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Certificate of Analysis

ALS Project Contact: Steve Kennedy
ALS Project ID: SKY300
ALS WO#: L1343473
Date of Sample Receipt: 7-Aug-13
Date of Report: 15-Aug-13

Client Name: ISKY Chemicals Co Ltd
Client Address: Kimhonda Building No.1
479 Furong Road(M)
Changsha, Hunan 410005, China
Client Contact: Gary Tang
Client Project ID:

COMMENTS: **Toxic PCDD/F and PCB Congeners by GC/HRMS**
Marker PCB Congeners by GC/MS

GC/HRMS for PCDD/F and PCB congeners was from an eluant fraction from carbon column clean-up
The balance of the PCB congeners were determined via GC/LRMS on a separate carbon column eluant fraction

Reporting units of pg/g are equivalent to ng/Kg
Reporting units of ng/g are equivalent to µg/Kg

Target analyte data are reported on an as-received basis.

Certified by:

A handwritten signature in black ink, appearing to read "Steve Kennedy", is written over a horizontal line.

Steve Kennedy
Laboratory Manager

Results in this certificate relate only to the samples as submitted to the laboratory.

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ALS Environmental

Sample Analysis Summary Report

Sample Name	Method Blank	ZINC SULPHATE MONOHYDRATE BATCH NO.: 4300FA004-2013- 001	MANGANESE SULPHATE MONOHYDRATE BATCH NO.: 20130710-2	FERROUS SULPHATE MONOHYDRATE BATCH NO.: 4300FA004-2013- 066	LCS
ALS Sample ID	WG1723211-1	L1343473-1	L1343473-2	L1343473-3	WG1723211-2
Sample Size	60.00	60.08	60.29	60.52	1.00
Sample units	grams	grams	grams	grams	n/a
Moisture Content	n/a	0.00%	0.10%	1.30%	n/a
Matrix	qc	solid	solid	solid	qc
Sampling Date	n/a	11-Jan-13	15-Jul-13	15-May-13	n/a
Extraction Date	09-Aug-13	09-Aug-13	09-Aug-13	09-Aug-13	09-Aug-13
Polychlorinated Dibenzo(p)dioxins	pg/g	pg/g	pg/g	pg/g	% Rec
2,3,7,8-TCDD	<0.0060	<0.010	<0.0055	<0.0043	92
1,2,3,7,8-PeCDD	<0.0072	<0.010	<0.0080	<0.0039	97
1,2,3,4,7,8-HxCDD	<0.0057	<0.018	<0.0078	<0.0035	80
1,2,3,6,7,8-HxCDD	<0.0066	<0.021	<0.0085	<0.0040	90
1,2,3,7,8,9-HxCDD	<0.0067	<0.021	<0.0082	<0.0038	83
1,2,3,4,6,7,8-HpCDD	<0.0075	0.0235	0.0187	<0.012	89
OCDD	<0.031	<0.078	<0.036	<0.078	97
Polychlorinated Dibenzofurans					
2,3,7,8-TCDF	<0.0037	<0.0058	<0.0096	<0.0072	89
1,2,3,7,8-PeCDF	<0.0098	<0.018	<0.0064	<0.0067	91
2,3,4,7,8-PeCDF	<0.0091	0.0248	<0.014	<0.0067	92
1,2,3,4,7,8-HxCDF	0.0139	0.0195	<0.0094	<0.0067	102
1,2,3,6,7,8-HxCDF	<0.0068	0.0208	<0.0093	<0.0066	93
2,3,4,6,7,8-HxCDF	<0.0068	<0.014	<0.0090	<0.0066	98
1,2,3,7,8,9-HxCDF	<0.0083	<0.017	<0.010	<0.011	97
1,2,3,4,6,7,8-HpCDF	<0.0096	<0.021	<0.0055	<0.0050	90
1,2,3,4,7,8,9-HpCDF	<0.0034	<0.011	<0.0081	<0.0063	92
OCDF	<0.012	<0.035	<0.012	<0.015	90
Dioxin-like Polychlorinated Biphenyls					
PCB-81	<0.0071	0.0106	<0.010	0.00609	95
PCB-77	<0.017	0.0538	<0.042	<0.12	95
PCB-123	<0.030	<0.019	0.0171	<0.071	96
PCB-118	<0.064	0.116	0.0936	<0.72	100
PCB-114	<0.011	<0.010	<0.0074	<0.024	96
PCB-105	<0.014	0.0740	0.0686	<0.50	97
PCB-126	<0.011	<0.0099	<0.0074	<0.017	97
PCB-167	<0.010	<0.019	<0.011	0.0423	94
PCB-156	<0.011	<0.020	<0.016	<0.086	92
PCB-157	<0.011	<0.020	<0.012	<0.036	89
PCB-169	<0.010	<0.018	<0.011	<0.0048	96
PCB-189	<0.0068	<0.0058	<0.0071	<0.0036	95
Toxic Equivalency WHO (2005)	pg/g	pg/g	pg/g	pg/g	
Lower Bound TEQ - PCDD/F	0.00139	0.0117	0.000187	0.00	
Upper Bound TEQ - PCDD/F	0.0223	0.0423	0.0254	0.0156	
Lower Bound TEQ - PCB	0.00	0.0000143	0.00000538	0.00000310	
Upper Bound TEQ - PCB	0.00141	0.00155	0.00108	0.00190	
Lower Bound TEQ - TOTAL	0.00139	0.0117	0.000192	0.00000310	
Upper Bound TEQ - TOTAL	0.0237	0.0438	0.0265	0.0175	
Marker Polychlorinated Biphenyls	ng/g	ng/g	ng/g	ng/g	%
PCB-28	0.000335	0.00282	0.0013	0.00332	100
PCB-52	<0.021	<0.021	<0.021	<0.021	128
PCB-101	<0.021	<0.021	<0.021	<0.021	110
PCB-153	<0.021	<0.021	<0.021	<0.021	89
PCB-138	<0.021	<0.021	<0.021	<0.021	110
PCB-180	<0.021	<0.021	<0.021	<0.021	105
Upper Bound Sum of Marker PCBs	0.105	0.108	0.106	0.109	

ALS Environmental									
Laboratory Method Blank Analysis Report									
Sample Name		Method Blank			Sampling Date		n/a		Approved: R. Zhadan --e-signature-- 15-Aug-13
ALS Sample ID		WG1723211-1			Extraction Date		09-Aug-13		
Analysis Method		Mod. 1613B/1668A			Sample Size		60.00 grams		
Analysis Type		Blank			Percent Moisture		n/a		
Sample Matrix		qc			Split Ratio		1		
Run Information		HR Injection 1					LR Injection 1		
Filename		2-130814A S:5					13081304.D		
Run Date		14-Aug-13 12:34					13-Aug-13 16:32		
Final Volume		25 uL					100 uL		
Dilution Factor		1					1		
Analysis Units		pg/g					pg/g		
Instrument - Column		HRMS-2 DB5MS#USD268766H					MSD-1 HP5ms #USC621543H		
Target Analytes		Ret. Time	Conc. pq/a	EDL pq/a	Flags	TEF WHO (2005)	Ret. Time	Conc. pq/a	
2,3,7,8-TCDD		NotFnd	<0.0060	0.0060	U	1			
1,2,3,7,8-PeCDD		NotFnd	<0.0072	0.0072	U	1			
1,2,3,4,7,8-HxCDD		NotFnd	<0.0057	0.0057	U	0.1			
1,2,3,6,7,8-HxCDD		NotFnd	<0.0066	0.0066	U	0.1			
1,2,3,7,8,9-HxCDD		NotFnd	<0.0067	0.0067	U	0.1			
1,2,3,4,6,7,8-HpCDD		14:10	<0.0075	0.0054	J R	0.01			
OCDD		15:46	<0.031	0.0039	J R	0.0003			
2,3,7,8-TCDF		NotFnd	<0.0037	0.0037	U	0.1			
1,2,3,7,8-PeCDF		NotFnd	<0.0098	0.0098	U	0.03			
2,3,4,7,8-PeCDF		NotFnd	<0.0091	0.0091	U	0.3			
1,2,3,4,7,8-HxCDF		12:01	0.0139	0.0071	J	0.1			
1,2,3,6,7,8-HxCDF		12:06	<0.0068	0.0067	J R	0.1			
2,3,4,6,7,8-HxCDF		NotFnd	<0.0068	0.0068	U	0.1			
1,2,3,7,8,9-HxCDF		NotFnd	<0.0083	0.0083	U	0.1			
1,2,3,4,6,7,8-HpCDF		NotFnd	<0.0096	0.0096	U	0.01			
1,2,3,4,7,8,9-HpCDF		NotFnd	<0.0034	0.0034	U	0.01			
OCDF		15:52	<0.012	0.0053	J R	0.0003			
PCB-28		5:18	0.335	0.019	M J				
PCB-52							NotFnd	<21	M U
PCB-81		7:30	<0.0071	0.0071	M U R	0.0003			
PCB-77		7:42	<0.017	0.0075	M J R	0.0001			
PCB-101							NotFnd	<21	M U
PCB-123		8:02	<0.030	0.014	J R	0.00003			
PCB-118		8:08	<0.064	0.011	J R	0.00003			
PCB-114		NotFnd	<0.011	0.011	U	0.00003			
PCB-105		8:38	<0.014	0.011	J R	0.00003			
PCB-126		NotFnd	<0.011	0.011	U	0.1			
PCB-153							NotFnd	<21	M U
PCB-138							NotFnd	<21	M U
PCB-167		NotFnd	<0.010	0.010	U	0.00003			
PCB-156		NotFnd	<0.011	0.011	U	0.00003			
PCB-157		NotFnd	<0.011	0.011	U	0.00003			
PCB-169		NotFnd	<0.010	0.010	U	0.03			
PCB-180							NotFnd	<21	M U
PCB-189		11:33	<0.0068	0.0039	J R	0.00003			
Extraction Standards		% Rec				Limits	% Rec		
13C12-2,3,7,8-TCDD		9:06	57			30-140			
13C12-1,2,3,7,8-PeCDD		10:50	70			30-140			
13C12-1,2,3,4,7,8-HxCDD		12:27	76		R	30-140			
13C12-1,2,3,6,7,8-HxCDD		12:30	66			30-140			
13C12-1,2,3,7,8,9-HxCDD		12:38	67			30-140			
13C12-1,2,3,4,6,7,8-HpCDD		14:10	70			15-140			
13C12-OCDD		15:46	68			15-140			
13C12-2,3,7,8-TCDF		8:53	59			30-140			
13C12-1,2,3,7,8-PeCDF		10:19	62			30-140			
13C12-2,3,4,7,8-PeCDF		10:43	65			30-140			
13C12-1,2,3,4,7,8-HxCDF		12:02	59			30-140			
13C12-1,2,3,6,7,8-HxCDF		12:06	59			30-140			
13C12-2,3,4,6,7,8-HxCDF		12:23	62			30-140			
13C12-1,2,3,7,8,9-HxCDF		12:49	57			30-140			
13C12-1,2,3,4,6,7,8-HpCDF		13:36	60			15-140			
13C12-1,2,3,4,7,8,9-HpCDF		14:27	63			15-140			
13C12-OCDF		15:52	61			15-140			
13C12-PCB-28 m		5:19	23			10-140			
13C12-PCB-52 m						10-140	5.76	46	
13C12-PCB-81 t		7:31	50			15-140			
13C12-PCB-77 t		7:41	52			15-140			
13C12-PCB-101 m						10-140	7.01	47	
13C12-PCB-123 t		8:03	52			15-140			
13C12-PCB-118 t,m		8:07	53			15-140			
13C12-PCB-114 t		8:19	57			15-140			
13C12-PCB-105 t		8:35	57			15-140			
13C12-PCB-126 t		9:14	62			30-140			
13C12-PCB-153 m						10-140	8.41	58	
13C12-PCB-138 m						10-140	8.90	61	
13C12-PCB-167 t		9:35	59			15-140			
13C12-PCB-156 t		10:02	59			15-140			
13C12-PCB-157 t		10:08	59			15-140			
13C12-PCB-169 t		10:48	64			30-140			
13C12-PCB-180 m						10-140	10.13	58	
13C12-PCB-189 t		11:32	64			15-140			
		pg/g							
Upper Bound Sum of Marker PCBs		105							
Toxic Equivalency WHO (2005)		pg/g							
Lower Bound TEQ - PCDD/F		0.00139							
Upper Bound TEQ - PCDD/F		0.0223							
Lower Bound TEQ - PCB		0.00							
Upper Bound TEQ - PCB		0.00141							
Lower Bound TEQ - TOTAL		0.00139							
Upper Bound TEQ - TOTAL		0.0237							
EDL		Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.							
TEF		Indicates the Toxic Equivalency Factor				TEQ	Indicates the Toxic Equivalency.		
t		Indicates a PCB with dioxin-like toxicity				m	Indicates a marker PCB.		
M		Indicates that a peak has been manually integrated							
U		Indicates that this compound was not detected above the EDL.							
J		indicates that a target analyte was detected below the calibrated range but above the EDL.							
R		Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.							

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Sample Analysis Report

ZINC SULPHATE MONOHYDRATE BATCH NO.:			
Sample Name	4300FA04-2013-001	Sampling Date	11-Jan-13
ALS Sample ID	L1343473-1	Extraction Date	09-Aug-13
Analysis Method	Mod. 1613B/1668A	Sample Size	60.08 grams
Analysis Type	Sample	Percent Moisture	0.0%
Sample Matrix	solid	Split Ratio	1
			Approved: R. Zhadan --e-signature-- 15-Aug-13

Run Information	HR Injection 1	LR Injection 1
Filename	2-130814A S-9	13081307.D
Run Date	14-Aug-13 13:54	13-Aug-13 17:27
Final Volume	25 uL	100 uL
Dilution Factor	1	1
Analysis Units	pg/g	pg/g
Instrument - Column	HRMS-2 DB5MS#USD268766H	MSD-1 HP5ms #USC621543H

Target Analytes	Ret. Time	Conc. pg/a	EDL pg/a	Flags	TEF WHO (2005)	Ret. Time	Conc. pg/a
2,3,7,8-TCDD	NotFnd	<0.010	0.010	U	1		
1,2,3,7,8-PeCDD	NotFnd	<0.010	0.010	U	1		
1,2,3,4,7,8-HxCDD	NotFnd	<0.018	0.018	U	0.1		
1,2,3,6,7,8-HxCDD	NotFnd	<0.021	0.021	U	0.1		
1,2,3,7,8,9-HxCDD	NotFnd	<0.021	0.021	U	0.1		
1,2,3,4,6,7,8-HpCDD	14:10	0.0235	0.0072	J	0.01		
OCDD	15:46	<0.078	0.0079	J R	0.0003		
2,3,7,8-TCDF	NotFnd	<0.0058	0.0058	U	0.1		
1,2,3,7,8-PeCDF	10:19	<0.018	0.0073	J R	0.03		
2,3,4,7,8-PeCDF	10:42	0.0248	0.0070	J	0.3		
1,2,3,4,7,8-HxCDF	12:01	0.0195	0.014	J B	0.1		
1,2,3,6,7,8-HxCDF	12:06	0.0208	0.014	J	0.1		
2,3,4,6,7,8-HxCDF	NotFnd	<0.014	0.014	U	0.1		
1,2,3,7,8,9-HxCDF	NotFnd	<0.017	0.017	U	0.1		
1,2,3,4,6,7,8-HpCDF	13:36	<0.021	0.0044	J R	0.01		
1,2,3,4,7,8,9-HpCDF	14:28	<0.011	0.0054	J R	0.01		
OCDF	15:52	<0.035	0.0082	J R	0.0003		
PCB-28	5:19	2.82	0.0062	J B			
PCB-52						NotFnd	<21 M U
PCB-81	7:34	0.0106	0.0067	M J	0.0003		
PCB-77	7:41	0.0538	0.0069	J	0.0001		
PCB-101						NotFnd	<21 M U
PCB-123	8:02	<0.019	0.012	J R	0.00003		
PCB-118	8:08	0.116	0.0096	J	0.00003		
PCB-114	NotFnd	<0.010	0.010	U	0.00003		
PCB-105	8:35	0.0740	0.010	J	0.00003		
PCB-126	NotFnd	<0.0099	0.0099	U	0.1		
PCB-153						NotFnd	<21 M U
PCB-138						NotFnd	<21 M U
PCB-167	NotFnd	<0.019	0.019	U	0.00003		
PCB-156	NotFnd	<0.020	0.020	U	0.00003		
PCB-157	NotFnd	<0.020	0.020	U	0.00003		
PCB-169	NotFnd	<0.018	0.018	U	0.03		
PCB-180						NotFnd	<21 M U
PCB-189	NotFnd	<0.0058	0.0058	U	0.00003		
Extraction Standards	% Rec	Limits	% Rec				
13C12-2,3,7,8-TCDD	9:06	32	30-140				
13C12-1,2,3,7,8-PeCDD	10:50	42	30-140				
13C12-1,2,3,4,7,8-HxCDD	12:27	42	30-140				
13C12-1,2,3,6,7,8-HxCDD	12:30	41	30-140				
13C12-1,2,3,7,8,9-HxCDD	12:38	39	30-140				
13C12-1,2,3,4,6,7,8-HpCDD	14:10	42	15-140				
13C12-OCDD	15:46	41	15-140				
13C12-2,3,7,8-TCDF	8:53	37	30-140				
13C12-1,2,3,7,8-PeCDF	10:19	36	30-140				
13C12-2,3,4,7,8-PeCDF	10:43	39	30-140				
13C12-1,2,3,4,7,8-HxCDF	12:02	36	30-140				
13C12-1,2,3,6,7,8-HxCDF	12:06	34	30-140				
13C12-2,3,4,6,7,8-HxCDF	12:22	36	30-140				
13C12-1,2,3,7,8,9-HxCDF	12:49	33	30-140				
13C12-1,2,3,4,6,7,8-HpCDF	13:36	37	15-140				
13C12-1,2,3,4,7,8,9-HpCDF	14:27	38	15-140				
13C12-OCDF	15:52	37	15-140				
13C12-PCB-28 m	5:19	19	10-140				
13C12-PCB-52 m			10-140				
13C12-PCB-81 t	7:31	34	15-140			5.76	55
13C12-PCB-77 t	7:41	36	15-140				
13C12-PCB-101 m			10-140			7.01	47
13C12-PCB-123 t	8:03	34	15-140				
13C12-PCB-118 t,m	8:07	33	15-140				
13C12-PCB-114 t	8:19	34	15-140				
13C12-PCB-105 t	8:35	34	15-140				
13C12-PCB-126 t	9:14	38	30-140				
13C12-PCB-153 m			10-140			8.41	53
13C12-PCB-138 m			10-140			8.91	58
13C12-PCB-167 t	9:35	34	15-140				
13C12-PCB-156 t	10:02	35	15-140				
13C12-PCB-157 t	10:07	36	15-140				
13C12-PCB-169 t	10:48	39	30-140				
13C12-PCB-180 m			10-140			10.14	47
13C12-PCB-189 t	11:32	38	15-140				

pg/g	
Upper Bound Sum of Marker PCBs	108

Toxic Equivalency WHO (2005)	pg/g
Lower Bound TEQ - PCDD/F	0.0117
Upper Bound TEQ - PCDD/F	0.0423
Lower Bound TEQ - PCB	0.0000143
Upper Bound TEQ - PCB	0.00155
Lower Bound TEQ - TOTAL	0.0117
Upper Bound TEQ - TOTAL	0.0438

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.
TEF	Indicates the Toxic Equivalency Factor
t	Indicates a PCB with dioxin-like toxicity
M	Indicates that a peak has been manually integrated
U	Indicates that this compound was not detected above the EDL.
J	Indicates that a target analyte was detected below the calibrated range but above the EDL.
B	Indicates that this compound was detected in the method blank at greater than 10% of the sample concentration.
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.

ALS Environmental									
Sample Analysis Report									
Sample Name		MANGANESE SULPHATE MONOHYDRATE BATCH				Sampling Date		15-Jul-13	
ALS Sample ID		NO.: 20130710-2				Extraction Date		09-Aug-13	
Analysis Method		Mod. 1613B/1668A				Sample Size		60.29 grams	
Analysis Type		Sample				Percent Moisture		0.1%	
Sample Matrix		solid				Split Ratio		1	
Run Information		HR Injection 1					LR Injection 1		
Filename		2-130814A S:10					13081308.D		
Run Date		14-Aug-13 14:14					13-Aug-13 17:46		
Final Volume		25 uL					100 uL		
Dilution Factor		1					1		
Analysis Units		pg/g					pg/g		
Instrument - Column		HRMS-2 DB5MS#USD268766H					MSD-1 HP5ms #USC621543H		
Target Analytes		Ret. Time	Conc. pa/q	EDL pa/q	Flags	TEF WHO (2005)	Ret. Time.	Conc. pa/q	
2,3,7,8-TCDD		NotFnd	<0.0055	0.0055	U	1			
1,2,3,7,8-PeCDD		NotFnd	<0.0080	0.0080	U	1			
1,2,3,4,7,8-HxCDD		NotFnd	<0.0078	0.0078	U	0.1			
1,2,3,6,7,8-HxCDD		NotFnd	<0.0085	0.0085	U	0.1			
1,2,3,7,8,9-HxCDD		NotFnd	<0.0082	0.0082	U	0.1			
1,2,3,4,6,7,8-HpCDD		14:11	0.0187	0.0046	J	0.01			
OCDD		15:46	<0.036	0.0053	J R	0.0003			
2,3,7,8-TCDF		NotFnd	<0.0096	0.0096	U	0.1			
1,2,3,7,8-PeCDF		NotFnd	<0.0064	0.0064	U	0.03			
2,3,4,7,8-PeCDF		10:41	<0.014	0.0066	M J R	0.3			
1,2,3,4,7,8-HxCDF		NotFnd	<0.0094	0.0094	U	0.1			
1,2,3,6,7,8-HxCDF		NotFnd	<0.0093	0.0093	U	0.1			
2,3,4,6,7,8-HxCDF		NotFnd	<0.0090	0.0090	U	0.1			
1,2,3,7,8,9-HxCDF		NotFnd	<0.010	0.010	U	0.1			
1,2,3,4,6,7,8-HpCDF		NotFnd	<0.0055	0.0055	U	0.01			
1,2,3,4,7,8,9-HpCDF		14:27	<0.0081	0.0068	J R	0.01			
OCDF		NotFnd	<0.012	0.012	U	0.0003			
PCB-28		5:19	1.30	0.015	J B				
PCB-52									
PCB-81		NotFnd	<0.010	0.010	U	0.0003	NotFnd	<21	M U
PCB-77		7:42	<0.042	0.011	M J R	0.0001			
PCB-101							NotFnd	<21	M U
PCB-123		8:03	0.0171	0.0090	J	0.00003			
PCB-118		8:08	0.0936	0.0070	J	0.00003			
PCB-114		NotFnd	<0.0074	0.0074	U	0.00003			
PCB-105		8:36	0.0686	0.0075	J	0.00003			
PCB-126		NotFnd	<0.0074	0.0074	U	0.1			
PCB-153							NotFnd	<21	M U
PCB-138							NotFnd	<21	M U
PCB-167		NotFnd	<0.011	0.011	U	0.00003			
PCB-156		10:03	<0.016	0.012	J R	0.00003			
PCB-157		NotFnd	<0.012	0.012	U	0.00003			
PCB-169		NotFnd	<0.011	0.011	U	0.03			
PCB-180							NotFnd	<21	M U
PCB-189		NotFnd	<0.0071	0.0071	U	0.00003			
Extraction Standards			% Rec		Limits				% Rec
13C12-2,3,7,8-TCDD		9:06	45		30-140				
13C12-1,2,3,7,8-PeCDD		10:50	52		30-140				
13C12-1,2,3,4,7,8-HxCDD		12:27	57		30-140				
13C12-1,2,3,6,7,8-HxCDD		12:30	58		30-140				
13C12-1,2,3,7,8,9-HxCDD		12:38	58		30-140				
13C12-1,2,3,4,6,7,8-HpCDD		14:11	54		15-140				
13C12-OCDD		15:46	52		15-140				
13C12-2,3,7,8-TCDF		8:53	49		30-140				
13C12-1,2,3,7,8-PeCDF		10:19	48		30-140				
13C12-2,3,4,7,8-PeCDF		10:42	48		30-140				
13C12-1,2,3,4,7,8-HxCDF		12:02	47		30-140				
13C12-1,2,3,6,7,8-HxCDF		12:06	45		30-140				
13C12-2,3,4,6,7,8-HxCDF		12:22	49		30-140				
13C12-1,2,3,7,8,9-HxCDF		12:49	49		30-140				
13C12-1,2,3,4,6,7,8-HpCDF		13:36	47		15-140				
13C12-1,2,3,4,7,8,9-HpCDF		14:27	50		15-140				
13C12-OCDF		15:52	46		15-140				
13C12-PCB-28 m		5:19	28		10-140				
13C12-PCB-52 m					10-140				
13C12-PCB-81 t		7:31	47		15-140		5.76	65	
13C12-PCB-77 t		7:41	47		15-140				
13C12-PCB-101 m					10-140		7.01	62	
13C12-PCB-123 t		8:03	42		15-140				
13C12-PCB-118 t,m		8:07	46		15-140				
13C12-PCB-114 t		8:19	46		15-140				
13C12-PCB-105 t		8:35	45		15-140				
13C12-PCB-126 t		9:14	49		30-140				
13C12-PCB-153 m					10-140		8.41	73	
13C12-PCB-138 m					10-140		8.90	78	
13C12-PCB-167 t		9:36	45		15-140				
13C12-PCB-156 t		10:02	46		15-140				
13C12-PCB-157 t		10:07	47		15-140				
13C12-PCB-169 t		10:48	50		30-140				
13C12-PCB-180 m					10-140		10.13	61	
13C12-PCB-189 t		11:32	45		15-140				
			pg/g						
Upper Bound Sum of Marker PCBs			106						
Toxic Equivalency WHO (2005)			pg/g						
Lower Bound TEQ - PCDD/F			0.000187						
Upper Bound TEQ - PCDD/F			0.0254						
Lower Bound TEQ - PCB			0.00000538						
Upper Bound TEQ - PCB			0.00108						
Lower Bound TEQ - TOTAL			0.000192						
Upper Bound TEQ - TOTAL			0.0265						
EDL		Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.							
TEF		Indicates the Toxic Equivalency Factor				TEQ	Indicates the Toxic Equivalency.		
t		Indicates a PCB with dioxin-like toxicity				m	Indicates a marker PCB.		
M		Indicates that a peak has been manually integrated							
U		Indicates that this compound was not detected above the EDL.							
J		indicates that a target analyte was detected below the calibrated range but above the EDL.							
B		Indicates that this compound was detected in the method blank at greater than 10% of the sample concentration.							
R		Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.							

ALS Environmental

Sample Analysis Report

FERROUS SULPHATE MONOHYDRATE BATCH NO.:			
Sample Name	4300FA004-2013-066	Sampling Date	15-May-13
ALS Sample ID	L1343473-3	Extraction Date	09-Aug-13
Analysis Method	Mod. 1613B/1668A	Sample Size	60.62 grams
Analysis Type	Sample	Percent Moisture	1.3%
Sample Matrix	solid	Split Ratio	1
		Approved:	<i>R. Zhadan</i>
		--e-signature--	15-Aug-13

Run Information	HR Injection 1	LR Injection 1
Filename	2-130814A S:11	13081309.D
Run Date	14-Aug-13 14:34	13-Aug-13 18:04
Final Volume	25 uL	100 uL
Dilution Factor	1	1
Analysis Units	pg/g	pg/g
Instrument - Column	HRMS-2 DB5MS#USD268766H	MSD-1 HP5ms #USC621543H

Target Analytes	Ret. Time	Conc. pg/a	EDL pg/a	Flags	TEF WHO (2005)	Ret. Time	Conc. pg/a
2,3,7,8-TCDD	NotFnd	<0.0043	0.0043	U	1		
1,2,3,7,8-PeCDD	NotFnd	<0.0039	0.0039	U	1		
1,2,3,4,7,8-HxCDD	NotFnd	<0.0035	0.0035	U	0.1		
1,2,3,6,7,8-HxCDD	NotFnd	<0.0040	0.0040	U	0.1		
1,2,3,7,8,9-HxCDD	NotFnd	<0.0038	0.0038	U	0.1		
1,2,3,4,6,7,8-HpCDD	14:11	<0.012	0.0037	M J R	0.01		
OCDD	15:46	<0.078	0.0046	J R	0.0003		
2,3,7,8-TCDF	NotFnd	<0.0072	0.0072	U	0.1		
1,2,3,7,8-PeCDF	NotFnd	<0.0067	0.0067	U	0.03		
2,3,4,7,8-PeCDF	NotFnd	<0.0067	0.0067	U	0.3		
1,2,3,4,7,8-HxCDF	NotFnd	<0.0067	0.0067	U	0.1		
1,2,3,6,7,8-HxCDF	NotFnd	<0.0066	0.0066	U	0.1		
2,3,4,6,7,8-HxCDF	NotFnd	<0.0066	0.0066	U	0.1		
1,2,3,7,8,9-HxCDF	12:48	<0.011	0.0077	J R	0.1		
1,2,3,4,6,7,8-HpCDF	NotFnd	<0.0050	0.0050	U	0.01		
1,2,3,4,7,8,9-HpCDF	NotFnd	<0.0063	0.0063	U	0.01		
OCDF	15:53	<0.015	0.015	U	0.0003		
PCB-28	5:18	3.32	0.015	J B			
PCB-52						NotFnd	<21 U
PCB-81	7:31	0.00609	0.0045	J	0.0003		
PCB-77	7:42	<0.12	0.0052	J R	0.0001		
PCB-101						NotFnd	<21 M U
PCB-123	8:03	<0.071	0.012	J R	0.00003		
PCB-118	8:08	<0.72	0.0093	J R	0.00003		
PCB-114	8:20	<0.024	0.010	J R	0.00003		
PCB-105	8:36	<0.50	0.011	J R	0.00003		
PCB-126	9:15	<0.017	0.0098	J R	0.1		
PCB-153						NotFnd	<21 M U
PCB-138						NotFnd	<21 M U
PCB-167	9:36	0.0423	0.0048	J	0.00003		
PCB-156	10:02	<0.086	0.0049	J R	0.00003		
PCB-157	10:08	<0.036	0.0049	J R	0.00003		
PCB-169	NotFnd	<0.0048	0.0048	U	0.03		
PCB-180						NotFnd	<21 M U
PCB-189	NotFnd	<0.0036	0.0036	U	0.00003		
Extraction Standards	% Rec	Limits	% Rec				
13C12-2,3,7,8-TCDD	9:06	58	30-140				
13C12-1,2,3,7,8-PeCDD	10:50	71	30-140				
13C12-1,2,3,4,7,8-HxCDD	12:27	72	30-140				
13C12-1,2,3,6,7,8-HxCDD	12:31	68	30-140				
13C12-1,2,3,7,8,9-HxCDD	12:39	70	30-140				
13C12-1,2,3,4,6,7,8-HpCDD	14:11	70	15-140				
13C12-OCDD	15:46	70	15-140				
13C12-2,3,7,8-TCDF	8:52	65	30-140				
13C12-1,2,3,7,8-PeCDF	10:19	63	30-140				
13C12-2,3,4,7,8-PeCDF	10:42	64	30-140				
13C12-1,2,3,4,7,8-HxCDF	12:02	62	30-140				
13C12-1,2,3,6,7,8-HxCDF	12:06	57	30-140				
13C12-2,3,4,6,7,8-HxCDF	12:23	63	30-140				
13C12-1,2,3,7,8,9-HxCDF	12:49	61	30-140				
13C12-1,2,3,4,6,7,8-HpCDF	13:36	63	15-140				
13C12-1,2,3,4,7,8,9-HpCDF	14:27	64	15-140				
13C12-OCDF	15:52	62	15-140				
13C12-PCB-28 m	5:19	46	10-140				
13C12-PCB-52 m			10-140			5.76	53 M
13C12-PCB-81 t	7:31	65	15-140				
13C12-PCB-77 t	7:41	64	15-140				
13C12-PCB-101 m			10-140			7.01	45
13C12-PCB-123 t	8:03	59	15-140				
13C12-PCB-118 t,m	8:07	60	15-140				
13C12-PCB-114 t	8:19	61	15-140				
13C12-PCB-105 t	8:36	58	15-140				
13C12-PCB-126 t	9:14	67	30-140				
13C12-PCB-153 m			10-140			8.41	47
13C12-PCB-138 m			10-140			8.91	50 M
13C12-PCB-167 t	9:36	60	15-140				
13C12-PCB-156 t	10:02	62	15-140				
13C12-PCB-157 t	10:08	61	15-140				
13C12-PCB-169 t	10:49	66	30-140				
13C12-PCB-180 m			10-140			10.14	45
13C12-PCB-189 t	11:32	65	15-140				

pg/g	
Upper Bound Sum of Marker PCBs	109

Toxic Equivalency WHO (2005)	pg/g
Lower Bound TEQ - PCDD/F	0.00
Upper Bound TEQ - PCDD/F	0.0156
Lower Bound TEQ - PCB	0.00000310
Upper Bound TEQ - PCB	0.00190
Lower Bound TEQ - TOTAL	0.00000310
Upper Bound TEQ - TOTAL	0.0175

EDL	Indicates the Estimated Detection Limit, based on the measured background noise for this target in this sample.	
TEF	Indicates the Toxic Equivalency Factor	TEQ Indicates the Toxic Equivalency.
t	Indicates a PCB with dioxin-like toxicity	m Indicates a marker PCB.
M	Indicates that a peak has been manually integrated	
U	Indicates that this compound was not detected above the EDL	
J	Indicates that a target analyte was detected below the calibrated range but above the EDL	
B	Indicates that this compound was detected in the method blank at greater than 10% of the sample concentration.	
R	Indicates that the ion abundance ratio for this compound did not meet the acceptance criterion.	

ALS Environmental									
Laboratory Control Sample Analysis Report									
Sample Name		LCS		Sampling Date		n/a		Approved: R. Zhadan --e-signature-- 15-Aug-13	
ALS Sample ID		WG1723211-2		Extraction Date		09-Aug-13			
Analysis Method		Mod. 1613B/1668A		Sample Size		1 n/a			
Analysis Type		LCS		Percent Moisture		n/a			
Sample Matrix		qc		Split Ratio		1			
Run Information		HR Injection 1				LR Injection 1			
Filename		2-130814A S;2				13081302.D			
Run Date		14-Aug-13 11:34				13-Aug-13 15:56			
Final Volume		25 uL				100 uL			
Dilution Factor		1				1			
Analysis Units		%				%			
Instrument - Column		HRMS-2 DB5MS#USD268766H				MSD-1 HP5ms #USC621543H			
Target Analytes		Ret. Time	% Rec	Flags	Limits	Ret. Time	% Rec		
2,3,7,8-TCDD		9:07	92		67-158				
1,2,3,7,8-PeCDD		10:52	97		70-142				
1,2,3,4,7,8-HxCDD		12:29	80		70-164				
1,2,3,6,7,8-HxCDD		12:32	90		76-134				
1,2,3,7,8,9-HxCDD		12:40	83		64-162				
1,2,3,4,6,7,8-HpCDD		14:12	89		70-140				
OCDD		15:47	97		78-144				
2,3,7,8-TCDF		8:54	89		75-158				
1,2,3,7,8-PeCDF		10:21	91		80-134				
2,3,4,7,8-PeCDF		10:44	92		68-160				
1,2,3,4,7,8-HxCDF		12:03	102		72-134				
1,2,3,6,7,8-HxCDF		12:07	93		84-130				
2,3,4,6,7,8-HxCDF		12:24	98		78-130				
1,2,3,7,8,9-HxCDF		12:50	97		70-156				
1,2,3,4,6,7,8-HpCDF		13:37	90		82-122				
1,2,3,4,7,8,9-OCDF		14:28	92		78-138				
OCDF		15:53	90		63-170				
PCB-28		5:20	100		50-150				
PCB-52					50-150	5.80	128	M	
PCB-81		7:32	95		50-150				
PCB-77		7:42	95		50-150				
PCB-101					50-150	7.05	110		
PCB-123		8:04	96		50-150				
PCB-118		8:08	100		50-150				
PCB-114		8:20	96		50-150				
PCB-105		8:37	97		50-150				
PCB-126		9:15	97		50-150				
PCB-153					50-150	8.44	89	M	
PCB-138					50-150	8.94	110		
PCB-167		9:37	94		50-150				
PCB-156		10:03	92		50-150				
PCB-157		10:09	89		50-150				
PCB-169		10:50	96		50-150				
PCB-180					50-150	10.15	105		
PCB-189		11:33	95		50-150				
Extraction Standards		% Rec	Limits	% Rec					
13C12-2,3,7,8-TCDD		9:07	48		30-140				
13C12-1,2,3,7,8-PeCDD		10:51	60		30-140				
13C12-1,2,3,4,7,8-HxCDD		12:28	62	M	30-140				
13C12-1,2,3,6,7,8-HxCDD		12:31	58	M	30-140				
13C12-1,2,3,7,8,9-HxCDD		12:39	61		30-140				
13C12-1,2,3,4,6,7,8-HpCDD		14:11	65		15-140				
13C12-OCDD		15:47	60		15-140				
13C12-2,3,7,8-TCDF		8:53	53		30-140				
13C12-1,2,3,7,8-PeCDF		10:20	54		30-140				
13C12-2,3,4,7,8-PeCDF		10:43	57		30-140				
13C12-1,2,3,4,7,8-HxCDF		12:03	51		30-140				
13C12-1,2,3,6,7,8-HxCDF		12:06	54		30-140				
13C12-2,3,4,6,7,8-HxCDF		12:23	53		30-140				