0.029 J**	0.0050 U	**0.022 J**	0.0050 U	0.0050 U	0.0050 U
Copper	7440-50-8		NM	**0.011 J**	NM	**0.097**	**0.0078 J**	**0.12**	0.0050 U	0.0050 U	**0.0091 J**
Iron	7439-89-6		NM	0.075 U	NM	**3.2**	0.075 U	**0.19**	0.075 U	0.075 U	0.075 U
Lead	7439-92-1	5	0.030 U	0.030 U	0.030 U	0.030 U	**0.12**	**0.57**	0.030 U	0.030 U	0.030 U
Magnesium	7439-95-4		NM	**38.1**	NM	**45.2**	**17.9**	**25.7**	**6.8**	**39**	**29**
Manganese	7439-96-5		NM	**5.2**	NM	**3**	**4**	**1.4**	**0.82**	**6.4**	**1.8**
Mercury	7439-97-6	0.2	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
Nickel	7440-02-0		NM	**0.023**	NM	**0.027**	**0.013**	**0.03**	**0.01**	0.010 U	0.010 U
Potassium	7440-09-7		NM	**15.6**	NM	**7.7**	**32.6**	**2.6 J**	**13.1**	**8.3**	2.0 U
Selenium	7782-49-2	1	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
Silver	7440-22-4	5	NM	0.0050 U	NM	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U
Thallium	7440-28-0		NM	0.10 U	NM	**0.0020 J**	0.10 U	**0.0024 J**	**0.0015 J**	**0.0026 J**	**0.0032 J**
Vanadium	7440-62-2		NM	0.0050 U	NM	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U	0.0050 U
Zinc	7440-66-6		NM	**0.16**	NM	**2.8**	**7**	**100**	**0.084**	**0.066**	**0.28**

Notes:

	Exceedance of USEPA TCLP Value
1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
NM	Not Measured

Appendix G-4-7
TCLP Results for Shallow Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Depth USEPA TCLP Value (mg/L)	BH-12 B12/S1 10/1/1992 mg/L 0'	BH-12 B12/S2 10/1/1992 mg/L 0'	GW1 GW1/S1 10/1/1992 mg/L 0'	GW2 GW2/S1 10/1/1992 mg/L 0'
Arsenic	7440-38-2	5	0.0010 U	0.0010 U	0.0010 U	**0.1**
Barium	7440-39-3	100	0.10 U	**0.24**	**0.26**	**0.64**
Cadmium	7440-43-9	1	**0.048**	**0.05**	**0.21**	**0.43**
Chromium	7440-47-3	5	0.010 U	**0.013**	**0.014**	**0.041**
Lead	7439-92-1	5	**1.1**	0.10 U	0.10 U	**5.2**
Mercury	7439-97-6	0.2	0.0020 U	0.0020 U	0.0020 U	**0.002**
Selenium	7782-49-2	1	0.0020 U	0.0020 U	0.0020 U	0.0020 U
Silver	7440-22-4	5	**0.032**	**0.015**	**0.013**	**0.027**

Notes:

	Exceedance of USEPA TCLP Value
1,000	Bold indicates a detection
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

Appendix G-4-7
TCLP Results for Deep Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Analyte	CAS #	Location ID Sample ID Date Units Depth USEPA TCLP Value (mg/L)	P-1 P-1 10/3/1994 mg/L 21'	P-1 P-1 10/3/1994 mg/L 80'	P-2 P-2 10/3/1994 mg/L 19'	P-2 P-2 10/4/1994 mg/L 42'	P-2 P-2 DP 10/4/1994 mg/L 42'	P-17 P-17 9/10/1994 mg/L 10'	P-17 P-17 9/10/1994 mg/L 42'	P-18 P-18 9/28/1994 mg/L 39'	P-19 P-19 9/29/1994 mg/L 20'	P-19 P-19 9/29/1994 mg/L 42'	P-21 P-21 9/30/1994 mg/L 21'	P-21 P-21 9/30/1994 mg/L 41'	P-21 P-21 9/30/1994 mg/L 60'	P-21 P-21 10/3/1994 mg/L 2.5'	P-22 P-22 10/4/1994 mg/L 41'	P-22 P-22 10/5/1994 mg/L 106'
Barium	7440-39-3	100	**0.055 J**	**0.078 J**	**0.13 J**	**0.078 J**	**0.078 J**	**1.5**	**0.92**	**0.25**	**0.16 J**	**0.13 J**	**0.069 J**	**0.10 J**	**0.11 J**	**0.054 J**	**0.075 J**	**0.62**
Cadmium	7440-43-9	1	**0.028**	**0.21**	**0.25**	**0.14**	**0.14**	**0.79**	**0.096**	**0.33**	**0.062**	**1.1**	**0.027**	**0.067**	**0.29**	**0.040**	**0.021**	**0.0080**
Chromium	7440-47-3	5	0.0050 U	**0.013**	0.0050 U	0.0050 U	0.0050 U	**0.020**	0.0050 U	**0.0068 J**	**0.0097 J**	0.0050 U	**0.0054 J**	0.0050 U	**0.0089 J**	0.0050 U	**0.0094 J**	0.0050 U
Iron	7439-89-6		0.050 U	**5.1**	0.050 U	**0.22**	**0.34**	**0.15**	**0.19**	**0.19**	**0.42**	**0.21**	0.050 U	0.050 U	**1.0**	0.050 U	**1.5**	0.050 U
Lead	7439-92-1	5	**3.4**	**0.023**	**0.63**	0.020 U	0.020 U	**7.2**	0.020 U	**0.12**	0.020 U	0.020 U	**0.048**	**0.51**	**0.39**	**2.4**	**0.21**	0.020 U
Manganese	7439-96-5		**0.13**	**5.4**	**7.2**	**0.052**	**0.054**	**2.8**	**7.4**	**1.8**	**0.17**	**0.32**	**0.65**	**0.67**	**0.78**	**0.062**	**0.069**	**4.9**
Mercury	7439-97-6	0.2	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U	0.00020 U
Nickel	7440-02-0		**0.081**	**0.78**	**0.049**	0.020 U	0.020 U	**0.035 J**	**0.23**	**0.25**	**0.029 J**	**1.1**	**0.094**	0.020 U	0.020 U	**0.025 J**	0.020 U	0.020 U
Zinc	7440-66-6		**1.7**	**662**	**7.6**	**2.1**	**2.2**	**7.8**	**4.5**	**4.9**	**107**	**9.1**	**4.6**	**1.1**	**6.4**	**184**	**6.2**	**1.7**

Notes:

	Exceedance of USEPA TCLP Value
1,000	Bold indicates a detection
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

Appendix G-4-8
SEP Results for Shallow Soil Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Sample ID	Date Collected	Location	Start Depth (ft)	End Depth (ft)	Parameter	Total	Exchangeable Bound Fraction	Organic Fraction	Carbonate Fraction	Non Crystalline Materials Fraction	Metal Hydroxide Bound Fraction	Sulfide Fraction	Residual Fraction
						Total	SEP Step 1	SEP Step 2	SEP Step 3	SEP Step 4	SEP Step 5	SEP Step 6	SEP Step 7
OU1-SS-SB311-0-1	10/3/2007	SB-311	0	1	Arsenic	17.6	1.8 U	4.9 J	1.8 U	2	0.76	12.2	1.6
OU1-SS-SB311-0-1	10/3/2007	SB-311	0	1	Cadmium	0.65	0.91 U	2.7 U	0.91 U	0.30 U	0.42	0.079 J	0.30 U
OU1-SS-SB311-0-1	10/3/2007	SB-311	0	1	Chromium	52.3	1.8 U	18.8	1.8 U	1	2.7	7.2	25.7
OU1-SS-SB311-0-1	10/3/2007	SB-311	0	1	Copper	17.9	4.7 U	14.2 U	4.7 U	8.3	2.9	4.5	1.3 J
OU1-SS-SB311-0-1	10/3/2007	SB-311	0	1	Lead	25.9	1.8 U	5.4 U	1.8 U	0.61 U	22.4	7.3	1.8
OU1-SS-SB311-0-1	10/3/2007	SB-311	0	1	Mercury	0.10 J	0.012 U	0.087	0.012 U	0.012 U	0.012 U	0.012 U	0.12 U
OU1-SS-SB311-0-1	10/3/2007	SB-311	0	1	Nickel	22.7	7.3 U	21.8 U	7.3 U	11.8	6.1	6.8	3.9
OU1-SS-SB311-0-1	10/3/2007	SB-311	0	1	Selenium	0.65	1.8 U	5.4 U	1.8 U	0.26 J	0.61 U	0.61 U	0.61
OU1-SS-SB311-0-1	10/3/2007	SB-311	0	1	Zinc	168	3.6 U	6.8 J	7.9	61	36.1	33.6 J	10.6 J

Notes:

J — The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

U — The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

Appendix G-4-8
SEP Results for Deep Soil Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Sample ID	Date Collected	Location	Start Depth (ft)	End Depth (ft)	Parameter	Total	Exchangeable Bound Fraction	Organic Fraction	Carbonate Fraction	Non Crystalline Materials Fraction	Metal Hydroxide Bound Fraction	Sulfide Fraction	Residual Fraction
						Total	SEP Step 1	SEP Step 2	SEP Step 3	SEP Step 4	SEP Step 5	SEP Step 6	SEP Step 7
OU1-SS-SB313-2-4	10/3/2007	SB-313	2	4	Arsenic	5.5	1.7 U	5.1 U	1.7 U	0.57 U	0.23 J	1.1	1.2
OU1-SS-SB313-2-4	10/3/2007	SB-313	2	4	Cadmium	0.33	0.85 U	2.5 U	0.85 U	0.28 U	0.086 J	0.28 U	0.28 U
OU1-SS-SB313-2-4	10/3/2007	SB-313	2	4	Chromium	52.1	1.7 U	4.2 J	1.7 U	0.64	2.4	6.8	27.7
OU1-SS-SB313-2-4	10/3/2007	SB-313	2	4	Copper	7.9	4.4 U	13.2 U	4.4 U	1.3 J	2.3	0.82 J	1.5
OU1-SS-SB313-2-4	10/3/2007	SB-313	2	4	Lead	10.4	1.7 U	5.1 U	1.7 U	0.57 U	2.7	0.89	0.37 J
OU1-SS-SB313-2-4	10/3/2007	SB-313	2	4	Mercury	0.11 U	0.011 U	0.034 U	0.011 U	0.011 U	0.011 U	0.011 U	0.11 U
OU1-SS-SB313-2-4	10/3/2007	SB-313	2	4	Nickel	40.5	0.77 J	20.4 U	6.8 U	2.7	7.3	8.5	4.2
OU1-SS-SB313-2-4	10/3/2007	SB-313	2	4	Selenium	1.7 U	1.7 U	5.1 U	1.7 U	0.57 U	0.50 J	0.57 U	0.27 J
OU1-SS-SB313-2-4	10/3/2007	SB-313	2	4	Zinc	75.1	3.4 U	6.4 J	0.69 J	2.5	8.3	9.3 J	12.7
OU1-SS-SB317-2-4	10/3/2007	SB-317	2	4	Arsenic	19	1.8 U	5.4 U	1.8 U	4.1	3.4	3.6	1.8
OU1-SS-SB317-2-4	10/3/2007	SB-317	2	4	Cadmium	9.4	0.38 J	1.9 J	4.5	0.38	3.5	0.8	0.14 J
OU1-SS-SB317-2-4	10/3/2007	SB-317	2	4	Chromium	61.1	1.8 U	5.4	1.8 U	0.55 J	7.4	15.1	38.7
OU1-SS-SB317-2-4	10/3/2007	SB-317	2	4	Copper	54.3	4.7 U	14.1 U	4.9	19.2	15.2	5.8	2.7
OU1-SS-SB317-2-4	10/3/2007	SB-317	2	4	Lead	130	1.8 U	5.4 U	3.1	4.3	106	35.5	6.9
OU1-SS-SB317-2-4	10/3/2007	SB-317	2	4	Mercury	0.14	0.012 U	0.15	0.012 U	0.012 U	0.012 U	0.012 U	0.12 U
OU1-SS-SB317-2-4	10/3/2007	SB-317	2	4	Nickel	40	0.78 J	21.7 U	7.2 U	6	18.6	17.1	8
OU1-SS-SB317-2-4	10/3/2007	SB-317	2	4	Selenium	0.84 U	1.8 U	5.4 U	1.8 U	0.60 U	0.60 U	0.60 U	0.32 J
OU1-SS-SB317-2-4	10/3/2007	SB-317	2	4	Zinc	2480	11.7	8.7 J	296	1060	1060	216 J	73.3

Notes:

J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

Appendix G-4-8
SEP Results for Shallow Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Sample ID	Date Collected	Location	Start Depth (ft)	End Depth (ft)	Parameter	Total	Exchangeable Bound Fraction	Organic Fraction	Carbonate Fraction	Non Crystalline Materials Fraction	Metal Hydroxide Bound Fraction	Sulfide Fraction	Residual Fraction
						Total	SEP Step 1	SEP Step 2	SEP Step 3	SEP Step 4	SEP Step 5	SEP Step 6	SEP Step 7
OU1-SS-SB301-0-1	10/9/2007	MW-301H	0	1	Arsenic	117	2.0 U	6.0 U	2.0 U	8.5	17.3	74	8.9
OU1-SS-SB301-0-1	10/9/2007	MW-301H	0	1	Cadmium	75.7	7.9	34	11.2	3.2	18.7	11.8	5.4
OU1-SS-SB301-0-1	10/9/2007	MW-301H	0	1	Chromium	54.3	2.0 U	2.0 J	2.0 U	0.75	3.8	8.3	15.7
OU1-SS-SB301-0-1	10/9/2007	MW-301H	0	1	Copper	511	5.2 U	24.1	88	109	62.1	129	25.4
OU1-SS-SB301-0-1	10/9/2007	MW-301H	0	1	Lead	3140	3.1	38.6	453	278	1700	490	195
OU1-SS-SB301-0-1	10/9/2007	MW-301H	0	1	Mercury	14.1	0.013 U	10.2	0.013 U	0.013 U	0.16	0.24	0.13 U
OU1-SS-SB301-0-1	10/9/2007	MW-301H	0	1	Nickel	45.9	1.7 J	24.1 U	1.7 J	5.4	9.9	20.5	5.6
OU1-SS-SB301-0-1	10/9/2007	MW-301H	0	1	Selenium	1.8	2.0 U	6.0 U	2.0 U	0.67 U	0.68 J	0.8	0.8
OU1-SS-SB301-0-1	10/9/2007	MW-301H	0	1	Zinc	53,300 J	941	513 J	17800	3640	16600	17,000 J	6,800 J
OU1-SS-SB316-0-1	10/3/2007	SB-316	0	1	Arsenic	33.5	1.7 U	5.2 U	1.7 U	2.8	7.5	24.4	6
OU1-SS-SB316-0-1	10/3/2007	SB-316	0	1	Cadmium	42.8	1.1	7.7	12.4	1.8	13.3	10.1	4.6
OU1-SS-SB316-0-1	10/3/2007	SB-316	0	1	Chromium	56.7	1.7 U	12.1	2.3	1.9	6.8	35	31.1
OU1-SS-SB316-0-1	10/3/2007	SB-316	0	1	Copper	247	4.5 U	13.4 U	27.9	77	66.5	57.5	43.3
OU1-SS-SB316-0-1	10/3/2007	SB-316	0	1	Lead	1200	1.7 U	5.2 U	62.2	35	1180	344	66
OU1-SS-SB316-0-1	10/3/2007	SB-316	0	1	Mercury	0.97	0.011 U	1.3	0.016	0.011 U	0.011 U	0.011 U	0.11 U
OU1-SS-SB316-0-1	10/3/2007	SB-316	0	1	Nickel	44.9	0.84 J	20.6 U	0.73 J	9.9	15.2	33.6	12
OU1-SS-SB316-0-1	10/3/2007	SB-316	0	1	Selenium	1	1.7 U	5.2 U	1.7 U	0.36 J	0.58	0.40 J	0.7
OU1-SS-SB316-0-1	10/3/2007	SB-316	0	1	Zinc	21200	56.6	41.0 J	3520	5520	7500	4030	2620
OU1-SS-SLP415S-0908	8/13/2009	SLP-415			Arsenic	52.9	1.6 U	0.88 J	3.7	2.8	1.7 J	5.4	2.7
OU1-SS-SLP415S-0908	8/13/2009	SLP-415			Cadmium	4.7 J	0.27 J	1.6	0.98	3.9	0.81 J	1.8	0.18 J
OU1-SS-SLP415S-0908	8/13/2009	SLP-415			Chromium	67	1.6 U	1.6 U	0.32 J	2.6	4.7 U	11.6	34.5
OU1-SS-SLP415S-0908	8/13/2009	SLP-415			Copper	1070	4.1 U	89.6	253	219	37.9	93	115
OU1-SS-SLP415S-0908	8/13/2009	SLP-415			Lead	111	1.6 U	42.8	21	93.4	4.7 U	15.3	6
OU1-SS-SLP415S-0908	8/13/2009	SLP-415			Mercury	0.49	0.010 U	0.010 U	0.010 U	0.51	0.12	0.0096 J	0.10 U
OU1-SS-SLP415S-0908	8/13/2009	SLP-415			Nickel	56.3	4.3 J	2.0 J	9.1	8.9	18.7 U	16.1	16
OU1-SS-SLP415S-0908	8/13/2009	SLP-415			Selenium	4.5 U	1.6 U	1.6 U	0.52 U	0.52 U	4.7 U	1.1 U	1.8 U
OU1-SS-SLP415S-0908	8/13/2009	SLP-415			Zinc	2,480 J	4.4	530 J	697	898 J	125	288	338

Notes:

J — The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

U — The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

Appendix G-4-8
SEP Results for Deep Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Sample ID	Date Collected	Location	Start Depth (ft)	End Depth (ft)	Parameter	Total	Exchangeable Bound Fraction	Organic Fraction	Carbonate Fraction	Non Crystalline Materials Fraction	Metal Hydroxide Bound Fraction	Sulfide Fraction	Residual Fraction
						Total	SEP Step 1	SEP Step 2	SEP Step 3	SEP Step 4	SEP Step 5	SEP Step 6	SEP Step 7
OU1-SS-SB302-10.5-11.5	10/9/2007	SB-302	10.5	11.5	Arsenic	32.7	1.9 U	2.1 J	1.9 U	2.1	5.2	14.7	3.1
OU1-SS-SB302-10.5-11.5	10/9/2007	SB-302	10.5	11.5	Cadmium	47.2	14.9	6	19.9	2.2	7.8	1.1	0.37
OU1-SS-SB302-10.5-11.5	10/9/2007	SB-302	10.5	11.5	Chromium	52.1	1.9 U	5.1 J	1.9 U	0.18 J	4.5	11	28.5
OU1-SS-SB302-10.5-11.5	10/9/2007	SB-302	10.5	11.5	Copper	53.6	4.9 U	14.7 U	3.0 J	6.4	11.9	10.4	17.2
OU1-SS-SB302-10.5-11.5	10/9/2007	SB-302	10.5	11.5	Lead	68.8	1.9 U	5.7 U	1.9 U	4.2	44.7	11.3	6.5
OU1-SS-SB302-10.5-11.5	10/9/2007	SB-302	10.5	11.5	Mercury	0.13 U	0.013 U	0.038 U	0.013 U	0.013 U	0.013 U	0.013 U	0.13 U
OU1-SS-SB302-10.5-11.5	10/9/2007	SB-302	10.5	11.5	Nickel	73.3	2.2 J	22.7 U	1.0 J	2.3 J	25.5	20.5	13.4
OU1-SS-SB302-10.5-11.5	10/9/2007	SB-302	10.5	11.5	Selenium	0.63 U	1.9 U	5.7 U	1.9 U	0.63 U	0.39 J	0.63 U	0.64
OU1-SS-SB302-10.5-11.5	10/9/2007	SB-302	10.5	11.5	Zinc	4350	785	7.8 J	1030	1180	628	262 J	192 J
OU1-SS-SB303-108-109	10/11/2007	MW-303H	108	109	Arsenic	11.7	1.7 U	5.0 U	1.7 U	0.61	0.25 J	9.3	1.1
OU1-SS-SB303-108-109	10/11/2007	MW-303H	108	109	Cadmium	4.6	0.84 U	0.42 J	2	0.28 U	1.5	0.51	0.085 J
OU1-SS-SB303-108-109	10/11/2007	MW-303H	108	109	Chromium	27.2	1.7 U	4.4 J	1.7 U	0.18 J	0.72	11	96.8
OU1-SS-SB303-108-109	10/11/2007	MW-303H	108	109	Copper	17.4	4.4 U	13.1 U	2.2 J	5.1	2	5.8	1.3 J
OU1-SS-SB303-108-109	10/11/2007	MW-303H	108	109	Lead	12.8	1.7 U	5.0 U	0.96 J	0.56 U	6.5	6.3	2.2
OU1-SS-SB303-108-109	10/11/2007	MW-303H	108	109	Mercury	0.11 U	0.011 U	0.034	0.011 U	0.011 U	0.011 U	0.011 U	0.11 U
OU1-SS-SB303-108-109	10/11/2007	MW-303H	108	109	Nickel	25.7	0.76 J	2.1 J	4.6 J	2.4	5.1	14.2	9.4
OU1-SS-SB303-108-109	10/11/2007	MW-303H	108	109	Selenium	1.6	1.7 U	4.3 J	1.7 U	0.56 U	0.43 J	0.35 J	1.3
OU1-SS-SB303-108-109	10/11/2007	MW-303H	108	109	Zinc	129 J	3.4 U	6.0 J	8.3	9.1	20.4	63.5 J	6.5 J
OU1-SS-SB303-89-90	10/11/2007	MW-303H	89	90	Arsenic	8.5	2.1 U	6.2 U	2.1 U	1.1	1.1	4.3	3.4
OU1-SS-SB303-89-90	10/11/2007	MW-303H	89	90	Cadmium	737	0.76 J	348	56	6.9	85.6	18.8	21
OU1-SS-SB303-89-90	10/11/2007	MW-303H	89	90	Chromium	115	2.1 U	5.5 J	2.1 U	0.98	8.3	14.1	80.2
OU1-SS-SB303-89-90	10/11/2007	MW-303H	89	90	Copper	402	5.4 U	14.0 J	119	72.2	29.7	83.6	23.1
OU1-SS-SB303-89-90	10/11/2007	MW-303H	89	90	Lead	148	2.1 U	6.2 U	5.5	4.7	57.4	30.3	628
OU1-SS-SB303-89-90	10/11/2007	MW-303H	89	90	Mercury	0.48	0.014 U	0.39	0.014 U	0.014 U	0.0083 J	0.032	0.14 U
OU1-SS-SB303-89-90	10/11/2007	MW-303H	89	90	Nickel	101	2.9 J	2.4 J	16.8	12.8	12.6	33.3	12.8
OU1-SS-SB303-89-90	10/11/2007	MW-303H	89	90	Selenium	11.3	2.1 U	5.5 J	2.1 U	0.32 J	0.66 J	2.7	0.96
OU1-SS-SB303-89-90	10/11/2007	MW-303H	89	90	Zinc	6,680 J	236	195 J	1700	2050	1830	497 J	177 J
OU1-SS-SB304-58-59	10/10/2007	MW-304S	58	59	Arsenic	9.9	1.7 U	5.2 U	1.7 U	1.3	0.59	1.5	11.2
OU1-SS-SB304-58-59	10/10/2007	MW-304S	58	59	Cadmium	90.9	2.2	5.4	49.5	2.6	10.7	4.5	15.9
OU1-SS-SB304-58-59	10/10/2007	MW-304S	58	59	Chromium	38.1	1.7 U	2.4 J	1.7 U	0.43 J	2.1	7.4	33.5
OU1-SS-SB304-58-59	10/10/2007	MW-304S	58	59	Copper	428	4.5 U	13.4 U	67.2	85.4	49.7	71.7	95.4
OU1-SS-SB304-58-59	10/10/2007	MW-304S	58	59	Lead	284	1.7 U	5.2 U	8.2	6.6	69.4	80.5	208
OU1-SS-SB304-58-59	10/10/2007	MW-304S	58	59	Mercury	0.11 U	0.011 U	0.034 U	0.011 U	0.011 U	0.011 U	0.011 U	0.11 U
OU1-SS-SB304-58-59	10/10/2007	MW-304S	58	59	Nickel	49.4	1.2 J	20.6 U	3.2 J	6.3	5.5	10.8	16.8
OU1-SS-SB304-58-59	10/10/2007	MW-304S	58	59	Selenium	0.77 U	1.7 U	5.2 U	1.7 U	0.57 U	0.49 J	0.57 U	0.57 U
OU1-SS-SB304-58-59	10/10/2007	MW-304S	58	59	Zinc	21,000 J	11.6	27.9 J	4250	3450	2350	2,160 J	2,880 J

Notes:

J — The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

U — The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

Appendix G-4-8
SEP Results for Shallow Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Sample ID	Date Collected	Location	Start Depth (ft)	End Depth (ft)	Parameter	Total	Exchangeable Bound Fraction	Organic Fraction	Carbonate Fraction	Non Crystalline Materials Fraction	Metal Hydroxide Bound Fraction	Sulfide Fraction	Residual Fraction
						Total	SEP Step 1	SEP Step 2	SEP Step 3	SEP Step 4	SEP Step 5	SEP Step 6	SEP Step 7
OU1-SS-SB301-0-1	10/9/2007	MW-301H	0	1	Arsenic	117	2.0 U	6.0 U	2.0 U	8.5	17.3	74	8.9
OU1-SS-SB301-0-1	10/9/2007	MW-301H	0	1	Cadmium	75.7	7.9	34	11.2	3.2	18.7	11.8	5.4
OU1-SS-SB301-0-1	10/9/2007	MW-301H	0	1	Chromium	54.3	2.0 U	2.0 J	2.0 U	0.75	3.8	8.3	15.7
OU1-SS-SB301-0-1	10/9/2007	MW-301H	0	1	Copper	511	5.2 U	24.1	88	109	62.1	129	25.4
OU1-SS-SB301-0-1	10/9/2007	MW-301H	0	1	Lead	3140	3.1	38.6	453	278	1700	490	195
OU1-SS-SB301-0-1	10/9/2007	MW-301H	0	1	Mercury	14.1	0.013 U	10.2	0.013 U	0.013 U	0.16	0.24	0.13 U
OU1-SS-SB301-0-1	10/9/2007	MW-301H	0	1	Nickel	45.9	1.7 J	24.1 U	1.7 J	5.4	9.9	20.5	5.6
OU1-SS-SB301-0-1	10/9/2007	MW-301H	0	1	Selenium	1.8	2.0 U	6.0 U	2.0 U	0.67 U	0.68 J	0.8	0.8
OU1-SS-SB301-0-1	10/9/2007	MW-301H	0	1	Zinc	53,300 J	941	513 J	17800	3640	16600	17,000 J	6,800 J
OU1-SS-SB316-0-1	10/3/2007	SB-316	0	1	Arsenic	33.5	1.7 U	5.2 U	1.7 U	2.8	7.5	24.4	6
OU1-SS-SB316-0-1	10/3/2007	SB-316	0	1	Cadmium	42.8	1.1	7.7	12.4	1.8	13.3	10.1	4.6
OU1-SS-SB316-0-1	10/3/2007	SB-316	0	1	Chromium	56.7	1.7 U	12.1	2.3	1.9	6.8	35	31.1
OU1-SS-SB316-0-1	10/3/2007	SB-316	0	1	Copper	247	4.5 U	13.4 U	27.9	77	66.5	57.5	43.3
OU1-SS-SB316-0-1	10/3/2007	SB-316	0	1	Lead	1200	1.7 U	5.2 U	62.2	35	1180	344	66
OU1-SS-SB316-0-1	10/3/2007	SB-316	0	1	Mercury	0.97	0.011 U	1.3	0.016	0.011 U	0.011 U	0.011 U	0.11 U
OU1-SS-SB316-0-1	10/3/2007	SB-316	0	1	Nickel	44.9	0.84 J	20.6 U	0.73 J	9.9	15.2	33.6	12
OU1-SS-SB316-0-1	10/3/2007	SB-316	0	1	Selenium	1	1.7 U	5.2 U	1.7 U	0.36 J	0.58	0.40 J	0.7
OU1-SS-SB316-0-1	10/3/2007	SB-316	0	1	Zinc	21200	56.6	41.0 J	3520	5520	7500	4030	2620
OU1-SS-SLP415S-0908	8/13/2009	SLP-415			Arsenic	52.9	1.6 U	0.88 J	3.7	2.8	1.7 J	5.4	2.7
OU1-SS-SLP415S-0908	8/13/2009	SLP-415			Cadmium	4.7 J	0.27 J	1.6	0.98	3.9	0.81 J	1.8	0.18 J
OU1-SS-SLP415S-0908	8/13/2009	SLP-415			Chromium	67	1.6 U	1.6 U	0.32 J	2.6	4.7 U	11.6	34.5
OU1-SS-SLP415S-0908	8/13/2009	SLP-415			Copper	1070	4.1 U	89.6	253	219	37.9	93	115
OU1-SS-SLP415S-0908	8/13/2009	SLP-415			Lead	111	1.6 U	42.8	21	93.4	4.7 U	15.3	6
OU1-SS-SLP415S-0908	8/13/2009	SLP-415			Mercury	0.49	0.010 U	0.010 U	0.010 U	0.51	0.12	0.0096 J	0.10 U
OU1-SS-SLP415S-0908	8/13/2009	SLP-415			Nickel	56.3	4.3 J	2.0 J	9.1	8.9	18.7 U	16.1	16
OU1-SS-SLP415S-0908	8/13/2009	SLP-415			Selenium	4.5 U	1.6 U	1.6 U	0.52 U	0.52 U	4.7 U	1.1 U	1.8 U
OU1-SS-SLP415S-0908	8/13/2009	SLP-415			Zinc	2,480 J	4.4	530 J	697	898 J	125	288	338

Notes:

J — The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

U — The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

Appendix G-4-8
SEP Results for Deep Soil Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

Sample ID	Date Collected	Location	Start Depth (ft)	End Depth (ft)	Parameter	Total	Exchangeable Bound Fraction	Organic Fraction	Carbonate Fraction	Non Crystalline Materials Fraction	Metal Hydroxide Bound Fraction	Sulfide Fraction	Residual Fraction
						Total	SEP Step 1	SEP Step 2	SEP Step 3	SEP Step 4	SEP Step 5	SEP Step 6	SEP Step 7
OU1-SS-SB302-10.5-11.5	10/9/2007	SB-302	10.5	11.5	Arsenic	32.7	1.9 U	2.1 J	1.9 U	2.1	5.2	14.7	3.1
OU1-SS-SB302-10.5-11.5	10/9/2007	SB-302	10.5	11.5	Cadmium	47.2	14.9	6	19.9	2.2	7.8	1.1	0.37
OU1-SS-SB302-10.5-11.5	10/9/2007	SB-302	10.5	11.5	Chromium	52.1	1.9 U	5.1 J	1.9 U	0.18 J	4.5	11	28.5
OU1-SS-SB302-10.5-11.5	10/9/2007	SB-302	10.5	11.5	Copper	53.6	4.9 U	14.7 U	3.0 J	6.4	11.9	10.4	17.2
OU1-SS-SB302-10.5-11.5	10/9/2007	SB-302	10.5	11.5	Lead	68.8	1.9 U	5.7 U	1.9 U	4.2	44.7	11.3	6.5
OU1-SS-SB302-10.5-11.5	10/9/2007	SB-302	10.5	11.5	Mercury	0.13 U	0.013 U	0.038 U	0.013 U	0.013 U	0.013 U	0.013 U	0.13 U
OU1-SS-SB302-10.5-11.5	10/9/2007	SB-302	10.5	11.5	Nickel	73.3	2.2 J	22.7 U	1.0 J	2.3 J	25.5	20.5	13.4
OU1-SS-SB302-10.5-11.5	10/9/2007	SB-302	10.5	11.5	Selenium	0.63 U	1.9 U	5.7 U	1.9 U	0.63 U	0.39 J	0.63 U	0.64
OU1-SS-SB302-10.5-11.5	10/9/2007	SB-302	10.5	11.5	Zinc	4350	785	7.8 J	1030	1180	628	262 J	192 J
OU1-SS-SB303-108-109	10/11/2007	MW-303H	108	109	Arsenic	11.7	1.7 U	5.0 U	1.7 U	0.61	0.25 J	9.3	1.1
OU1-SS-SB303-108-109	10/11/2007	MW-303H	108	109	Cadmium	4.6	0.84 U	0.42 J	2	0.28 U	1.5	0.51	0.085 J
OU1-SS-SB303-108-109	10/11/2007	MW-303H	108	109	Chromium	27.2	1.7 U	4.4 J	1.7 U	0.18 J	0.72	11	96.8
OU1-SS-SB303-108-109	10/11/2007	MW-303H	108	109	Copper	17.4	4.4 U	13.1 U	2.2 J	5.1	2	5.8	1.3 J
OU1-SS-SB303-108-109	10/11/2007	MW-303H	108	109	Lead	12.8	1.7 U	5.0 U	0.96 J	0.56 U	6.5	6.3	2.2
OU1-SS-SB303-108-109	10/11/2007	MW-303H	108	109	Mercury	0.11 U	0.011 U	0.034	0.011 U	0.011 U	0.011 U	0.011 U	0.11 U
OU1-SS-SB303-108-109	10/11/2007	MW-303H	108	109	Nickel	25.7	0.76 J	2.1 J	4.6 J	2.4	5.1	14.2	9.4
OU1-SS-SB303-108-109	10/11/2007	MW-303H	108	109	Selenium	1.6	1.7 U	4.3 J	1.7 U	0.56 U	0.43 J	0.35 J	1.3
OU1-SS-SB303-108-109	10/11/2007	MW-303H	108	109	Zinc	129 J	3.4 U	6.0 J	8.3	9.1	20.4	63.5 J	6.5 J
OU1-SS-SB303-89-90	10/11/2007	MW-303H	89	90	Arsenic	8.5	2.1 U	6.2 U	2.1 U	1.1	1.1	4.3	3.4
OU1-SS-SB303-89-90	10/11/2007	MW-303H	89	90	Cadmium	737	0.76 J	348	56	6.9	85.6	18.8	21
OU1-SS-SB303-89-90	10/11/2007	MW-303H	89	90	Chromium	115	2.1 U	5.5 J	2.1 U	0.98	8.3	14.1	80.2
OU1-SS-SB303-89-90	10/11/2007	MW-303H	89	90	Copper	402	5.4 U	14.0 J	119	72.2	29.7	83.6	23.1
OU1-SS-SB303-89-90	10/11/2007	MW-303H	89	90	Lead	148	2.1 U	6.2 U	5.5	4.7	57.4	30.3	628
OU1-SS-SB303-89-90	10/11/2007	MW-303H	89	90	Mercury	0.48	0.014 U	0.39	0.014 U	0.014 U	0.0083 J	0.032	0.14 U
OU1-SS-SB303-89-90	10/11/2007	MW-303H	89	90	Nickel	101	2.9 J	2.4 J	16.8	12.8	12.6	33.3	12.8
OU1-SS-SB303-89-90	10/11/2007	MW-303H	89	90	Selenium	11.3	2.1 U	5.5 J	2.1 U	0.32 J	0.66 J	2.7	0.96
OU1-SS-SB303-89-90	10/11/2007	MW-303H	89	90	Zinc	6,680 J	236	195 J	1700	2050	1830	497 J	177 J
OU1-SS-SB304-58-59	10/10/2007	MW-304S	58	59	Arsenic	9.9	1.7 U	5.2 U	1.7 U	1.3	0.59	1.5	11.2
OU1-SS-SB304-58-59	10/10/2007	MW-304S	58	59	Cadmium	90.9	2.2	5.4	49.5	2.6	10.7	4.5	15.9
OU1-SS-SB304-58-59	10/10/2007	MW-304S	58	59	Chromium	38.1	1.7 U	2.4 J	1.7 U	0.43 J	2.1	7.4	33.5
OU1-SS-SB304-58-59	10/10/2007	MW-304S	58	59	Copper	428	4.5 U	13.4 U	67.2	85.4	49.7	71.7	95.4
OU1-SS-SB304-58-59	10/10/2007	MW-304S	58	59	Lead	284	1.7 U	5.2 U	8.2	6.6	69.4	80.5	208
OU1-SS-SB304-58-59	10/10/2007	MW-304S	58	59	Mercury	0.11 U	0.011 U	0.034 U	0.011 U	0.011 U	0.011 U	0.011 U	0.11 U
OU1-SS-SB304-58-59	10/10/2007	MW-304S	58	59	Nickel	49.4	1.2 J	20.6 U	3.2 J	6.3	5.5	10.8	16.8
OU1-SS-SB304-58-59	10/10/2007	MW-304S	58	59	Selenium	0.77 U	1.7 U	5.2 U	1.7 U	0.57 U	0.49 J	0.57 U	0.57 U
OU1-SS-SB304-58-59	10/10/2007	MW-304S	58	59	Zinc	21,000 J	11.6	27.9 J	4250	3450	2350	2,160 J	2,880 J

Notes:

J — The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

U — The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

Appendix G-4-9
Metals and Cyanide Results for Groundwater Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site

Analyte	CAS #	Tapwater RSL (µg/L)	Location ID Sample ID Date Units Total or Dissolved MCL (µg/L)	G-02 G-02 11/15/1993 µg/L D	G-02 G-02 11/15/1993 µg/L T	G-05 G-05 11/15/1993 µg/L D	G-05 G-05 11/15/1993 µg/L T	G-101 G101 10/1/1992 µg/L T	G-101 G101 11/1/1991 µg/L T	G-101 G101 11/15/1993 µg/L D	G-101 G101 11/15/1993 µg/L T	G-103 G103 10/1/1992 µg/L T	G-103 G103 11/1/1991 µg/L T	G-103 G103 11/15/1993 µg/L D	G-103 G103 11/15/1993 µg/L T	G-106 G106 10/1/1992 µg/L T
Aluminum	7429-90-5	37,000	NS	100 U	**996**	100 U	**6310**	NM	**48,300**	100 U	100 U	NM	**123,000**	100 U	100 U	NM
Antimony	7440-36-0	15	6	25.0 U	25.0 U	25.0 U	25.0 U	NM	25.0 U	25.0 U	25.0 U	NM	25.0 U	25.0 U	25.0 U	NM
Arsenic	7440-38-2	0.045	10	**1.3**	1.0 U	**2.6 J**	**5.5 J**	**3**	**21.1**	**2.0 J**	**1.2 J**	**3**	**7.1 J**	**3**	**1**	**6**
Barium	7440-39-3	7,300	2,000	**39.8**	**55.2**	**47.8 J**	**134**	100 U	**362**	**17.8 J**	**18.2 J**	**2,180**	**2,530**	**18.6**	**23.7**	**320**
Beryllium	7440-41-7	73	4	1.0 U	1.0 U	1.0 U	1.0 U	NM	**2.0 J**	1.0 U	1.0 U	NM	**13**	1.0 U	1.0 U	NM
Cadmium	7440-43-9	18	5	4.0 U	4.0 U	**5.3**	**25.5**	5.0 U	**37**	4.0 U	4.0 U	**12**	**19**	4.0 U	4.0 U	**46**
Chromium	7440-47-3	NS	100**	5.0 U	**5.7**	5.0 U	**7.7 J**	**13**	**57**	5.0 U	5.0 U	**163**	**248**	5.0 U	5.0 U	**65**
Cobalt	7440-48-4	11	NS	**20.3**	**19**	**13.9 J**	**22.4 J**	NM	**47.0 J**	5.0 U	5.0 U	NM	**71.1**	5.0 U	5.0 U	NM
Copper	7440-50-8	1,500	1,300	**77**	**31.1**	5.0 U	**94**	NM	**100**	**9.9 J**	**13.4**	NM	**249**	5.0 U	5.0 U	NM
Cyanide	57-12-5	730	200	NM	6.2 U	NM	5.0 U	NM	8.3 U	NM	6.2 U	NM	5.0 U	NM	5.0 U	NM
Iron	7439-89-6	26,000	NS	75.0 U	**838**	**597**	**11200**	NM	**33,800**	75.0 U	75.0 U	NM	**208,000**	75.0 U	75.0 U	NM
Lead	7439-92-1	NS	15	**2**	**5.8**	**291**	**2,180**	**38**	**614**	**11.3**	**11**	**45**	20.0 U	**3.2**	5.0 U	**130**
Manganese	7439-96-5	880	NS	**4,370**	**3,830**	**3,150**	**3,240**	NM	**3,700**	**23.7**	**26.3**	NM	**14,400**	**460**	**433**	NM
Mercury	7439-97-6	0.57	2	0.20 U	0.20 U	0.20 U	**12.9**	0.20 U	**1.6**	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Nickel	7440-02-0	730	NS	**38.7**	**41.3**	**13.6 J**	**38**	NM	**75**	**11.0 J**	**13.6 J**	NM	**207**	**10.8**	**12**	NM
Selenium	7782-49-2	180	50	5.0 U	5.0 U	5.0 U	5.0 U	2.0 U	20.0 U	5.0 U	5.0 U	2.0 U	20.0 U	5.0 U	5.0 U	2.0 U
Silver	7440-22-4	180	NS	5.0 U	5.0 U	5.0 U	5.0 U	10.0 U	9.0 U	5.0 U	5.0 U	**33**	9.0 U	5.0 U	5.0 U	**55**
Thallium	7440-28-0	2.4++	2	1.0 U	1.0 U	1.0 U	1.0 U	NM	3.0 U	1.0 U	1.0 U	NM	3.0 U	1.0 U	1.0 U	NM
Vanadium	7440-62-2	180	NS	5.0 U	5.0 U	5.0 U	**15.0 J**	NM	**62**	5.0 U	5.0 U	NM	**253**	5.0 U	5.0 U	NM
Zinc	7440-66-6	11,000	NS	**538**	**305**	**3,280**	**6**	NM	**3,320**	**216**	**229**	NM	**3,640**	**180**	**175**	NM

Notes:

	Exceedance of Tapwater RSL and/or MCL
1,000	Bold indicates a detection
J	Estimated
U	Non-Detect
NM	Not Measured
NS	No applicable standard
T	Total
D	Dissolved
**	Screening value for total chromium is based on April 2009 US EPA RSL.
++	Screening value for thallium is based on April 2009 US EPA RSL.

Appendix G-4-9
Metals and Cyanide Results for Groundwater Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site

Analyte	CAS #	Tapwater RSL (µg/L)	Location ID Sample ID Date Units Total or Dissolved MCL (µg/L)	G-106 G106 11/1/1991 µg/L T	G-106 G106 11/16/1993 µg/L D	G-106 G106 11/16/1993 µg/L T	G-02 OU1-GW-G-02-0712 12/5/2007 µg/L T	G-101 OU1-GW-G-101-0712 12/5/2007 µg/L T	G-101 OU1-GW-G-101-0712 12/6/2007 µg/L D	G-103 OU1-GW-G-103-0712 12/3/2007 µg/L T	G-106 OU1-GW-G-106-0712 12/4/2007 µg/L D
Aluminum	7429-90-5	37,000	NS	**55,000**	100 U	100 U	**1430**	**260**	36.4 U	100 U	100 U
Antimony	7440-36-0	15	6	25.0 U	25.0 U	25.0 U	0.39 U	0.39 U	0.39 U	5.0 U	5.0 U
Arsenic	7440-38-2	0.045	10	**8.4 J**	**7.6**	**2.5**	**1.1 J**	0.52 U	**1.9 J**	5.0 U	5.0 U
Barium	7440-39-3	7,300	2,000	**384**	**22.3**	**17.2**	**37.6**	**32.9**	**33.1**	**27.3**	**20.1**
Beryllium	7440-41-7	73	4	**5.0 J**	1.0 U	1.0 U	0.48 U	0.48 U	0.48 U	5.0 U	5.0 U
Cadmium	7440-43-9	18	5	**35**	4.0 U	**5.6**	**2.1 J**	0.21 U	0.21 U	5.0 U	**45.7**
Chromium	7440-47-3	NS	100**	**121**	5.0 U	5.0 U	**417**	**1.5 J**	**1.2 J**	15.0 U	15.0 U
Cobalt	7440-48-4	11	NS	**74**	**16.1**	**12.4**	**22.6**	**2.0 J**	**2.1 J**	5.0 U	**8.2**
Copper	7440-50-8	1,500	1,300	**385**	5.0 U	5.0 U	**13.7**	**6.7**	**6.3**	5.0 U	**5.6**
Cyanide	57-12-5	730	200	5.0 U	NM	5.0 U	NM	10.0 U	NM	10.0 U	NM
Iron	7439-89-6	26,000	NS	**84,600**	**3210**	**3050**	**2450**	**151**	21.6 U	**288**	**947**
Lead	7439-92-1	NS	15	**605**	5.2 U	**9.6**	**2.4 J**	**0.74 J**	0.60 U	5.0 U	5.0 U
Manganese	7439-96-5	880	NS	**9,110**	**6,550**	**6,240**	**5,690**	**6.8 J**	**1.1 J**	**1,900**	**1,960**
Mercury	7439-97-6	0.57	2	0.20 U	0.20 U	0.20 U	0.028 U	0.028 U	0.028 U	0.20 U	0.20 U
Nickel	7440-02-0	730	NS	**116**	**22.5**	**22.2**	**385**	**18.7**	**21.3**	**25.2**	**63**
Selenium	7782-49-2	180	50	20.0 U	5.0 U	5.0 U	0.74 U	0.74 U	**6.2**	5.0 U	5.0 U
Silver	7440-22-4	180	NS	9.0 U	5.0 U	5.0 U	**6.7 J**	3.7 U	3.7 U	10.0 U	10.0 U
Thallium	7440-28-0	2.4++	2	30.0 U	1.0 U	1.0 U	0.38 U	**0.45 J**	0.38 U	5.0 U	5.0 U
Vanadium	7440-62-2	180	NS	**19.0 J**	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	5.0 U	5.0 U
Zinc	7440-66-6	11,000	NS	**17,100**	**11,000**	**10,200**	**1,010**	**19.9 J**	**10.7 J**	**180**	**15,300**

Notes:

	Exceedance of Tapwater RSL and/or MCL
1,000	Bold indicates a detection
J	Estimated
U	Non-Detect
NM	Not Measured
NS	No applicable standard
T	Total
D	Dissolved
**	Screening value for total chromium is based on April 2009 US EPA RSl
++	Screening value for thallium is based on April 2009 US EPA RSL.

Appendix G-4-9
Metals and Cyanide Results for Groundwater Samples Collected from the Plant Area
Matthiessen and Hegeler Zinc Company Site

Analyte	CAS #	Tapwater RSL (µg/L)	Location ID Sample ID Date Units Total or Dissolved MCL (µg/L)	G-106 OU1-GW-G-106-0712 12/4/2007 µg/L T	MW-A OU1-GW-MW404-0712 12/5/2007 µg/L T	MW-A OU1-GW-MW-A-0712 12/5/2007 µg/L D	MW-A OU1-GW-MW-A-0712 12/5/2007 µg/L T
Aluminum	7429-90-5	37,000	NS	100 U	36.4 U	36.4 U	36.4 U
Antimony	7440-36-0	15	6	5.0 U	0.39 U	0.39 U	0.39 U
Arsenic	7440-38-2	0.045	10	5.0 U	0.52 U	**1.3 J**	0.52 U
Barium	7440-39-3	7,300	2,000	**20.4**	**15.4**	**15.3**	**15.5**
Beryllium	7440-41-7	73	4	5.0 U	0.48 U	0.48 U	0.48 U
Cadmium	7440-43-9	18	5	**47.9**	**81.8**	**82.4**	**81.5**
Chromium	7440-47-3	NS	100**	15.0 U	1.1 U	1.1 U	1.1 U
Cobalt	7440-48-4	11	NS	**8.6**	**4.7 J**	**4.7 J**	**4.5 J**
Copper	7440-50-8	1,500	1,300	5.0 U	**6.4**	**6.5**	**6.3**
Cyanide	57-12-5	730	200	10.0 U	10.0 U	NM	10.0 U
Iron	7439-89-6	26,000	NS	**889**	**1510**	**1500**	**1530**
Lead	7439-92-1	NS	15	5.0 U	0.60 U	0.60 U	0.60 U
Manganese	7439-96-5	880	NS	**1,890**	**4,550**	**4,540**	**4,470**
Mercury	7439-97-6	0.57	2	0.20 U	0.028 U	0.028 U	0.028 U
Nickel	7440-02-0	730	NS	**62.3**	**84.9**	**97.4**	**80.6**
Selenium	7782-49-2	180	50	5.0 U	**1.6 J**	**6.2**	**1.2 J**
Silver	7440-22-4	180	NS	10.0 U	**7.8 J**	**7.8 J**	**8.6 J**
Thallium	7440-28-0	2.4++	2	5.0 U	0.38 U	0.38 U	0.38 U
Vanadium	7440-62-2	180	NS	5.0 U	1.0 U	1.0 U	1.0 U
Zinc	7440-66-6	11,000	NS	**14,300**	**16,300**	**16,100**	**16,200**

Notes:

	Exceedance of Tapwater RSL and/or MCL
1,000	Bold indicates a detection
J	Estimated
U	Non-Detect
NM	Not Measured
NS	No applicable standard
T	Total
D	Dissolved
**	Screening value for total chromium is based on April 2009 US EPA RSl
++	Screening value for thallium is based on April 2009 US EPA RSL.

Appendix G-4-9
Metals and Cyanide Results for Groundwater Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site

Analyte	CAS #	Tapwater RSL (µg/L)	Location ID Sample ID Date Units Total or Dissolved MCL (µg/L)	MW-1 MW-1 10/1/1992 µg/L T	MW-1 MW-1 11/16/1993 µg/L D	MW-1 MW-1 11/16/1993 µg/L T	MW-1 MW-1 11/5/1994 µg/L T	MW-1 MW-1-Dup 11/5/1994 µg/L T	MW-2 MW-2 10/1/1992 µg/L T	MW-2 MW-2 11/16/1993 µg/L D	MW-2 MW-2 11/16/1993 µg/L T	MW-2 MW-2 11/9/1994 µg/L T	ISW-001 OU1-GW-ISW001-0906 6/19/2009 µg/L D	ISW-001 OU1-GW-ISW001-0906 6/19/2009 µg/L T
Aluminum	7429-90-5	37,000	NS	NM	**479**	**3740**	NM	NM	NM	**780**	**25,800**	NM	100 U	**1,150**
Antimony	7440-36-0	15	6	NM	25.0 U	25.0 U	NM	NM	NM	25.0 U	25.0 U	NM	60.0 U	60.0 U
Arsenic	7440-38-2	0.045	10	**3**	**5.6**	**9**	NM	NM	**19**	**7**	**22**	NM	**7**	**11**
Barium	7440-39-3	7,300	2,000	**350**	**41.7**	**85.1**	**24.3 J**	**24.2 J**	**480**	**28**	**1,080**	**33.8 J**	**123**	**135**
Beryllium	7440-41-7	73	4	NM	1.0 U	1.0 U	NM	NM	NM	1.0 U	**4**	NM	1.0 U	1.0 U
Cadmium	7440-43-9	18	5	**15**	**12.1**	**28.9**	**13.9**	**12.5**	**11**	4.0 U	**51**	3.0 U	1.0 U	**13**
Chromium	7440-47-3	NS	100**	**22**	5.0 U	5.0 U	5.0 U	5.0 U	**79**	5.0 U	**77**	5.0 U	2.0 U	**5**
Cobalt	7440-48-4	11	NS	NM	**8.2**	**8.2**	NM	NM	NM	**30**	**101**	NM	**16**	**16**
Copper	7440-50-8	1,500	1,300	NM	5.0 U	**21.7**	NM	NM	NM	**7**	**3,120**	NM	**1**	**101**
Cyanide	57-12-5	730	200	NM	NM	6.2 U	**8.5**	6.2 U	NM	NM	5.0 U	**6.7**	NM	NM
Iron	7439-89-6	26,000	NS	NM	**1160**	**7280**	**3910**	**4450**	NM	**3,910**	**137,000**	**5,900**	**5,130**	**8,340**
Lead	7439-92-1	NS	15	**22**	**10.8**	**31.3**	5.0 U	5.0 U	**110**	**24.5**	**303**	5.0 U	1.0 U*	**53.9**
Manganese	7439-96-5	880	NS	NM	**7,700**	**6,580**	**9,800**	**10,800**	NM	**4,020**	**16,900**	**2,650**	**1,220**	**1,060**
Mercury	7439-97-6	0.57	2	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	**2.1**	0.20 U	0.20 U	**0.47**
Nickel	7440-02-0	730	NS	NM	**14.9**	**30.1**	**47.1**	**29.0 J**	NM	**14.7**	**212**	**37.7 J**	**20**	**21.8**
Selenium	7782-49-2	180	50	**2**	5.0 U	5.0 U	NM	NM	**2**	5.0 U	5.0 U	NM	2.0 U	2.0 U
Silver	7440-22-4	180	NS	**18**	5.0 U	5.0 U	NM	NM	**38**	5.0 U	5.0 U	NM	10.0 U	10.0 U
Thallium	7440-28-0	2.4++	2	NM	1.0 U	1.0 U	NM	NM	NM	1.0 U	**1.3**	NM	1.0 U	1.0 U
Vanadium	7440-62-2	180	NS	NM	**6.8**	**15.9**	NM	NM	NM	5.0 U	**155**	NM	1.0 U	**2**
Zinc	7440-66-6	11,000	NS	NM	**5,090**	**7,200**	**8,370**	**8,280**	NM	**2,270**	**26,400**	**1,130**	**58.9**	**472**

Notes:

	Exceedance of Tapwater RSL and/or MCL
1,000	Bold indicates a detection
J	Estimated
U	Non-Detect
NM	Not Measured
NS	No applicable standard
T	Total
D	Dissolved
**	Screening value for total chromium is based on April 2009 US EPA RSL.
++	Screening value for thallium is based on April 2009 US EPA RSL.

Appendix G-4-9
Metals and Cyanide Results for Groundwater Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site

Analyte	CAS #	Tapwater RSL (µg/L)	Location ID / Sample ID / Date / Units / Total or Dissolved / MCL (µg/L)	ISW-001 OU1-GW-ISW001-0908 8/19/2009 µg/L D	ISW-001 OU1-GW-ISW001-0908 8/19/2009 µg/L T	ISW-002 OU1-GW-ISW002-0906 6/19/2009 µg/L D	ISW-002 OU1-GW-ISW002-0906 6/19/2009 µg/L T	ISW-002 OU1-GW-ISW002-0908 8/20/2009 µg/L D	ISW-002 OU1-GW-ISW002-0908 8/20/2009 µg/L T	MW-2 OU1-GW-MW2-0801 1/14/2008 µg/L D
Aluminum	7429-90-5	37,000	NS	14.9 U	**1,340**	100 U	100 U	14.9 U	**10,600**	100 U
Antimony	7440-36-0	15	6	0.93 U	60.0 U	60.0 U	60.0 U	0.93 U	60.0 U	1.0 U
Arsenic	7440-38-2	0.045	10	**7.4 J**	**14**	**10**	**9.9**	**12**	**57**	**5.3**
Barium	7440-39-3	7,300	2,000	**157**	**174**	**24**	**23.9**	**25**	**81**	**33.6**
Beryllium	7440-41-7	73	4	0.14 U	0.14 U	1.0 U	1.0 U	0.14 U	**0.37 J**	1.0 U
Cadmium	7440-43-9	18	5	0.33 U	**16**	1.0 U	1.0 U	0.33 U	**7.4 J**	1.0 U
Chromium	7440-47-3	NS	100**	1.8 U	**4.9 J**	2.0 U	**7**	1.8 U	**28**	3.0 U
Cobalt	7440-48-4	11	NS	**5.1 J**	**8.5 J**	**124**	**123**	**69**	**90**	**12**
Copper	7440-50-8	1,500	1,300	**1.9 J**	**121**	1.0 U	**5.3**	**2.5 J**	**611**	**2**
Cyanide	57-12-5	730	200	NM	NM	NM	NM	NM	NM	NM
Iron	7439-89-6	26,000	NS	**3,780**	**9,280**	**62,900**	**61,800**	**41,700**	**72,700**	**2,160**
Lead	7439-92-1	NS	15	1.0 U	**71**	1.0 U*	**1.8**	0.26 U	**163**	1.0 U
Manganese	7439-96-5	880	NS	**811**	**910**	**7,010**	**6,810**	**5,730**	**6,070**	**1,340**
Mercury	7439-97-6	0.57	2	0.019 U	**0.42**	0.20 U	0.20 U	0.019 U	**0.41**	0.20 U
Nickel	7440-02-0	730	NS	**12.9**	**19.9**	**86.5**	**87.9**	**44.3**	**86.4**	**16.4**
Selenium	7782-49-2	180	50	0.56 U	0.56 U	2.0 U	2.0 U	0.56 U	**0.71 J**	2.0 U
Silver	7440-22-4	180	NS	0.83 U	**2.0 J**	10.0 U	10.0 U	**1.8 J**	**9.6 J**	10.0 U
Thallium	7440-28-0	2.4++	2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vanadium	7440-62-2	180	NS	5.5 U	5.5 U	1.0 U	1.0 U	5.5 U	**15.9**	1.0 U
Zinc	7440-66-6	11,000	NS	**34.2**	**450**	**21,500**	**21,400**	**5,620**	**9,900**	**457**

Notes:

	Exceedance of Tapwater RSL and/or MCL
1,000	Bold indicates a detection
J	Estimated
U	Non-Detect
NM	Not Measured
NS	No applicable standard
T	Total
D	Dissolved
**	Screening value for total chromium is based on April 2009 US
++	Screening value for thallium is based on April 2009 US EPA

Appendix G-4-9
Metals and Cyanide Results for Groundwater Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site

Analyte	CAS #	Tapwater RSL (µg/L)	Location ID / Sample ID / Date / Units / Total or Dissolved / MCL (µg/L)	MW-2 OU1-GW-MW2-0801 1/14/2008 µg/L T	MW-303H OU1-GW-MW-303H-0712 12/4/2007 µg/L D	MW-303H OU1-GW-MW-303H-0712 12/4/2007 µg/L T	MW-305H OU1-GW-MW-305H-0712 12/4/2007 µg/L D	MW-305H OU1-GW-MW-305H-0712 12/4/2007 µg/L T	MW-321H OU1-GW-MW-321-H 1/15/2008 µg/L T	MW-322H OU1-GW-MW-322-H 1/15/2008 µg/L T
Aluminum	7429-90-5	37,000	NS	**427**	100 U	100 U	**268**	100 U	**234**	**385**
Antimony	7440-36-0	15	6	**1**	5.0 U	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U
Arsenic	7440-38-2	0.045	10	**9**	5.0 U	5.0 U	5.0 U	5.0 U	**3.8**	**5.6**
Barium	7440-39-3	7,300	2,000	**42**	**54.3**	**53.5**	**40.6**	**30.2**	**31.1**	**26**
Beryllium	7440-41-7	73	4	1.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U
Cadmium	7440-43-9	18	5	1.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 U	**3.5**
Chromium	7440-47-3	NS	100**	3.0 U	15.0 U	15.0 U	15.0 U	15.0 U	3.0 U	3.0 U
Cobalt	7440-48-4	11	NS	**12**	5.0 U	5.0 U	**6**	5.0 U	**7**	**51**
Copper	7440-50-8	1,500	1,300	**8**	5.0 U	5.0 U	5.0 U	5.0 U	**6.6**	**3.5**
Cyanide	57-12-5	730	200	10.0 U	NM	NM	NM	NM	NM	10.0 U
Iron	7439-89-6	26,000	NS	**4,000**	**1,730**	**1,370**	**3,500**	**2,340**	**3,250**	**15,500**
Lead	7439-92-1	NS	15	**18.5**	5.0 U	5.0 U	5.0 U	5.0 U	**1.8**	**9.4**
Manganese	7439-96-5	880	NS	**1,540**	**4,020**	**4,000**	**5,450**	**5,220**	**8,390**	**6,600**
Mercury	7439-97-6	0.57	2	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Nickel	7440-02-0	730	NS	**17.5**	**17.7**	**18.4**	**16.7**	**16.2**	**19.4**	**134**
Selenium	7782-49-2	180	50	2.0 U	5.0 U	5.0 U	5.0 U	5.0 U	2.0 U	2.0 U
Silver	7440-22-4	180	NS	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Thallium	7440-28-0	2.4++	2	1.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U
Vanadium	7440-62-2	180	NS	**1.1**	5.0 U	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U
Zinc	7440-66-6	11,000	NS	**827**	20.0 U	20.0 U	**97.1**	**61.5**	**62.4**	**34,500**

Notes:

	Exceedance of Tapwater RSL and/or MCL
1,000	Bold indicates a detection
J	Estimated
U	Non-Detect
NM	Not Measured
NS	No applicable standard
T	Total
D	Dissolved
**	Screening value for total chromium is based on April 2009 US
++	Screening value for thallium is based on April 2009 US EPA

Appendix G-4-9
Metals and Cyanide Results for Groundwater Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site

Analyte	CAS #	Tapwater RSL (µg/L)	Location ID Sample ID Date Units Total or Dissolved MCL (µg/L)	P-17 OU1-GW-P-17 1/15/2008 µg/L T	P-18 OU1-GW-P-18 1/14/2008 µg/L T	P-1 P-1 11/10/1994 µg/L T	P-7 OU1-GW-P-7-0712 12/6/2007 µg/L T	P-9 OU1-GW-P-9-0712 12/6/2007 µg/L T	P-6 P-6 11/8/1994 µg/L T	P-6 P-6 11/9/1994 µg/L T	P-7 P-7 11/7/1994 µg/L T	P-9 P-9 11/7/1994 µg/L T
Aluminum	7429-90-5	37,000	NS	**131**	100 U	NM	**86.3 J**	**187**	NM	NM	NM	NM
Antimony	7440-36-0	15	6	1.0 U	1.0 U	NM	0.39 U	**0.48 J**	NM	NM	NM	NM
Arsenic	7440-38-2	0.045	10	**8.7**	**2.8**	NM	**1.3 J**	**3.4 J**	1.0 U	NM	NM	NM
Barium	7440-39-3	7,300	2,000	**31.4**	**37.2**	**6.8 J**	**30.6**	**49**	**47.8 J**	**91.5 J**	**46.8 J**	**24.3 J**
Beryllium	7440-41-7	73	4	1.0 U	1.0 U	NM	0.48 U	0.48 U	NM	NM	NM	NM
Cadmium	7440-43-9	18	5	1.0 U	**1.4**	**2,220**	**2.7 J**	**1.8 J**	**3.0 J**	**3.0 J**	3.0 U	**5.2**
Chromium	7440-47-3	NS	100**	3.0 U	3.0 U	**6.6 J**	**3.4 J**	**1.3 J**	5.0 U	5.0 U	5.0 U	5.0 U
Cobalt	7440-48-4	11	NS	**33**	**1**	NM	**70.1**	**16.3**	NM	NM	NM	NM
Copper	7440-50-8	1,500	1,300	**5**	**1.8**	NM	**4.6 J**	**2.7 J**	NM	NM	NM	NM
Cyanide	57-12-5	730	200	NM	NM	5.0 U	NM	NM	5.0 U	6.2 U	5.0 U	5.0 U
Iron	7439-89-6	26,000	NS	**6,660**	**1,920**	**1,480**	**689**	**1420**	**1290**	**163**	**14700**	50.0 U
Lead	7439-92-1	NS	15	**11.3**	1.0 U	5.0 U	**0.65 J**	0.60 U	5.0 U	**67.4**	**10.9 J**	5.0 U
Manganese	7439-96-5	880	NS	**2,260**	**106**	**12,400**	**19,600**	**4,740**	**25,300**	**2,530**	**20,700**	**629**
Mercury	7439-97-6	0.57	2	0.20 U	0.20 U	**0.25**	0.028 U	0.028 U	0.20 U	0.20 U	0.20 U	**0.48**
Nickel	7440-02-0	730	NS	**61.5**	**8.6**	**1,090**	**80**	**54.3**	**31.9 J**	**45.9**	**31.0 J**	20.0 U
Selenium	7782-49-2	180	50	2.0 U	2.0 U	NM	**2.6 J**	**2.7 J**	5.0 U	NM	NM	NM
Silver	7440-22-4	180	NS	10.0 U	10.0 U	NM	**10.6**	**9.3 J**	NM	NM	NM	NM
Thallium	7440-28-0	2.4++	2	1.0 U	1.0 U	NM	0.38 U	0.38 U	NM	NM	NM	NM
Vanadium	7440-62-2	180	NS	1.0 U	1.0 U	NM	1.0 U	1.0 U	NM	NM	NM	NM
Zinc	7440-66-6	11,000	NS	**2,670**	**3,120**	**831,000**	**13,600**	**405**	**921**	**5,260**	**2,670**	**941**

Notes:

	Exceedance of Tapwater RSL and/or MCL
1,000	Bold indicates a detection
J	Estimated
U	Non-Detect
NM	Not Measured
NS	No applicable standard
T	Total
D	Dissolved
**	Screening value for total chromium is based on April 2009 US
++	Screening value for thallium is based on April 2009 US EPA

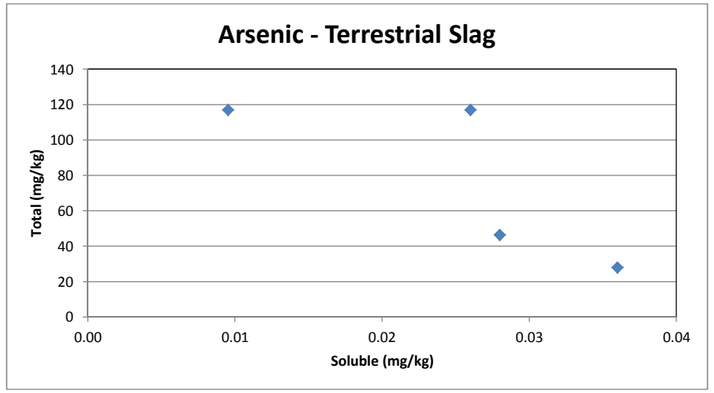
Appendix G-4-9
Metals and Cyanide Results for Groundwater Samples Collected from the Slag Pile
Matthiessen and Hegeler Zinc Company Site

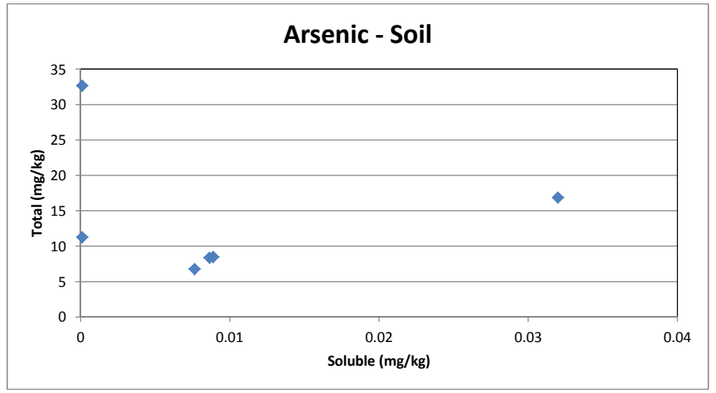
Analyte	CAS #	Tapwater RSL (µg/L)	Location ID Sample ID Date Units Total or Dissolved MCL (µg/L)	P-15 P-15 11/10/1994 µg/L T	P-17 P-17 11/9/1994 µg/L T	P-18 P-18 11/10/1994 µg/L T	P-18 P-18-DUP 11/10/1994 µg/L D	P-19 P-19 11/10/1994 µg/L T
Aluminum	7429-90-5	37,000	NS	NM	NM	NM	NM	NM
Antimony	7440-36-0	15	6	NM	NM	NM	NM	NM
Arsenic	7440-38-2	0.045	10	NM	NM	NM	NM	NM
Barium	7440-39-3	7,300	2,000	**41.5 J**	**24.7 J**	**15.0 J**	**15.0 J**	**23.2 J**
Beryllium	7440-41-7	73	4	NM	NM	NM	NM	NM
Cadmium	7440-43-9	18	5	3.0 U	3.0 U	**562**	**552**	**72**
Chromium	7440-47-3	NS	100**	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Cobalt	7440-48-4	11	NS	NM	NM	NM	NM	NM
Copper	7440-50-8	1,500	1,300	NM	NM	NM	NM	NM
Cyanide	57-12-5	730	200	5.0 U	5.0 U	**5.4**	NM	**6.1**
Iron	7439-89-6	26,000	NS	**190**	**5,380**	**17,300**	**17,100**	**130**
Lead	7439-92-1	NS	15	**10.4 J**	**11.4 J**	5.0 U	5.0 U	5.0 U
Manganese	7439-96-5	880	NS	**3,280**	**2,020**	**11,500**	**11,400**	**1,210**
Mercury	7439-97-6	0.57	2	0.20 U	0.20 U	**0.24**	0.20 U	0.20 U
Nickel	7440-02-0	730	NS	20.0 U	**90.7**	**485**	**480**	**46**
Selenium	7782-49-2	180	50	NM	NM	NM	NM	NM
Silver	7440-22-4	180	NS	NM	NM	NM	NM	NM
Thallium	7440-28-0	2.4++	2	NM	NM	NM	NM	NM
Vanadium	7440-62-2	180	NS	NM	NM	NM	NM	NM
Zinc	7440-66-6	11,000	NS	**517**	**8,840**	**382,000**	**393,000**	**6,460**

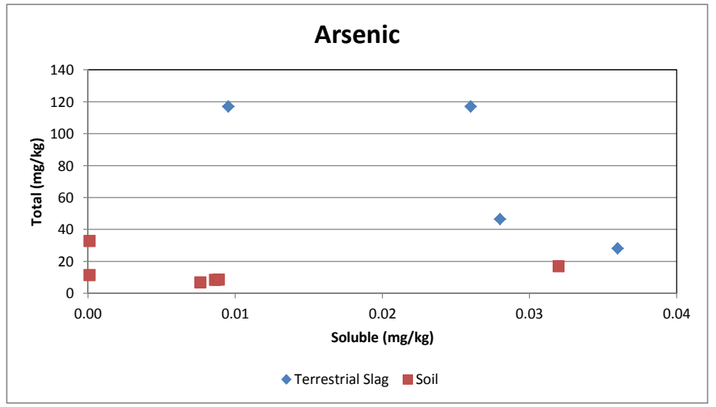
Notes:

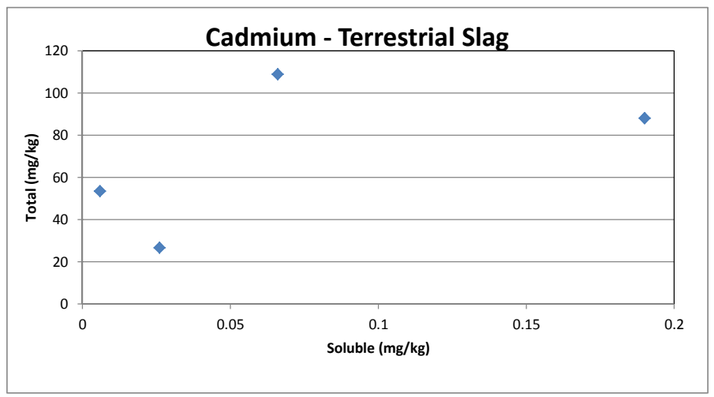
	Exceedance of Tapwater RSL and/or MCL
1,000	Bold indicates a detection
J	Estimated
U	Non-Detect
NM	Not Measured
NS	No applicable standard
T	Total
D	Dissolved
**	Screening value for total chromium is based on April 2009 US
++	Screening value for thallium is based on April 2009 US EPA

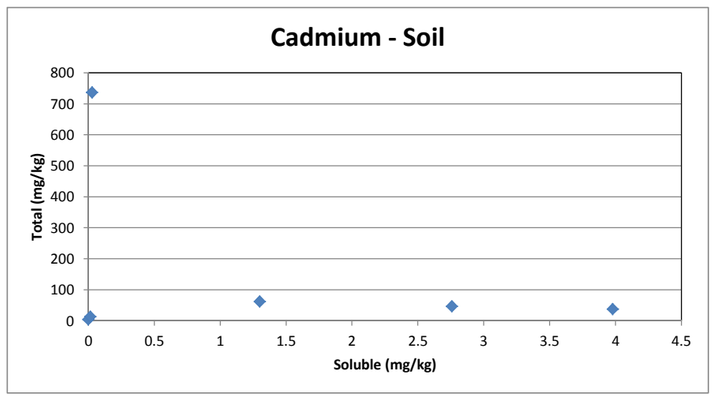
Appendix G-5-1
Soil SPLP
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

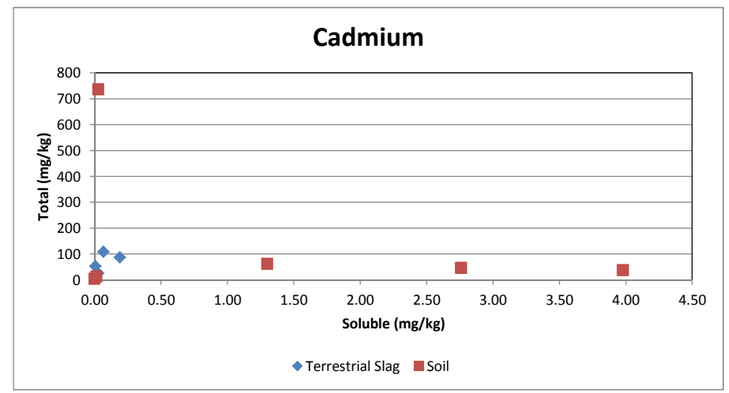


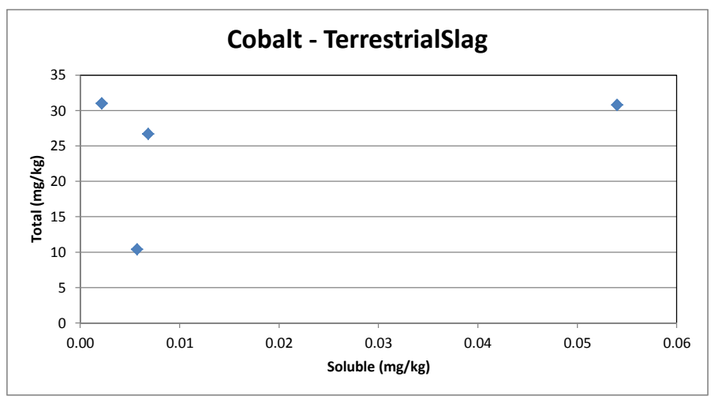


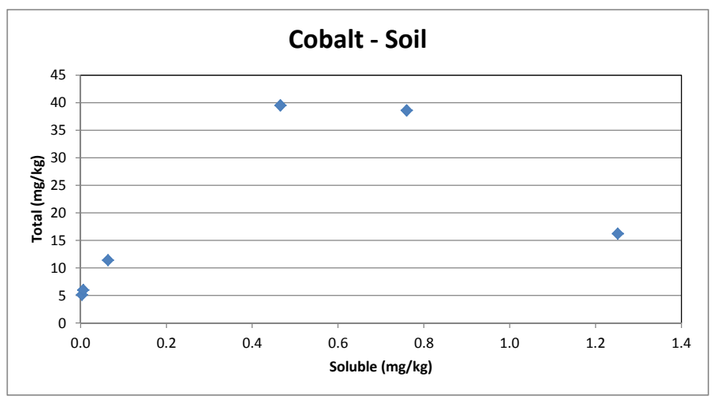


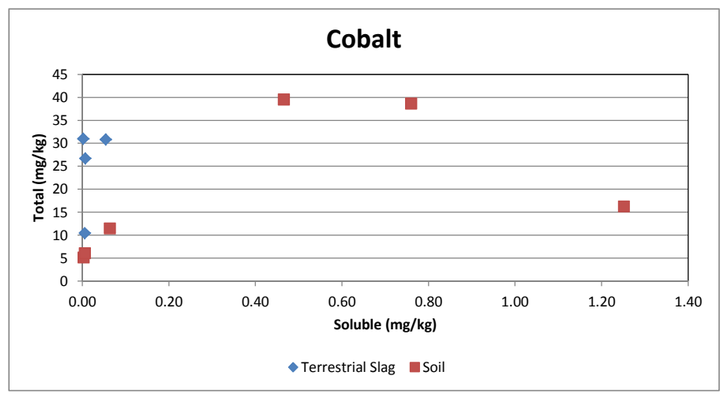




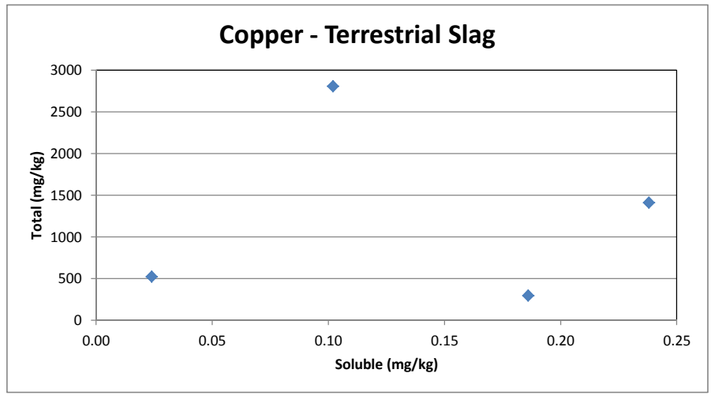


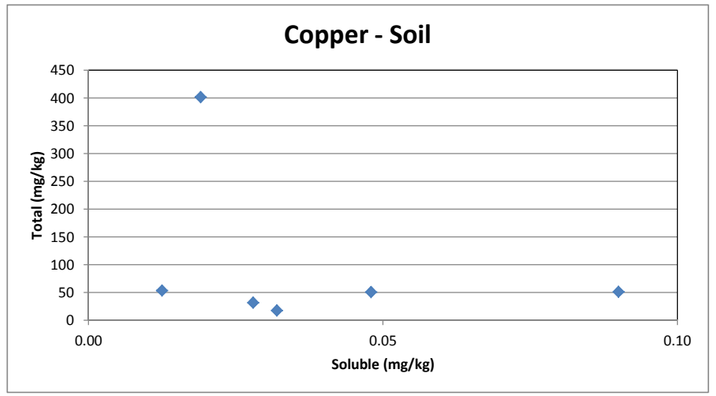


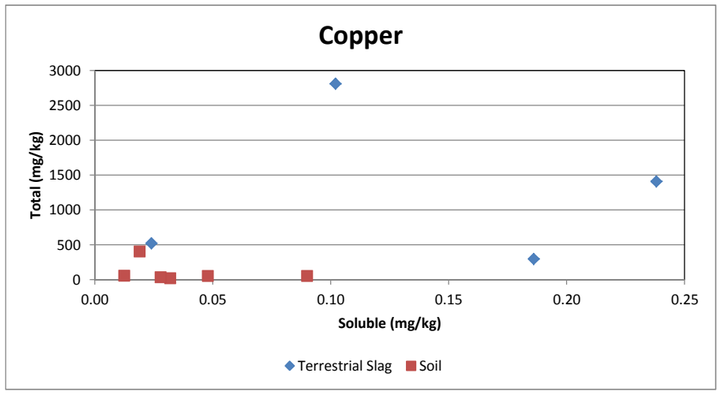


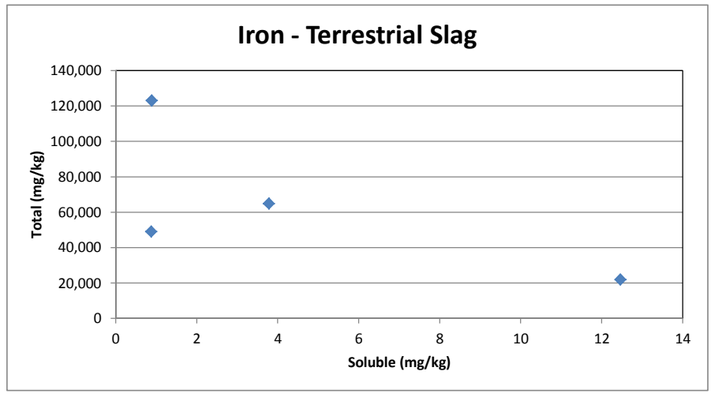


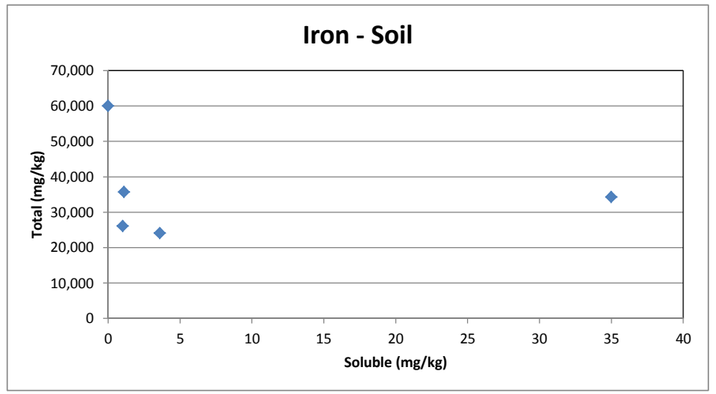
Appendix G-5-1
Soil SPLP
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

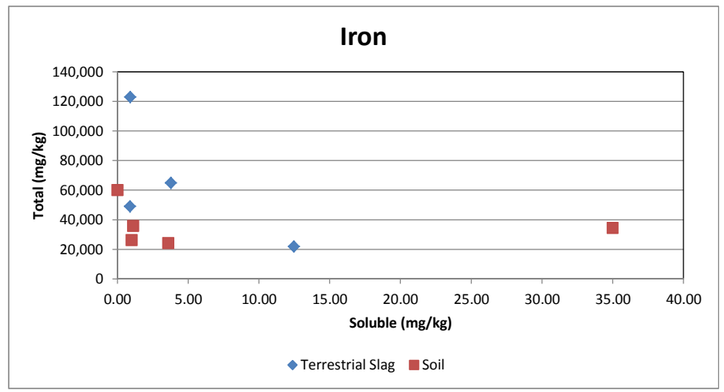


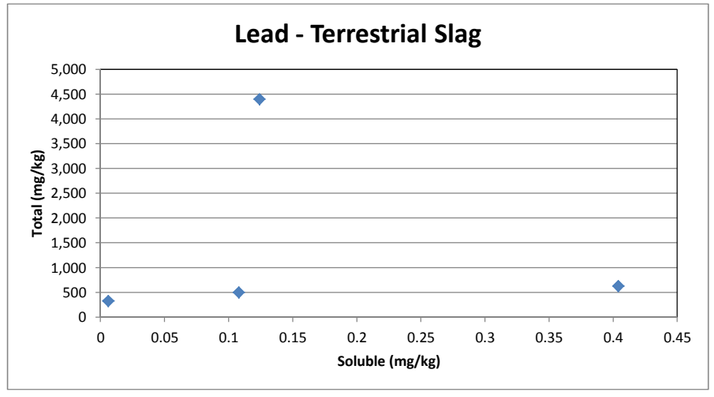


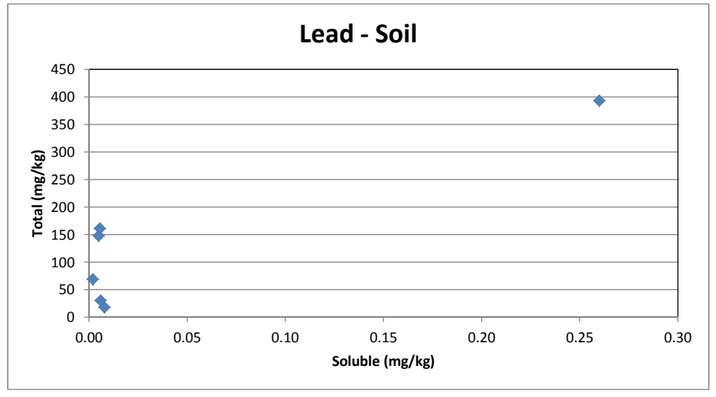


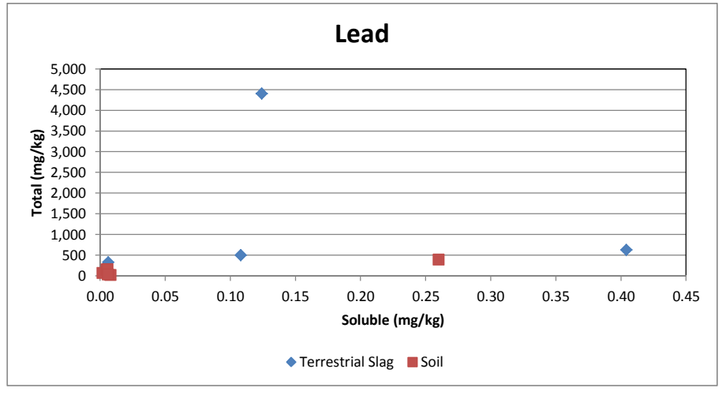




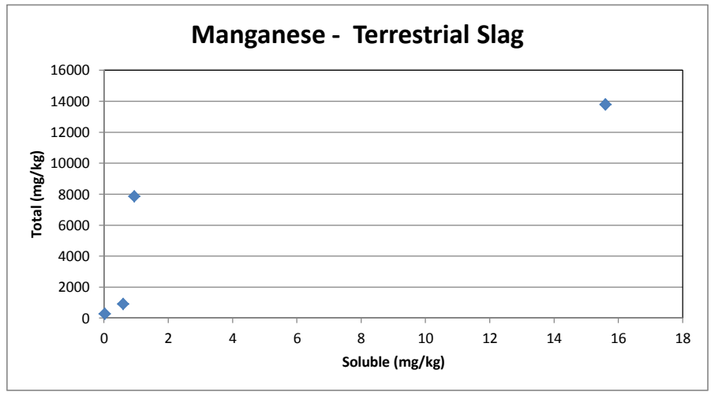


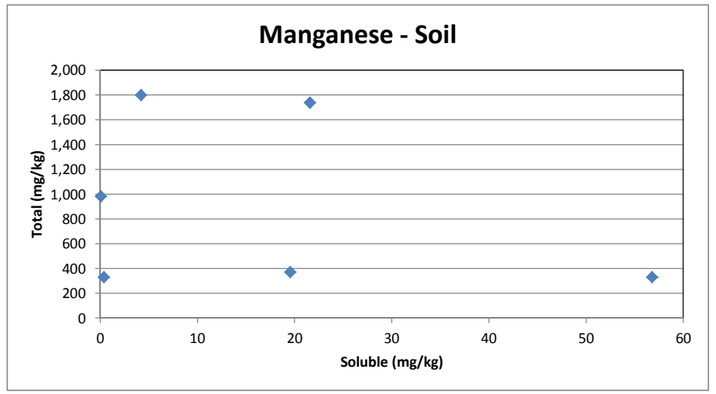


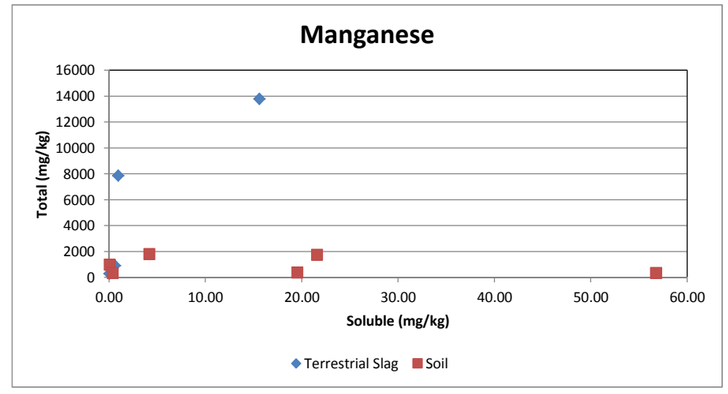


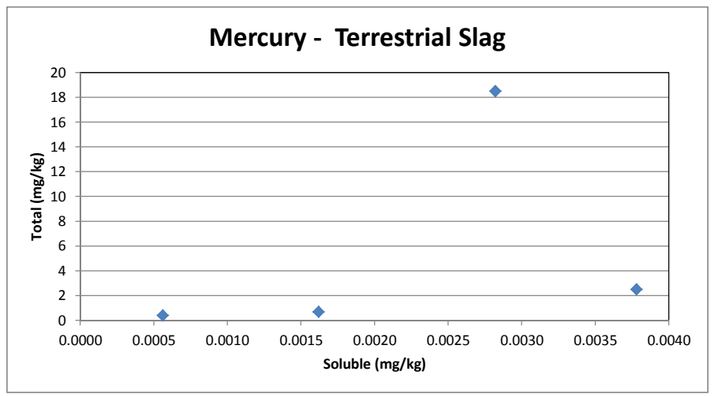


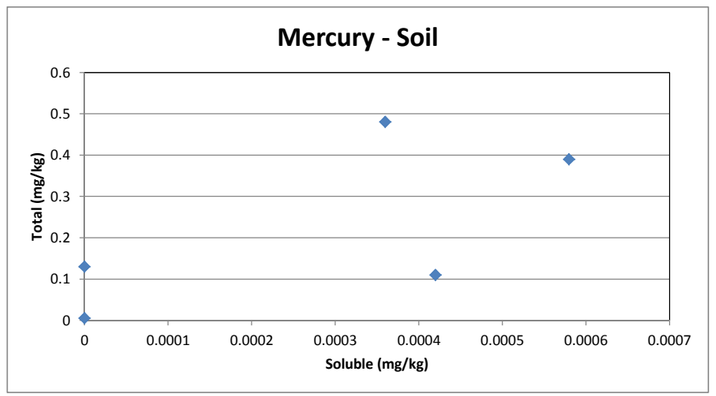
Appendix G-5-1
Soil SPLP
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

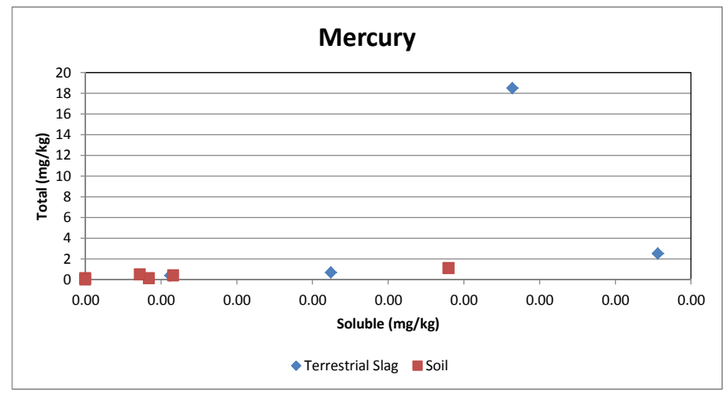


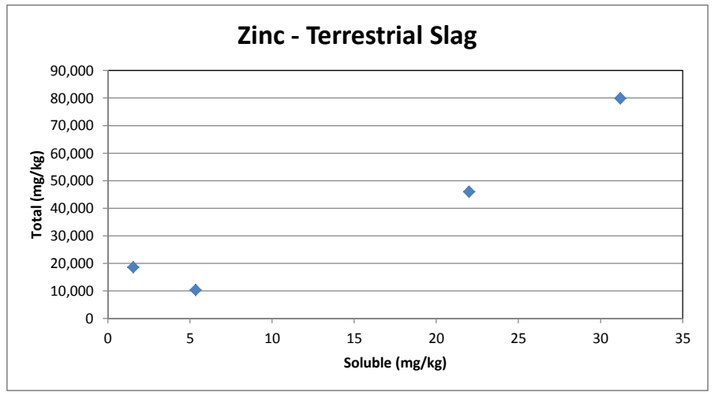


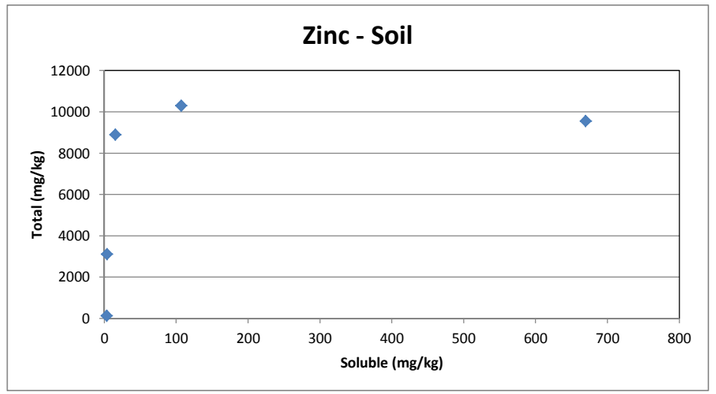


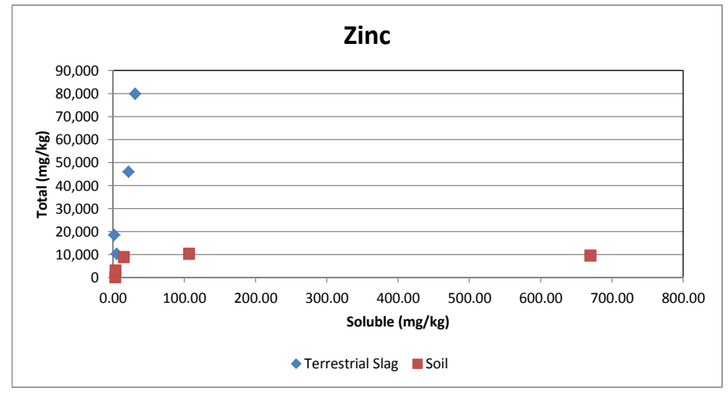




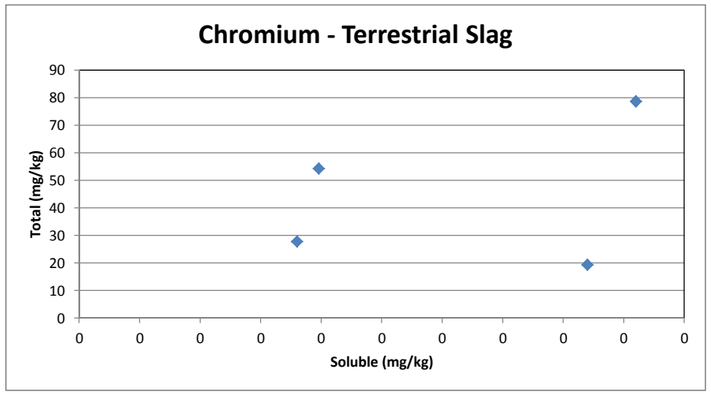


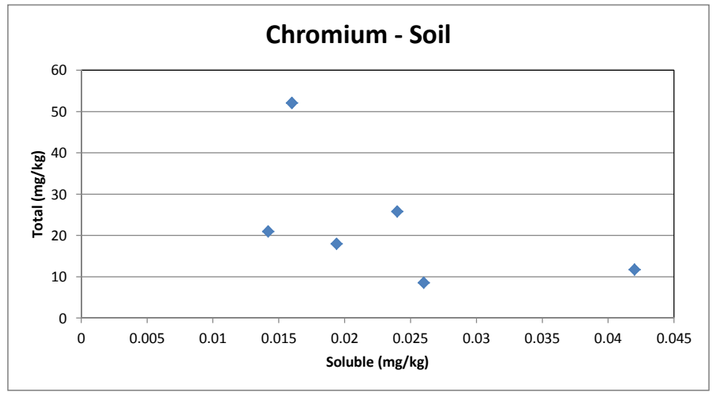


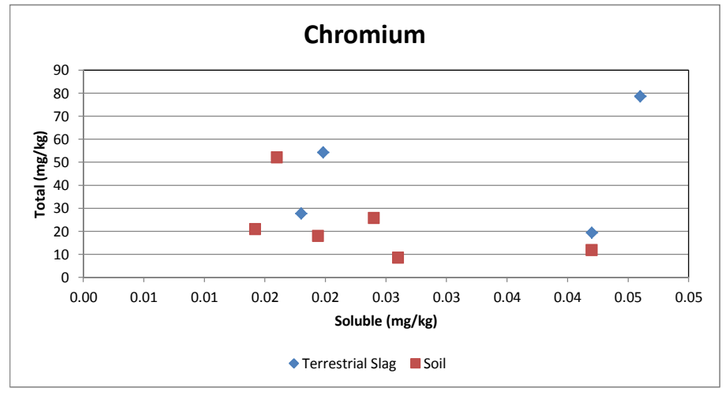




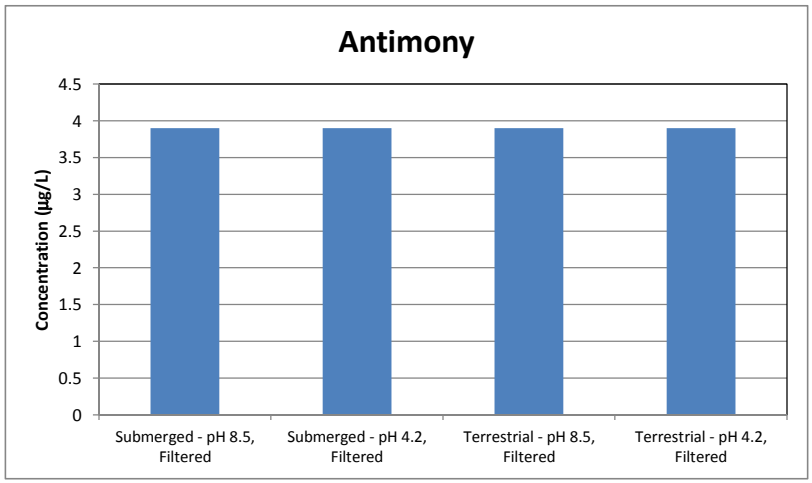
Appendix G-5-1
Soil SPLP
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

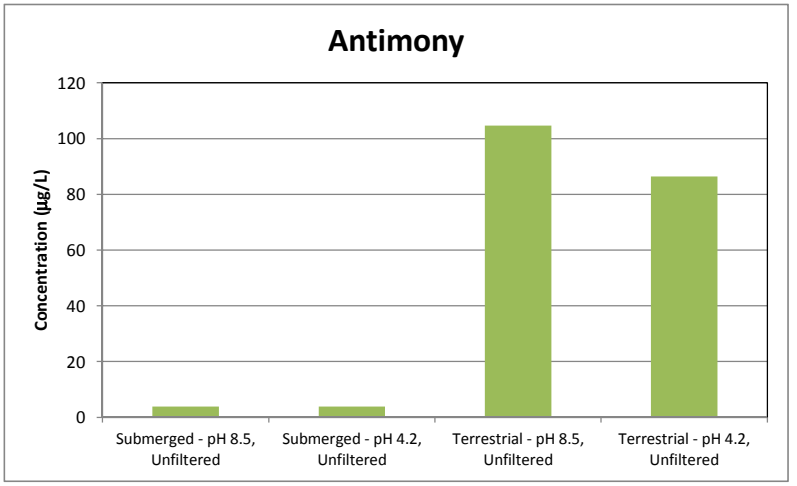


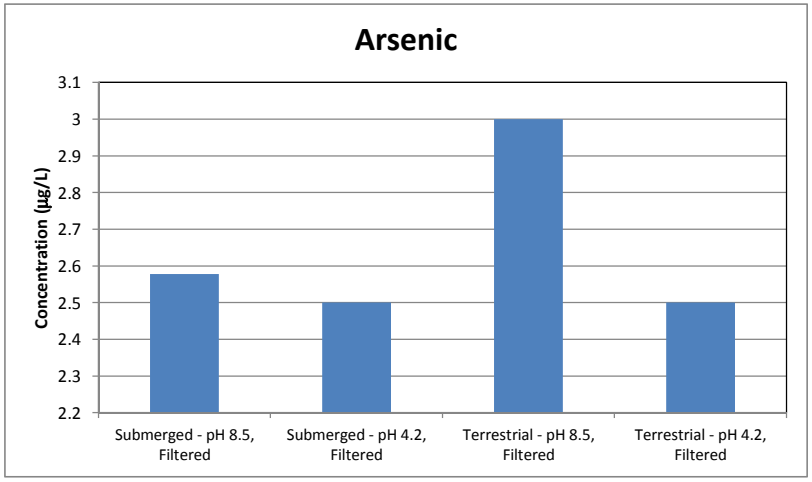


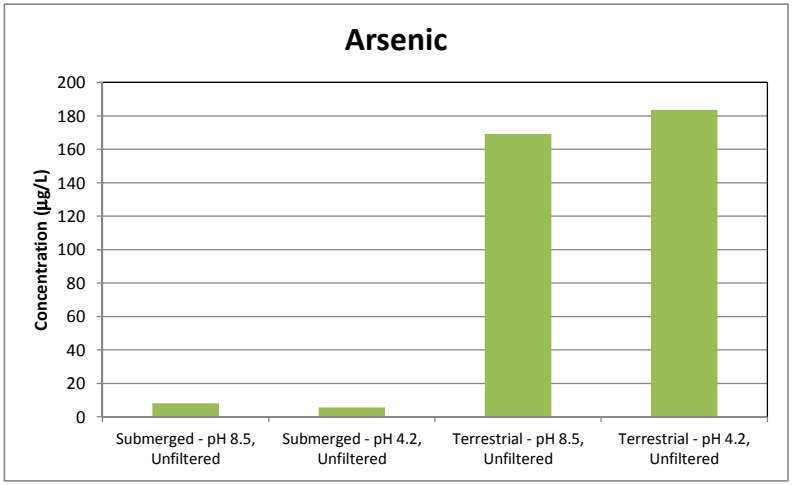


Appendix G-5-2
Leachability
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

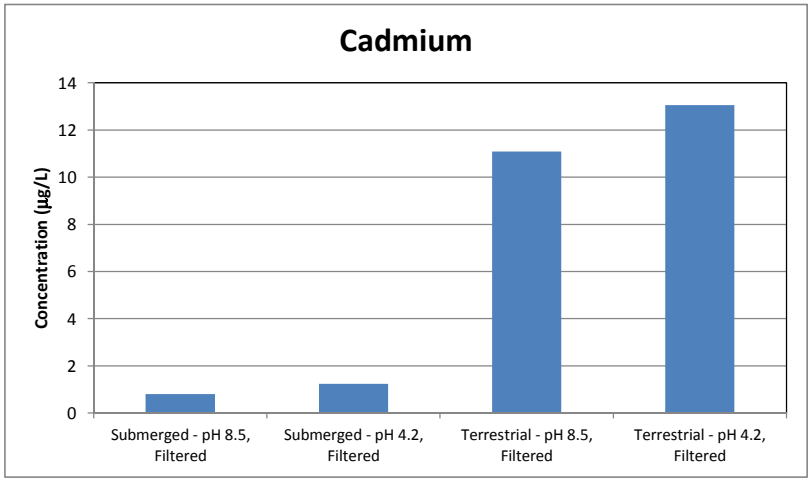


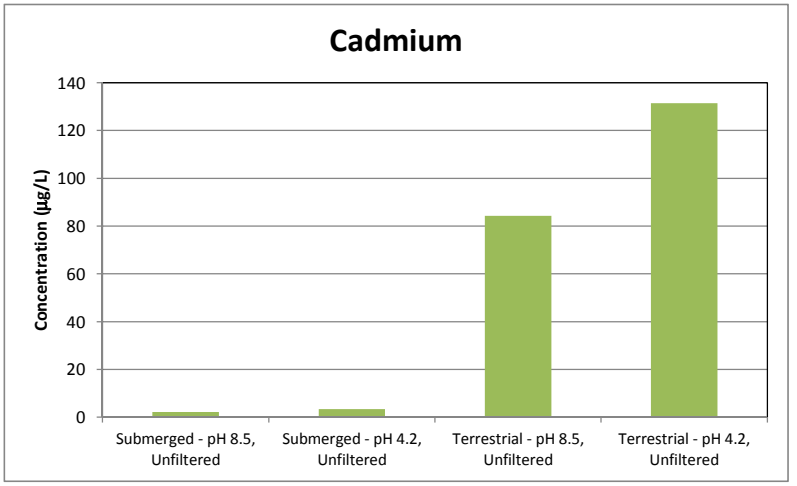


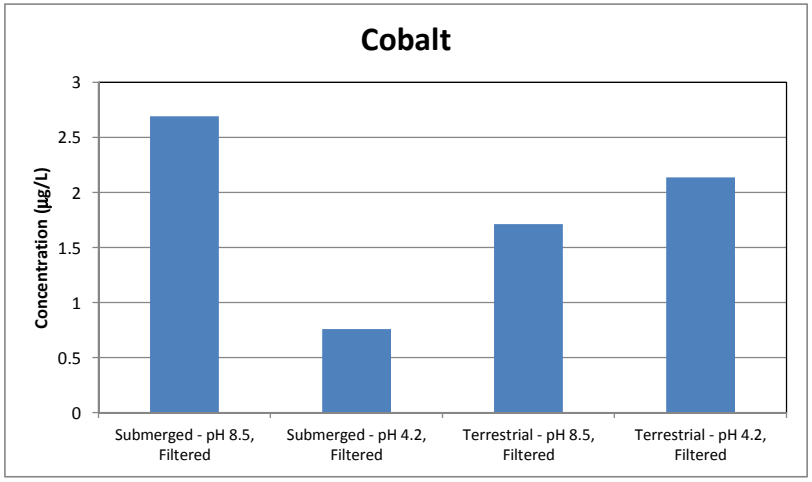


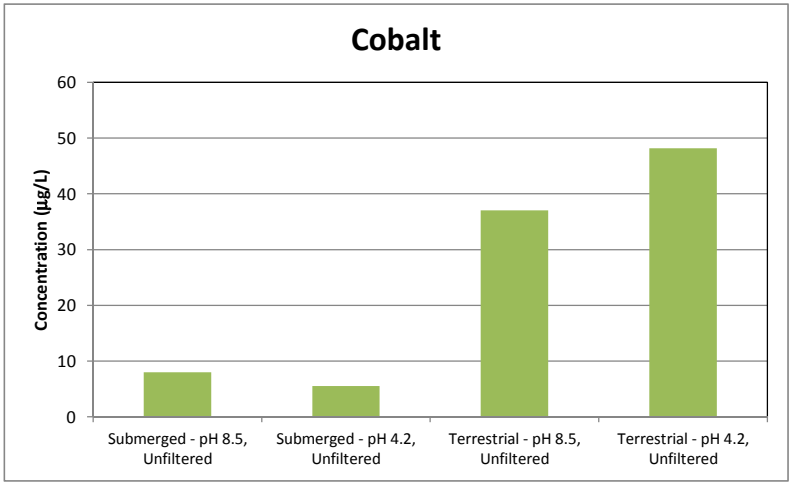


Appendix G-5-2
Leachability
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

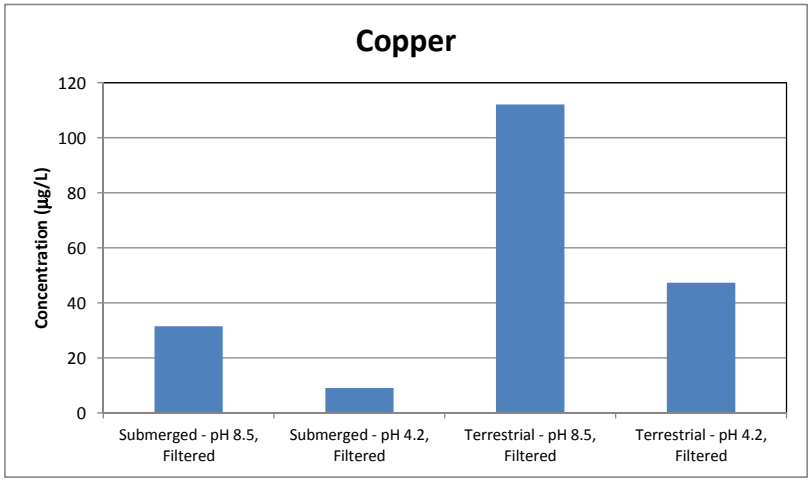


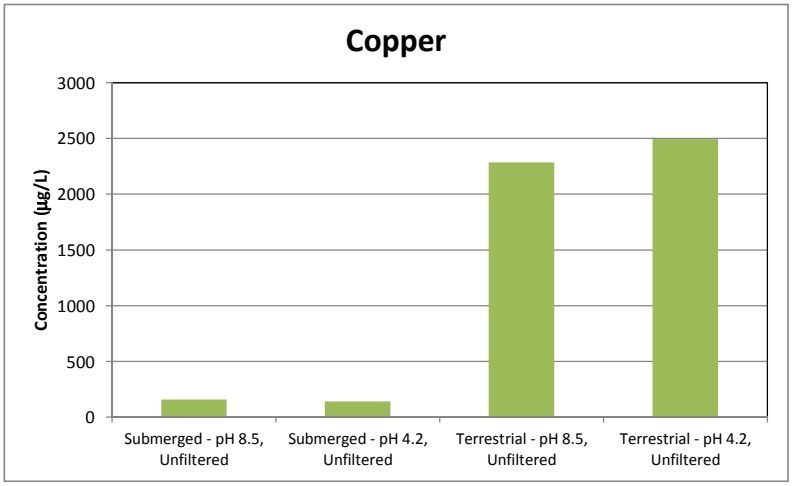


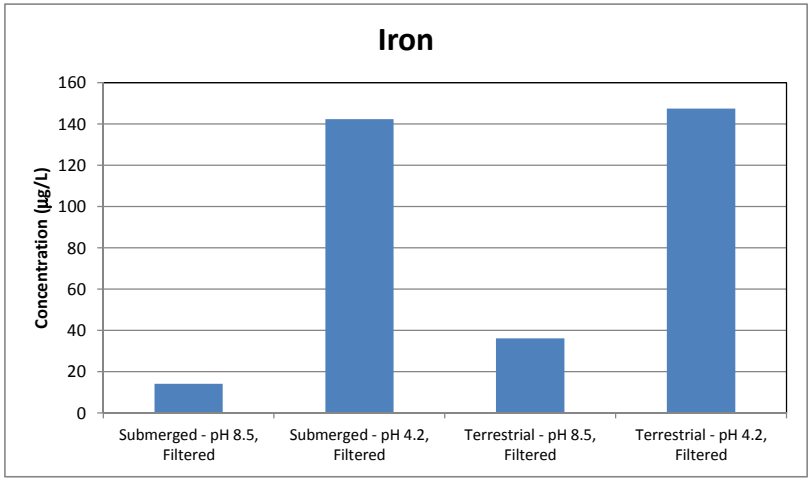


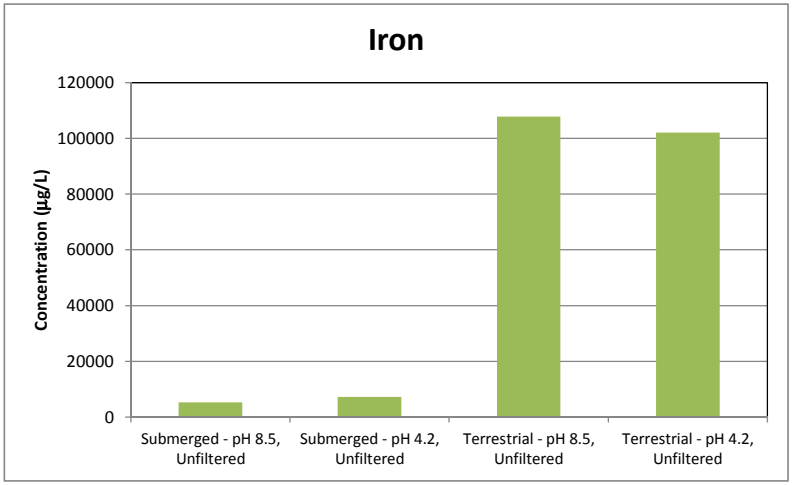


Appendix G-5-2
Leachability
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

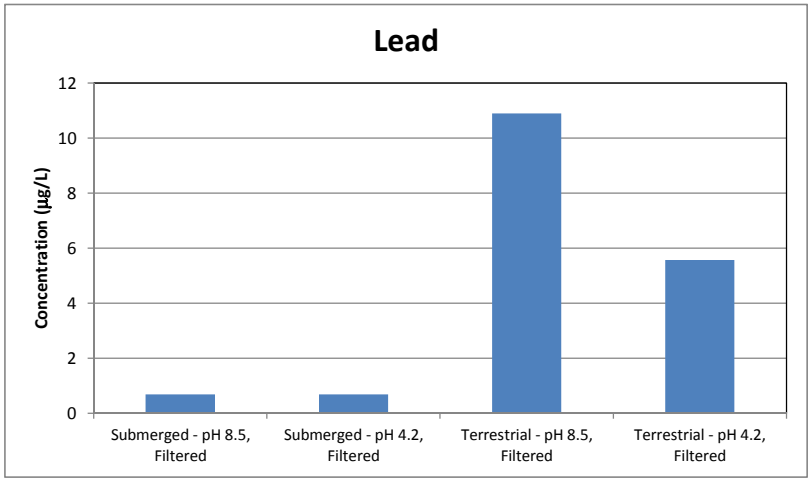


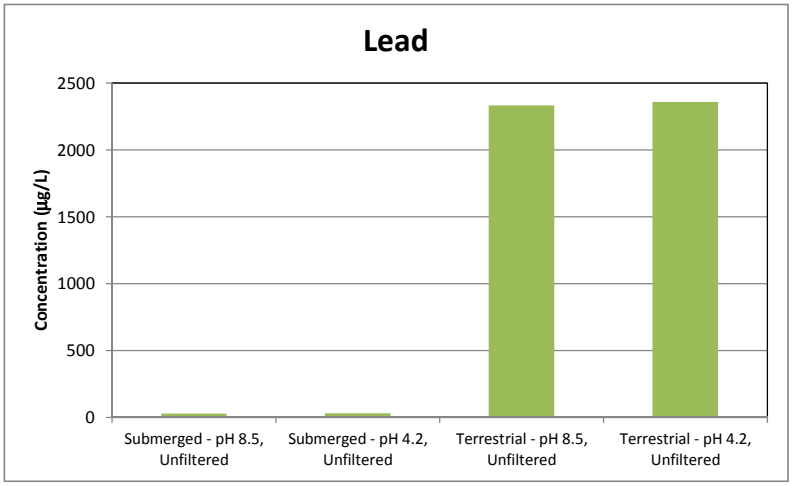


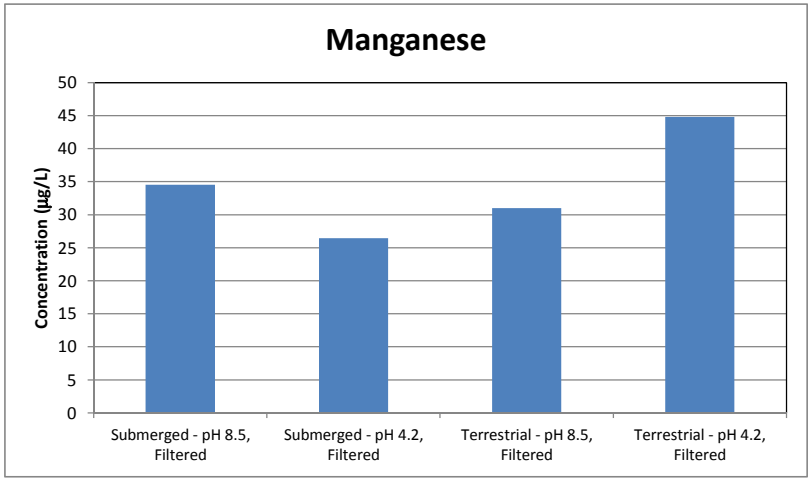


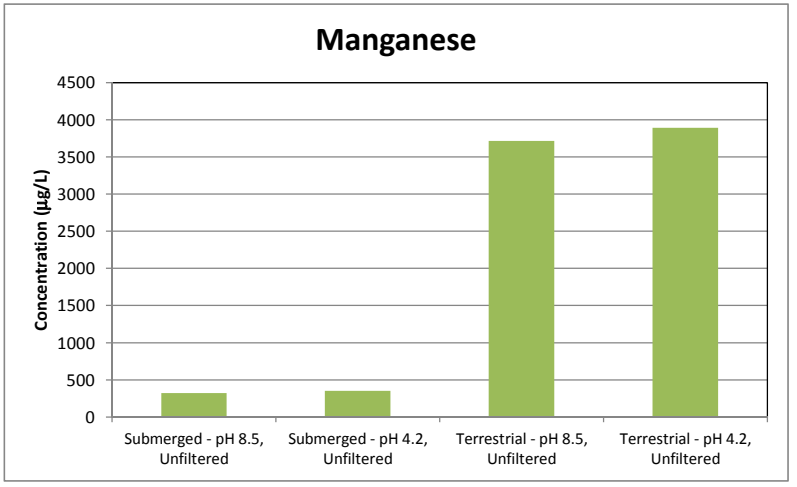


Appendix G-5-2
Leachability
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

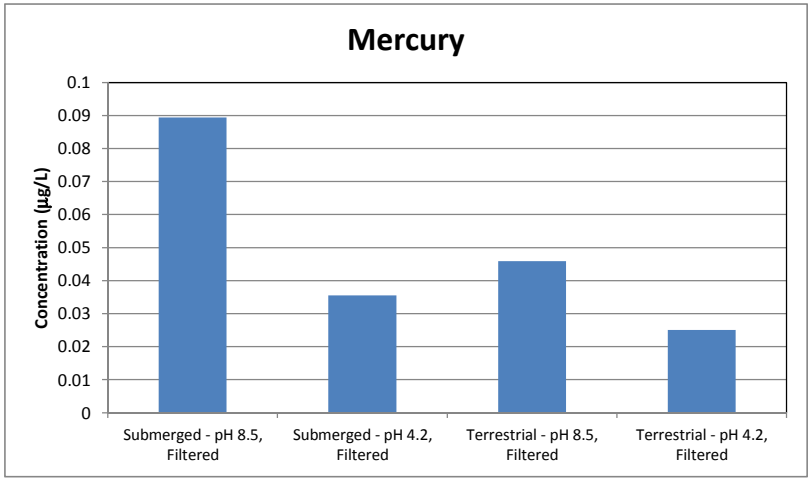


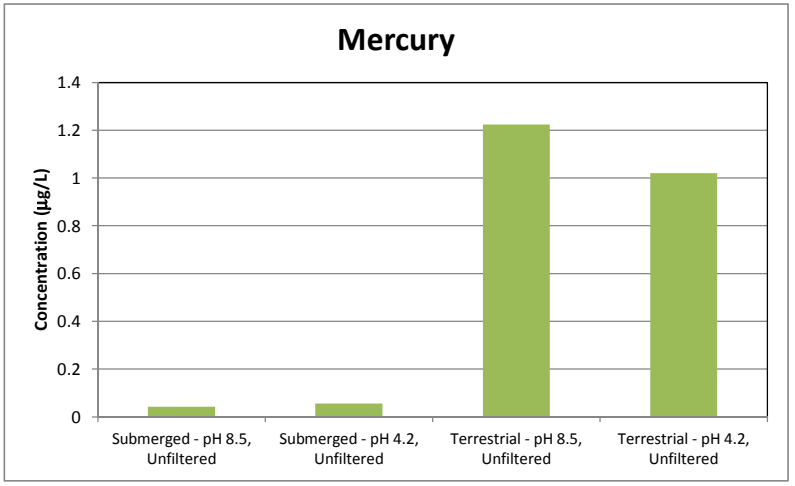


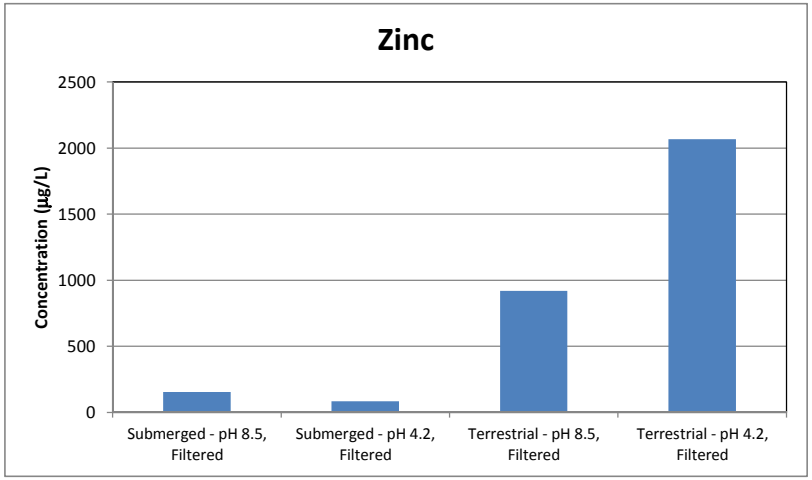


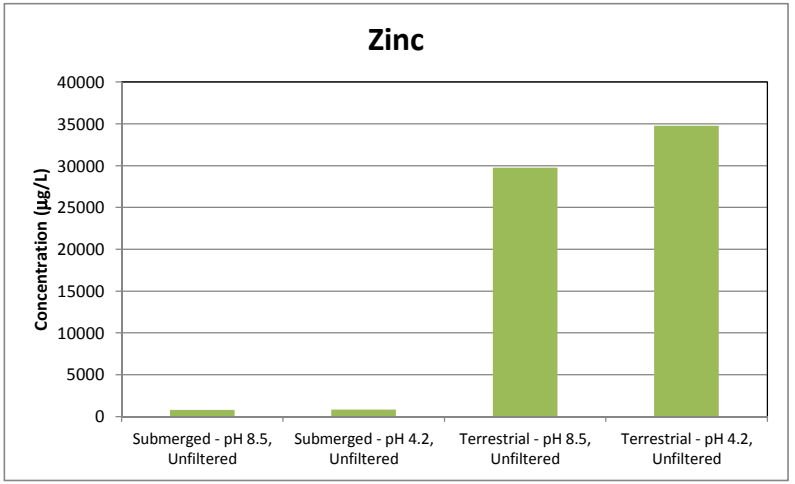


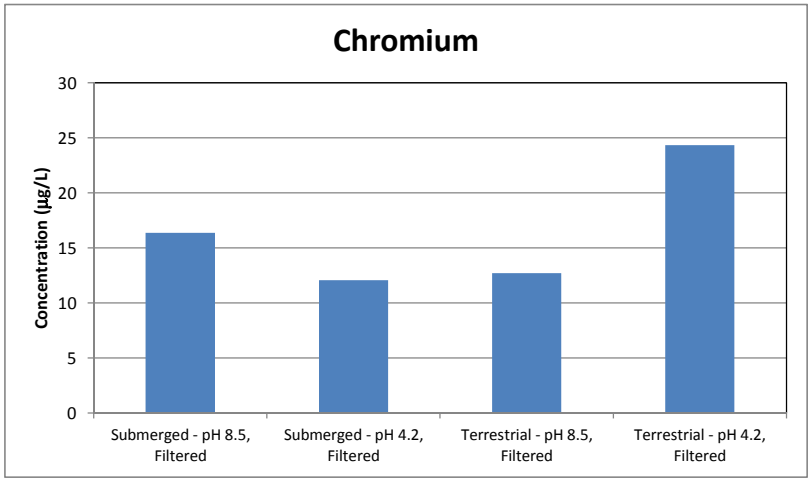
Appendix G-5-2
Leachability
Matthiessen and Hegeler Zinc Company Site - OU1
LaSalle, Illinois

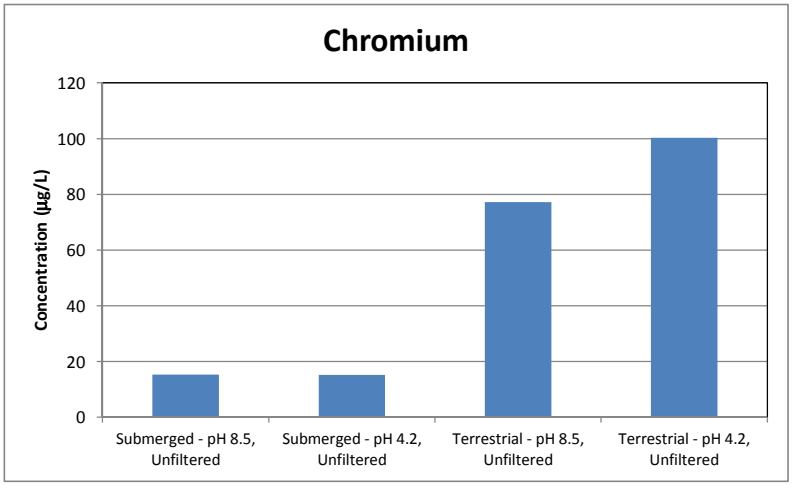









Chromium
Concentration (µg/L)
30
25
20
15
10
5
0
Submerged - pH 8.5, Filtered
Submerged - pH 4.2, Filtered
Terrestrial - pH 8.5, Filtered
Terrestrial - pH 4.2, Filtered


Chromium
Concentration (µg/L)
120
100
80
60
40
20
0
Submerged - pH 8.5, Unfiltered
Submerged - pH 4.2, Unfiltered
Terrestrial - pH 8.5, Unfiltered
Terrestrial - pH 4.2, Unfiltered