



January 9, 2020

Reference No. 11111394-002

Mr. Dan Cook
Environmental Specialist Senior
Contaminated Sites Section
Iowa Department of Natural Resources
Wallace State Office Building
502 East 9th Street
Des Moines, Iowa 50319

Dear Mr. Cook:

**Re: Fall 2019 Northern Drainageway Cover Inspection
Former Great Rivers Cooperative
Lockridge, Iowa**

On November 25, 2019, GHD conducted the fall inspection of the Northern Drainageway Cover at the former Great Rivers Cooperative site near Lockridge, Iowa. Sediment sampling in the drainageway channel, 100 feet north of the cover, was also completed during the fall inspection. This letter provides a summary of the findings; a photographic log of the inspection is included in Attachment A. The site layout is shown on Figure 1.

1. Final Cap Grading, Slope, Erosion Control, and Vegetative Cover

The final cap grading and slope have not changed significantly since completion of construction in September 1998. Vegetation on the cover appeared thick and vigorous. No residual oil stains were observed near the southwest edge of the cover where petroleum-contaminated run-on previously occurred from the recycling facility. No run-off from the metal recycling operation in this area was observed during the fall inspection. Scovern Outdoor Grooming was retained to periodically mow the cap during 2019.

2. Site Fencing and Controlled Access Security

When GHD arrived on site, both fence gates were closed and locked. Following the inspection, both gates were closed and relocked. The fencing was in good condition. Periodic herbicide applications were completed during 2019 to prevent growth of woody vegetation into the fencing.

3. Surface Water Run-On Diversion and Run-Off Control

Surface water run-on from the west is controlled by the drainage channel constructed on the west side of the cover. Surface water run-on from the east is directed back to the east by the constructed contours of the site. A drainage terrace running east to west controls run-off on the cap and directs run-off to a rip-rap-armored channel on the west side of the cover. Constructed surface water run-on diversion and run-off controls appeared to be effective; no areas of significant erosion of the cover were



observed during the inspection. The rip-rap-armored channel is treated with herbicide during the growing season to limit growth of the vegetation in the channel. At the bottom (north end) of the rip-rap-armored channel, the fencepost previously noted as being loose remained in position with no compromise to the fencing. Drainage conditions in this area and the fencepost conditions will be monitored in the future to determine if any repairs are needed. An area was observed east of the drainageway where water has been running under the fence and causing a small area of erosion approximately 6 inches wide and 6 inches deep. This area will also be monitored in the future.

4. Drainage Terrace, Channels, and Control System Performance

The drainage control system at the site is generally performing as designed. No pooling of water was observed near the center of the drainage terrace during the fall inspection. No ponding of water was noted on the cap. There was no evidence of slumping on the downward slope of the terrace and no observed surficial cracks along the crest of the terrace. Vegetation was in good condition.

5. Flexible Membrane Liner Performance and Evidence of Exposure

The flexible membrane liner appears to be performing as designed. There was no evidence of exposure of the liner during the site visit. No deep-rooted plants were observed on the cover. Woody vegetation previously growing in the rip-rap-armored channel has been controlled by the application of herbicides.

6. Evidence of Cover Subsidence and Settlement

There was no observed evidence of cover subsidence or settlement.

7. General Observations

During some past inspections, scrap metal was observed on the cap or piled directly adjacent to the fence surrounding the cap. During this inspection, no significant debris were observed on the cap or placed immediately adjacent to the cap. Surface water run-on to the cap from the west, which previously resulted in petroleum staining on the cap, appears to be directed away from the cap.

8. Sediment Sampling and Analysis

A sediment sample was collected as part of the fall 2019 inspection. The sample was collected from the northern drainageway located on property now owned by Justin and Jennifer Deutsh. The sample was collected from the top 6 inches of sediment in the center of the drainage channel, approximately 100 feet north of the fence separating the cover from the Deutsh property. Water was flowing in the channel during this sampling event. The 2019 and previous sampling results are summarized in Table 1. A copy of the laboratory analytical report is provided in Attachment B. The concentrations of the primary constituents of concern are generally lower than the 2018 results, and remain lower than historically detected.



9. Closing

The next inspection is scheduled for April 2020. If there are any questions regarding this inspection report, please contact me at 515-414-3935.

Sincerely,

GHD

A handwritten signature in black ink that reads "Kevin G. Armstrong". The signature is written in a cursive, flowing style.

Kevin G. Armstrong, C.P.G.

Project Manager

DP/hs/9

Encl. Figure 1 - Site Map

Table 1 - Laboratory Analytical Results Summary

Attachment A - Photographic Log

Attachment B - Laboratory Analytical Report

cc: George Crouse, Syngenta Crop Protection, LLC
Iowa Department of Natural Resources Field Office No. 6

Figure 1



Source: U.S. GEOLOGICAL SURVEY 2010 HIGH RESOLUTION ORTHOIMAGERY FOR EASTERN AREAS, IA

0 50 100ft

Coordinate System:
STATE PLANE NAD 83
IOWA SOUTH FEET



GREAT RIVERS COOPERATIVE
LOCKRIDGE, IOWA
NORTHERN DRAINAGEWAY COVER

SITE MAP

LEGEND

- APPROXIMATE
PROPERTY BOUNDARY
- RAILWAY
- FENCE

11111394-001

Nov 2, 2015

FIGURE 1

Table 1

Table 1

**Laboratory Analytical Results Summary
Great Rivers Cooperative
Lockridge, Iowa**

Compound	Units	100-C, 0-6" 6/29/2001	100-C, 0-6" 10/19/2001	100-C, 0-6" 12/20/2001	100-C, 0-6" 4/3/2002	100-C, 0-6" 7/18/2002	100-C, 0-6" 10/30/2003	100-C, 0-6" 11/10/2004	100-C, 0-6" 10/25/2005
4,4'-DDD	mg/kg	130	1.92	37.7	18.9	6.5	4.21	49.7	5.91
4,4'-DDE	mg/kg	40.7	0.336	0.799	1.92	2.02	0.787	22	1.42
4,4'-DDT	mg/kg	168	1.52	33.8	32.6	8.27	2.01	54	7.51
Aldrin	mg/kg	15.3	0.098	<0.500	<0.050	0.708	2.53	20.2	0.803
alpha-BHC	mg/kg	<0.500	<0.005	<0.500	<0.050	<0.100	<0.100	<2.50	<0.050
beta-BHC	mg/kg	<0.500	<0.005	<0.500	<0.050	<0.100	<0.100	<2.50	<0.050
Chlordane	mg/kg	<5.00	<0.050	<5.0	<0.500	<1.00	<1.00	<25.0	<0.500
delta-BHC	mg/kg	2.8	<0.005	<0.500	<0.050	<0.100	<0.100	<2.50	<0.050
Dieldrin	mg/kg	<0.500	<0.005	<0.500	<0.050	<0.100	0.305	16.8	<0.050
Endosulfan I	mg/kg	<0.500	<0.005	1.27	0.327	<0.100	<0.100	<2.50	0.072
Endosulfan II	mg/kg	<0.500	<0.005	<0.500	<0.050	<0.100	<0.100	<2.50	<0.050
Endosulfan Sulfate	mg/kg	<0.100	<0.001	<.100	<0.010	<0.020	<0.020	<0.500	<0.010
Endrin	mg/kg	<0.500	<0.005	<0.500	<0.050	<0.100	<0.100	10.1	<0.050
Endrin Aldehyde	mg/kg	<0.200	<0.002	<0.200	<0.020	<0.040	<0.040	<1.00	<0.020
gamma-BHC (Lindane)	mg/kg	0.823	<0.005	<0.500	<0.050	<0.100	<0.100	<2.50	<0.050
Heptachlor	mg/kg	11.1	0.021	1.03	<0.050	<0.100	<0.100	16.4	1.17
Heptachlor Epoxide	mg/kg	2.09	<0.005	<0.500	<0.050	<0.100	<0.100	<2.50	0.199
Hexachlorobenzene	mg/kg	<0.500	<0.005	<0.500	<0.050	<0.100	<0.100	<2.50	<0.050
Methoxychlor	mg/kg	<0.500	<0.005	<0.500	<0.050	<0.100	<0.100	4.72	<0.050
Toxaphene	mg/kg	<5.00	<0.050	<5.00	<0.500	<1.00	<1.00	<25.0	<0.500

Table 1

**Laboratory Analytical Results Summary
Great Rivers Cooperative
Lockridge, Iowa**

Compound	Units	100-C, 0-6" 10/4/2006	100-C, 0-6" 10/23/2007	100-C, 0-6" 9/23/2008	100-C, 0-6" 10/12/2009	100-C, 0-6" 11/8/2010	100-C, 0-6" 8/31/2011	100-C, 0-6" 10/11/2012	100-C, 0-6" 10/23/2013
4,4'-DDD	mg/kg	77.2	4.34	3.87	7.06	1.81	14.4	1.55	1.14
4,4'-DDE	mg/kg	18.4	0.731	0.684	7.65	0.207	3.03	0.212	0.234
4,4'-DDT	mg/kg	53.3	4.78	6.28	10.3	1.21	0.631	1.09	1.41
Aldrin	mg/kg	14	0.185	0.21	1.25	0.064	1.15	<0.050	0.032
alpha-BHC	mg/kg	<2.50	<0.050	<0.050	<0.625	<0.005	<0.159	<0.050	<0.005
beta-BHC	mg/kg	<2.50	0.008	<0.050	<0.625	<0.005	<0.159	<0.050	0.008
Chlordane	mg/kg	<25.0	<0.050	<0.050	<1.25	<0.050	<0.159	<0.500	<0.005
delta-BHC	mg/kg	<2.50	<0.050	<0.050	<0.625	0.012	<0.159	<0.050	<0.005
Dieldrin	mg/kg	<2.50	0.098	0.097	<1.25	0.066	0.689	<0.050	<0.005
Endosulfan I	mg/kg	<2.50	<0.050	<0.050	<1.25	<0.005	<0.159	<0.050	<0.005
Endosulfan II	mg/kg	<2.50	<0.050	<0.050	<1.25	<0.005	<0.159	<0.050	<0.005
Endosulfan Sulfate	mg/kg	<0.500	<0.001	<0.010	<1.25	<0.001	<0.032	<0.010	<0.001
Endrin	mg/kg	<2.50	<0.005	<0.050	<1.25	<0.005	0.281	<0.050	<0.005
Endrin Aldehyde	mg/kg	<1.00	<0.002	<0.020	<0.050	<0.002	<0.064	<0.020	<0.002
gamma-BHC (Lindane)	mg/kg	<2.50	0.008	<0.050	<0.625	0.006	<0.159	<0.050	<0.005
Heptachlor	mg/kg	<2.50	0.284	<0.050	<0.625	<0.005	<0.159	<0.050	<0.005
Heptachlor Epoxide	mg/kg	<2.50	<0.005	<0.050	<0.125	<0.005	<0.159	<0.050	<0.005
Hexachlorobenzene	mg/kg	<2.50	<0.005	<0.050	<0.125	<0.005	<0.159	<0.050	<0.005
Methoxychlor	mg/kg	<2.50	0.041	<0.050	<0.125	0.046	<0.159	<0.050	<0.005
Toxaphene	mg/kg	<25.0	<0.050	<0.500	<0.125	<0.050	<1.59	<0.500	<0.005

Table 1

**Laboratory Analytical Results Summary
Great Rivers Cooperative
Lockridge, Iowa**

Compound	Units	100-C, 0-6" 10/24/2014	100-C, 0-6" 10/13/2015	100-C, 0-6" 10/25/2016	100-C, 0-6" 11/28/2017	100-C, 0-6" 11/15/2018	100-C, 0-6" 11/25/2019
4,4'-DDD	mg/kg	0.804	0.021	1.48	1.10	1.04	0.144
4,4'-DDE	mg/kg	0.224	<0.005	0.219	0.225	0.183	0.662
4,4'-DDT	mg/kg	0.118	0.014	1.6	1.03	0.335	0.237
Aldrin	mg/kg	0.067	<0.005	<0.074	0.777	0.023	<0.005
alpha-BHC	mg/kg	<0.025	<0.005	<0.074	<0.050	<0.005	<0.005
beta-BHC	mg/kg	<0.025	<0.005	<0.074	<0.050	0.009	<0.005
Chlordane	mg/kg	<0.025	<0.050	<0.738	<0.500	<0.050	0.795
delta-BHC	mg/kg	<0.025	<0.005	<0.074	<0.050	0.005	<0.005
Dieldrin	mg/kg	<0.025	<0.005	<0.074	<0.050	0.036	<0.005
Endosulfan I	mg/kg	<0.025	<0.005	<0.074	<0.050	<0.005	<0.005
Endosulfan II	mg/kg	<0.025	<0.005	<0.074	<0.050	<0.005	<0.005
Endosulfan Sulfate	mg/kg	<0.025	<0.001	<0.015	<0.010	<0.001	<0.005
Endrin	mg/kg	<0.025	<0.005	<0.074	<0.050	<0.005	<0.005
Endrin Aldehyde	mg/kg	<0.025	0.002	<0.030	<0.020	<0.002	<0.005
gamma-BHC (Lindane)	mg/kg	<0.025	<0.005	<0.074	<0.050	<0.005	<0.005
Heptachlor	mg/kg	<0.025	<0.005	<0.074	<0.050	<0.005	<0.005
Heptachlor Epoxide	mg/kg	<0.025	<0.005	<0.074	<0.050	<0.005	<0.005
Hexachlorobenzene	mg/kg	<0.025	<0.005	<0.074	<0.050	<0.005	<0.005
Methoxychlor	mg/kg	<0.025	<0.005	<0.074	<0.050	<0.005	<0.005
Toxaphene	mg/kg	<0.025	<0.050	<0.738	<0.500	<0.050	0.75

Attachment A

Photographic Log



Photo 1 – View of east gate from outside of the capped area.



Photo 2 – View of outside of south fence line.



Site Photographs



Photo 3 – Interior of south fenceline looking west.



Photo 4 – Interior of south fenceline looking east.



Site Photographs



Photo 5 – View of locked west gate from capped area.



Photo 6 – Interior of west fenceline looking north.



Site Photographs



Photo 7 – Central portion of capped area.



Photo 8 – Rip-rap lined drainageway.



Site Photographs



Photo 9 – Interior of west fenceline looking south.



Photo 10 – Interior of north fenceline looking east.



Site Photographs



Photo 11 – Interior of east fenceline looking south.



Photo 12 – Interior of east fenceline looking south.



Site Photographs



Photo 13 – View along terrace to the rip-rap lined drainageway.



Photo 14 – View of terrace looking east.



Site Photographs



Photo 15 – View of area where water has run under the north fence east of the rip-rap lined drainageway.



Site Photographs

Attachment B

Laboratory Analytical Report

December 09 2019

Kevin Armstrong
GHD-DSM
11228 Aurora Ave
Des Moines, IA 50322

RE: Sygenta
11111394-002

Enclosed are the results of analyses for samples received by the laboratory on 11/25/19 15:27. If you have any questions concerning this report, please feel free to contact me at 1-800-858-5227.

ANALYTICAL REPORT FOR SAMPLES

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SS-100-C	1K91872-01	Soil	11/25/19 10:30	11/25/19 15:27

GHD-DSM
11228 Aurora Ave
Des Moines, IA 50322

Project: Sygenta
Project Number: 11111394-002
Project Manager: Kevin Armstrong

Reported
12/09/19 16:10

CHAIN OF CUSTODY RECORD

COC NO.: 11162018
PAGE 1 OF 1

(See Reverse Side for Instructions)

Address: 11228 Aurora Avenue, Des Moines, IA 50322
Phone: 515-414-3935 Fax: 515-414-3943

Temp. 2

SSOW ID: S5OW 11111394-002
Cooler No.:
Carrier: Keystone Courier
Airbill No: N/A
Total # of Containers: 1

MS/MSD Request

Comments/
Special Instructions:

Project No/Phase/Task Code:
11111394-002

Project Name:
GREAT RIVERS COOPERATIVE

Project Location:
LOCKRIDGE, IOWA

GHD Chemistry Contact:
Grant Anderson (grant.anderson@ghd.com)

Sampler(s):
Diane Pals

Laboratory Name:
KEYSTONE LABORATORIES, INC.

Lab Location:
NEWTON, IOWA

Lab Contact:
Leslie Taylor

ANALYSIS REQUESTED
(See Back of COC for Definitions)

SAMPLE TYPE

Pesticides (8081)

Filtered (Y/N)

Grab (G) or Comp (C)

Matrix Code

Carrier: Keystone Courier

Airbill No: N/A

Total # of Containers: 1

MS/MSD Request

Comments/
Special Instructions:

Item	SAMPLE IDENTIFICATION (Containers for each sample may be combined on one line)		DATE (mm/dd/yyyy)	TIME (hh:mm)	PRESERVATION - (SEE BACK OF COC FOR ABBREVIATIONS)		Pesticides (8081)	Grab (G) or Comp (C)	Filtered (Y/N)	Total Containers/sample	MS/MSD Request	Comments/ Special Instructions:
	DATE (mm/dd/yyyy)	TIME (hh:mm)			SE	G						
1	SS-100-C		11/25/19	1030			X					
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												

Notes/ Special Requirements: email results to Kevin Armstrong (kevin.armstrong@ghd.com)

TAT Required in business days (use separate COCs for different TATs):
☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 1 Week ☒ 2 Week ☐ Other:

RELINQUISHED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME
Diane Pals	GHD	11/25/19	1527	Kevin Armstrong		11/25/19	1527

GHD Form: COC-10B (20110804)

GHD-DSM
11228 Aurora Ave
Des Moines, IA 50322

Project: Sygenta
Project Number: 11111394-002
Project Manager: Kevin Armstrong

Reported
12/09/19 16:10

SS-100-C
1K91872-01 (Soil)

Date Sampled: 11/25/2019 10:30:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Keystone Laboratories, Inc. - Newton

Determination of Organochlorine Insecticides & Metabolites

Alpha-BHC	ND	0.005	mg/kg dry	1	1CL0134	12/04/19	12/05/19 15:36	EPA 8081	
Gamma-BHC [Lindane]	ND	0.005	"	"	"	"	"	"	
Beta-BHC	ND	0.005	"	"	"	"	"	"	
Heptachlor	ND	0.005	"	"	"	"	"	"	
Delta-BHC	ND	0.005	"	"	"	"	"	"	
Aldrin	ND	0.005	"	"	"	"	"	"	
Heptachlor Epoxide	ND	0.005	"	"	"	"	"	"	
Endosulfan I	ND	0.005	"	"	"	"	"	"	
4,4'-DDE	OVERRANGE	0.005	"	"	"	"	"	"	
Dieldrin	ND	0.005	"	"	"	"	"	"	
Endrin	ND	0.005	"	"	"	"	"	"	
4,4'-DDD	OVERRANGE	0.005	"	"	"	"	"	"	
Endosulfan II	ND	0.005	"	"	"	"	"	"	
4,4'-DDT	OVERRANGE	0.001	"	"	"	"	"	"	
Endrin Aldehyde	ND	0.002	"	"	"	"	"	"	
Endosulfan Sulfate	ND	0.001	"	"	"	"	"	"	
Methoxychlor	ND	0.005	"	"	"	"	"	"	
Chlordane	0.795	0.050	"	"	"	"	"	"	
Toxaphene	0.750	0.050	"	"	"	"	"	"	
Hexachlorobenzene	ND	0.005	"	"	"	"	"	"	
Surrogate: Tetrachloro-m-xylene		71.9 %	23-145		"	"	"	"	

Determination of Conventional Chemistry Parameters

% Solids	74.5	0.10	%	1	1CL0122	12/04/19	12/04/19 09:29	SM 2540 G	
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GHD-DSM
11228 Aurora Ave
Des Moines, IA 50322

Project: Sygenta
Project Number: 11111394-002
Project Manager: Kevin Armstrong

Reported
12/09/19 16:10

SS-100-C

1K91872-01RE1 (Soil)

Date Sampled: 11/25/2019 10:30:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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Keystone Laboratories, Inc. - Newton

Determination of Organochlorine Insecticides & Metabolites

4,4'-DDE	0.144	0.100	mg/kg dry	20	1CL0134	12/04/19	12/06/19 08:15	EPA 8081	
4,4'-DDD	0.662	0.100	"	"	"	"	"	"	
4,4'-DDT	0.237	0.020	"	"	"	"	"	"	

<i>Surrogate: Tetrachloro-m-xylene</i>	<i>85.0 %</i>	<i>23-145</i>	<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	<i>S-01</i>
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GHD-DSM
11228 Aurora Ave
Des Moines, IA 50322

Project: Sygenta
Project Number: 11111394-002
Project Manager: Kevin Armstrong

Reported
12/09/19 16:10

Determination of Organochlorine Insecticides & Metabolites - Quality Control

Keystone Laboratories, Inc. - Newton

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1CL0134 - 3550B NP/OC Sonic

Blank (1CL0134-BLK1)

Prepared: 12/04/19 Analyzed: 12/05/19

Alpha-BHC	ND	0.005	mg/kg wet							
Gamma-BHC [Lindane]	ND	0.005	"							
Beta-BHC	ND	0.005	"							
Heptachlor	ND	0.005	"							
Delta-BHC	ND	0.005	"							
Aldrin	ND	0.005	"							
Heptachlor Epoxide	ND	0.005	"							
Endosulfan I	ND	0.005	"							
4,4'-DDE	ND	0.005	"							
Dieldrin	ND	0.005	"							
Endrin	ND	0.005	"							
4,4'-DDD	ND	0.005	"							
Endosulfan II	ND	0.005	"							
4,4'-DDT	ND	0.001	"							
Endrin Aldehyde	ND	0.002	"							
Endosulfan Sulfate	ND	0.001	"							
Methoxychlor	ND	0.005	"							
Chlordane	ND	0.050	"							
Toxaphene	ND	0.050	"							
Hexachlorobenzene	ND	0.005	"							

Surrogate: Tetrachloro-m-xylene 0.0136 " 0.0200000 67.8 23-145

LCS (1CL0134-BS1)

Prepared: 12/04/19 Analyzed: 12/05/19

Alpha-BHC	0.0060	0.005	mg/kg wet	0.00833333	71.9	47-119
Gamma-BHC [Lindane]	0.0062	0.005	"	0.00833333	74.3	45-128
Beta-BHC	0.0061	0.005	"	0.00833333	73.4	30-148
Heptachlor	0.0067	0.005	"	0.00833333	80.7	37-132
Delta-BHC	0.0063	0.005	"	0.00833333	75.9	45-130
Aldrin	0.0063	0.005	"	0.00833333	75.1	43-121
Heptachlor Epoxide	0.0065	0.005	"	0.00833333	77.4	50-132
Endosulfan I	0.0064	0.005	"	0.00833333	77.0	32-132
4,4'-DDE	0.0066	0.005	"	0.00833333	79.2	30-135
Dieldrin	0.0056	0.005	"	0.00833333	67.0	51-131
Endrin	0.0074	0.005	"	0.00833333	88.3	43-139
4,4'-DDD	0.0068	0.005	"	0.00833333	82.0	39-142
Endosulfan II	0.0067	0.005	"	0.00833333	80.5	32-151
4,4'-DDT	0.0063	0.001	"	0.00833333	75.2	30-151
Endrin Aldehyde	0.0040	0.002	"	0.00833333	48.0	10-140
Endosulfan Sulfate	0.0065	0.001	"	0.00833333	78.1	44-135
Methoxychlor	0.0063	0.005	"	0.00833333	76.1	40-153

Surrogate: Tetrachloro-m-xylene 0.0149 " 0.0200000 74.7 23-145

GHD-DSM
11228 Aurora Ave
Des Moines, IA 50322

Project: Sygenta
Project Number: 11111394-002
Project Manager: Kevin Armstrong

Reported
12/09/19 16:10

Determination of Organochlorine Insecticides & Metabolites - Quality Control

Keystone Laboratories, Inc. - Newton

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1CL0134 - 3550B NP/OC Sonic

Matrix Spike (1CL0134-MS1)		Source: 1K91872-01		Prepared: 12/04/19		Analyzed: 12/05/19				
Alpha-BHC	0.0090	0.005	mg/kg dry	0.0111301	ND	80.7	49-108			
Gamma-BHC [Lindane]	0.0106	0.005	"	0.0111301	ND	94.9	39-119			
Beta-BHC	0.0092	0.005	"	0.0111301	ND	82.2	49-151			
Heptachlor	0.0088	0.005	"	0.0111301	ND	78.9	30-175			
Delta-BHC	0.0115	0.005	"	0.0111301	ND	104	24-134			
Aldrin	0.0108	0.005	"	0.0111301	ND	97.0	40-135			
Heptachlor Epoxide	0.0120	0.005	"	0.0111301	ND	108	26-167			
Endosulfan I	0.0100	0.005	"	0.0111301	ND	89.9	30-147			
4,4'-DDE	2226	0.005	"	0.0111301	OVERRANGE	NR	29-155			QM-02
Dieldrin	0.0135	0.005	"	0.0111301	ND	121	39-134			
Endrin	0.0090	0.005	"	0.0111301	ND	81.2	51-159			
4,4'-DDD	2226	0.005	"	0.0111301	OVERRANGE	NR	34-174			QM-02
Endosulfan II	0.0123	0.005	"	0.0111301	ND	110	46-144			
4,4'-DDT	2226	0.001	"	0.0111301	OVERRANGE	NR	25-168			QM-02
Endrin Aldehyde	0.0096	0.002	"	0.0111301	ND	85.9	11-162			
Endosulfan Sulfate	0.0106	0.001	"	0.0111301	ND	94.9	23-157			
Methoxychlor	0.0131	0.005	"	0.0111301	ND	117	49-170			
Surrogate: Tetrachloro-m-xylene	0.0202		"	0.0267123		75.5	23-145			

Matrix Spike Dup (1CL0134-MSD1)		Source: 1K91872-01		Prepared: 12/04/19		Analyzed: 12/05/19				
Alpha-BHC	0.0086	0.005	mg/kg dry	0.0111264	ND	77.0	49-108	4.75	30	
Gamma-BHC [Lindane]	0.0103	0.005	"	0.0111264	ND	92.8	39-119	2.26	30	
Beta-BHC	0.0109	0.005	"	0.0111264	ND	98.3	49-151	17.7	30	
Heptachlor	0.0094	0.005	"	0.0111264	ND	84.7	30-175	7.08	30	
Delta-BHC	0.0122	0.005	"	0.0111264	ND	110	24-134	5.88	30	
Aldrin	0.0129	0.005	"	0.0111264	ND	116	40-135	18.1	30	
Heptachlor Epoxide	0.0110	0.005	"	0.0111264	ND	98.8	26-167	8.81	30	
Endosulfan I	0.0142	0.005	"	0.0111264	ND	127	30-147	34.3	30	QR-02
4,4'-DDE	2225	0.005	"	0.0111264	OVERRANGE	NR	29-155	0.0331	30	QM-02
Dieldrin	0.0207	0.005	"	0.0111264	ND	186	39-134	42.2	30	QM-05
Endrin	0.0101	0.005	"	0.0111264	ND	91.1	51-159	11.5	30	
4,4'-DDD	2225	0.005	"	0.0111264	OVERRANGE	NR	34-174	0.0331	30	QM-02
Endosulfan II	0.0167	0.005	"	0.0111264	ND	150	46-144	30.7	30	QM-05
4,4'-DDT	2225	0.001	"	0.0111264	OVERRANGE	NR	25-168	0.0331	30	QM-02
Endrin Aldehyde	0.0084	0.002	"	0.0111264	ND	75.9	11-162	12.3	30	
Endosulfan Sulfate	0.0109	0.001	"	0.0111264	ND	98.0	23-157	3.15	30	
Methoxychlor	0.0148	0.005	"	0.0111264	ND	133	49-170	12.4	30	
Surrogate: Tetrachloro-m-xylene	0.0223		"	0.0267034		83.7	23-145			

GHD-DSM
11228 Aurora Ave
Des Moines, IA 50322

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Determination of Conventional Chemistry Parameters - Quality Control

Keystone Laboratories, Inc. - Newton

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1CL0122 - Wet Chem Preparation

Duplicate (1CL0122-DUP1)		Source: 1K91872-01			Prepared & Analyzed: 12/04/19					
% Solids	72.4	0.10	%		74.5			2.74	12	
Duplicate (1CL0122-DUP2)		Source: 1K91957-06			Prepared & Analyzed: 12/04/19					
% Solids	80.5	0.10	%		79.0			1.78	12	

Certified Analyses Included in This Report

Method/Matrix	Analyte	Certifications
<i>EPA 8081 in Soil</i>	Alpha-BHC	KS-NT,SIA1X
	Gamma-BHC [Lindane]	KS-NT,SIA1X
	Beta-BHC	KS-NT,SIA1X
	Heptachlor	KS-NT,SIA1X
	Delta-BHC	KS-NT,SIA1X
	Aldrin	KS-NT,SIA1X
	Heptachlor Epoxide	KS-NT,SIA1X
	Endosulfan I	KS-NT,SIA1X
	4,4'-DDE	KS-NT,SIA1X
	Dieldrin	KS-NT,SIA1X
	Endrin	KS-NT
	4,4'-DDD	KS-NT,SIA1X
	Endosulfan II	KS-NT,SIA1X
	4,4'-DDT	KS-NT,SIA1X
	Endrin Aldehyde	KS-NT,SIA1X
	Endosulfan Sulfate	KS-NT,SIA1X
	Methoxychlor	KS-NT,SIA1X
	Chlordane	KS-NT,SIA1X
	Toxaphene	KS-NT,SIA1X
	Hexachlorobenzene	KS-NT
<i>SM 2540 G in Soil</i>	% Solids	SIA1X

Code	Certifying Authority	Certificate Number	Expires
KS-KC	Kansas Department of Health and Environment-KC	E-10110	04/30/2020
KS-NT	Kansas Department of Health and Environment (NELAP)	E-10287	10/31/2020
MO-KC	Missouri Department of Natural Resources	140	04/30/2020
SIA1X	Iowa Department of Natural Resources	95	02/01/2021

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Notes and Definitions

S-01	The surrogate recovery for this sample is not available due to sample dilution required from high analyte concentration and/or matrix interference's.
QR-02	The RPD result exceeded the QC control limits; however, both percent recoveries were acceptable. Sample results for the QC batch were accepted based on percent recoveries and completeness of QC data.
QM-05	The spike recovery and/or RPD was outside acceptance limits for the MS and/or MSD due to matrix interference. The LCS and/or LCSD were within acceptance limits showing that the laboratory is in control and the data is acceptable.
QM-02	The RPD and/or percent recovery for this QC spike sample cannot be accurately calculated due to the high concentration of analyte inherent in the sample.
O-11A	OVERRANGE
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

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A handwritten signature in cursive script that reads "Leslie Taylor".

Leslie Taylor
Project Manager I

www.ghd.com

