Section A7.1.3.a	Adsorption and Desorption test - Sludge **TABLES AND FIGURES**

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[redacted]	[redacted]	[redacted]	[redacted]
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[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

Table A7.1.3.a-2: Quantities of ^{14}C DCOIT Adsorbed to Activated Sludge

Concentration g/L[1]	Replicate	% Applied Chemical Adsorbed	Weight of adsorbed Chemical (µg)
9	1	94.4	29.09
9	2	94.7	29.19
6	1	92.4	28.48
6	2	92.5	28.52
3	1	86.5	26.68
3	2	86.9	26.80
1	1	63.1	19.47
1	2	72.7	22.40
0.5	1	45.5	14.02
0.5	2	51.0	15.71
0.1	1	28.8	8.892
0.1	2	22.2	6.851

[1] Grams of dry weight sludge per liter of $CaCl_2$ solution

Table A7.1.3.a-3: Isotherm and Adsorption Coefficients

Concentration (g/L)[1]	Replicate	Ce (µg/ml)[2]	X/m (µg/g)[3]	K_d (ml/g)
9	1	0.05847	107.7	1842
9	2	0.05507	108.4	1969
6	1	0.07893	157.4	1994
6	2	0.07764	158.7	2044
3	1	0.1394	288.1	2067
3	2	0.1351	294.2	2177
1	1	0.3826	625.9	1636
1	2	0.2833	764.5	2699
0.5	1	0.5649	941.3	1666
0.5	2	0.5087	994.3	1955
0.1	1	0.7367	2403	3262
0.1	2	0.804	2447	3043

[1] Grams of dry weight sludge per liter of $CaCl_2$ solution
[2] µg of ^{14}C DCOIT/ml of $CaCl_2$ solution
[3] µg of ^{14}C DCOIT/g of sludge

Table A7.1.3.a-4: Recovery of Applied ^{14}C-Activity

Concentration (g/L)[1]	Replicate	% of apllied ^{14}C-Activity			
		Supernatant	Acetone Extract	Sludge Combustion	Total
9	1	5.2	5.6	86.2	97.0
9	2	4.9	6.2	79.8	90.9
6	1	7.2	8.1	75.0	90.3
6	2	7.1	8.0	78.3	93.4
3	1	13.0	13.2	68.8	95.0
3	2	12.7	15.7	65.8	94.2
1	1	36.4	23.8	38.8	99.0
1	2	26.9	24.2	27.4	78.5[2]
0.5	1	54.0	20.9	16.6	91.5
0.5	2	48.6	23.0	26.4	98.0
0.1	1	70.8	14.3	12.2	97.3
0.1	2	77.5	9.8	4.4	91.7

[1] Grams of dry weight sludge per liter of $CaCl_2$ solution.
[2] Low value probably due to incomplete combustion as replicate 1 for this concentration gives good recovery. There was an insufficient amount dry sludge to repeat combustion.

Document III-A / Section A7.1.3, A7.1.4, A7.2 and A7.3

Figure A7.1.3.a-1: Equilibration Time of ^{14}C DCOIT Between Sludge and 0.01M $CaCl_2$ Solution

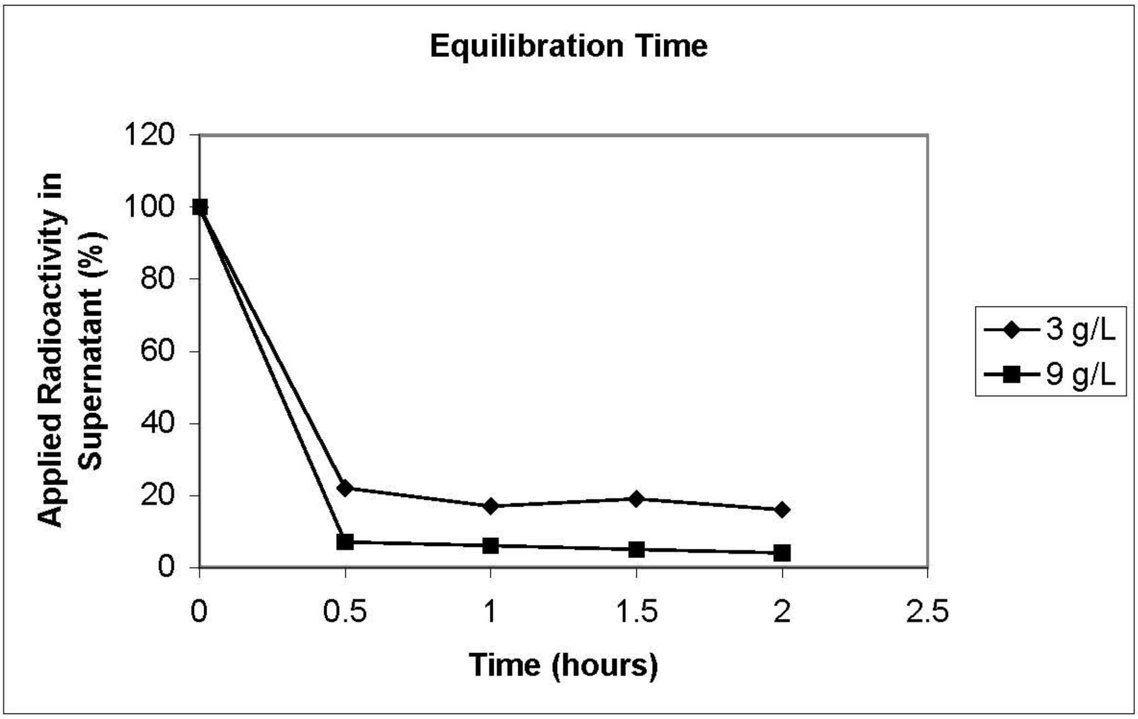
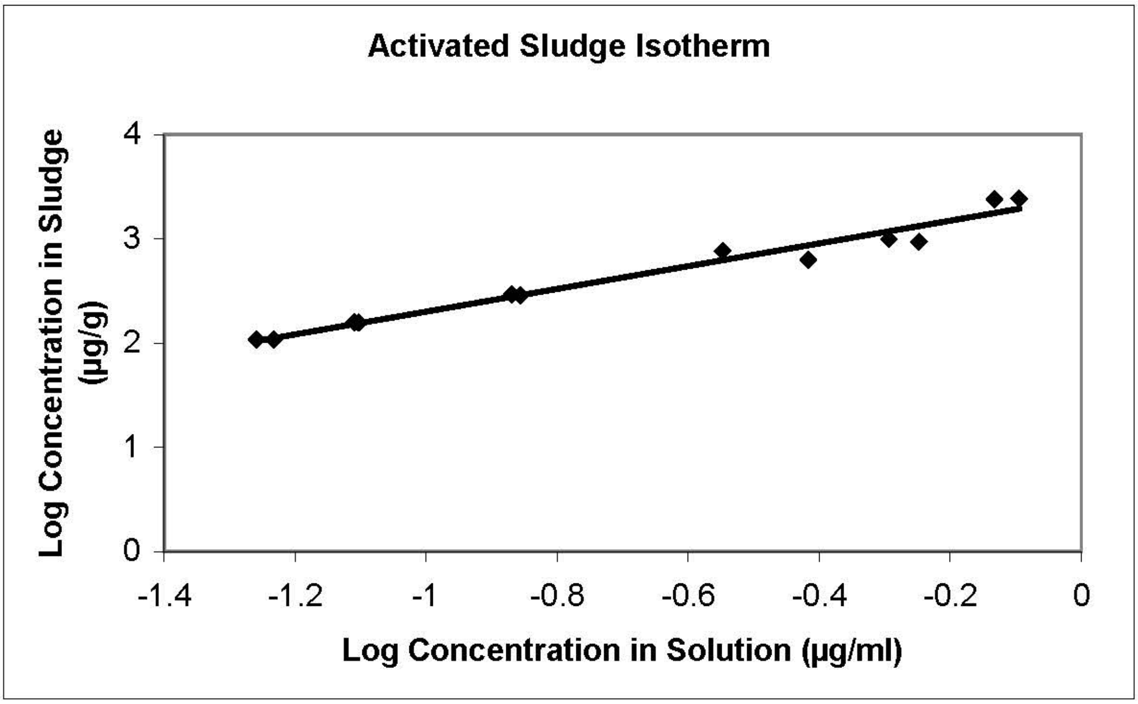


Figure A7.1.3.a-2: Activated Sludge Isotherm for DCOIT



$\text{Log } X/m = \text{Log } K_f + (1/n) \text{ Log } C_e$

Where X/m is the concentration of ^{14}C DCOIT in sludge and
C_e is the concentration of ^{14}C DCOIT in 0.01M $CaCl_2$ solution

The intercept and slope of the line of best fit gave Log K_f and 1/n, respectively.

$\text{Log } X/m = 3.392 + 1.089 \text{ Log } C_e$

Freundlich constant (K_f) = 2466
1/n = 1.089
$r^2 = 0.9678$

Section A7.1.3.b Adsorption and Desorption test - Soil and Sediment

Annex Point IIA VII.7.7.

			Official use only
		1 REFERENCE	
1.1	**Reference**	Reference type: Study report Year: 1991 Report date: 2 January 1991 [redacted]	
1.2	**Data protection**	Yes	
1.2.1	Data owner	Rohm and Haas Company	
1.2.2			
1.2.3	Criteria for data protection	[redacted] [redacted]	
		2 GUIDELINES AND QUALITY ASSURANCE	
2.1	**Guideline study**	Yes. U.S. Environmental Protection Agency, 40 CFR § 158, Subdivision N, Chemistry, Environmental Fate 163-1.	
2.2	**GLP**	Yes	
2.3	**Deviations**	No GLP deviations or deviations from the US EPA guidelines. The major deviations from the OECD 106 (Jan 2000 version) are the lack of the OECD defined preliminary and screening tiers.	
		3 MATERIALS AND METHODS	
3.1	**Test material**	^{14}C DCOIT (RH-5287). [redacted]	
3.1.1	Lot/Batch number	[redacted]	
3.1.2	Purity	[redacted]	
3.1.3	Further relevant properties	[redacted] [redacted]	
3.1.4	Method of analysis	[redacted]	
3.2	**Degradation products**	[redacted]	

Section A7.1.3.b Adsorption and Desorption test - Soil and Sediment

Annex Point IIA VII.7.7.

		[redacted]	
3.2.1	Method of analysis for degradation products	[redacted]	
3.3	**Reference substance**	[redacted]	
3.3.1	Method of analysis for reference substance	[redacted]	
3.4	**Soil types**	Four Agricultural soils and 1 marine sediment were employed. The four soils were obtained in Fayette County, Kentucky, USA. The marine sediment was obtained from the Chesapeake Bay, off of Gloucester Point, Virginia, USA. The characterization and physiochemical characteristics of the soils and sediment used in this study are presented in Table A7.1.3b-1.	
3.5	**Testing procedure**		
3.5.1	Test system	[redacted]	
3.5.2	Test solution	[redacted]	
3.6	**Test performance**		
3.6.1	OECD Preliminary and Screening tests	[redacted]	
3.6.2	Preliminary test performed	[redacted]	
		[redacted]	
		[redacted]	x
		[redacted]	

Section A7.1.3.b Adsorption and Desorption test - Soil and Sediment

Annex Point IIA VII.7.7.

[redacted]

3.6.3 Definitive test

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

4 RESULTS

4.1 Preliminary test performed

Equilibrium of ^{14}C between the soil/sediment and water was generally reached within 3 hours (Table A7.1.3.b-2). To insure equilibrium was reached under all conditions and to maintain a consistent sampling interval, the phases were equilibrated in the definitive study for 24 hours.

From the preliminary study using different quantities of soil with 30 ml of 0.01M $CaCl_2$ solution, it was determined that the appropriate quantity of soil to obtain 20 to 80% adsorption was: loamy sand, 1.0 g; sandy loam, 0.5 g; silt loam, 0.25 g; silty clay loam, 0.5 g, and aquatic sediment 0.05 g.

Studying the effect of ^{14}C DCOIT concentration on absorption, it was determined that 2 ppm and 3 ppm solutions were too high. There was probably a problem with the solubility of the parent compound. Thus it was decided to use 0.25, 0.50, 0.75, 1.0, and 1.5 ppm concentrations.

4.2 Definitive study

The recovery of radiocarbon is presented in Table A7.1.3.b-3. Mean recovery for all concentrations was 94.6 ± 6.3% of the applied radiocarbon.

Table 7.1.3b-4 provides the percent of radiocarbon adsorbed to soil and the percent desorbed. The percent adsorbed ranged from 38.9 to 78.1 and the percent desorbed ranged from 7.5 to 34.5.

The Freundlich adsorption and desorption coefficients (K_d for adsorption and desorption), theFreundlich adsorption and desorption constant (K_{oc}), and the Freundlich exponent(n) for the five soil/sediment analyzed are presented in Table A7.1.3.b-5. The specific adsorption K_{oc} as shown in Table A7.1.3.b-7ranges from 5659(silt loam) to 28320 (aquatic sediment) while the desorption K_{oc} ranges from 18466(silt loam) to 59282 (aquatic sediment), when omitting the outlier at 0.5 mg/L for aquatic sediment. According to the US EPA guidelines, since the K_{oc} is greater than 5000, DCOIT is classified as nonmobile and the adsorbed compound will undergo no significant desorption.

The results from HPLC characterization of radiocarbon in soil/sediment extracts are presented in Table A7.1.3.b-8. On average, 94.83 ± 2.65% of the radiocarbon was identified by HPLC as DCOIT. Thus, the test compound remained stable in the test system and no metabolite exceeds 10% of the applied radiocarbon.

5 APPLICANT'S SUMMARY AND CONCLUSION

5.1 Materials and methods

The test guideline followed were U.S. Environmental Protection Agency, 40 CFR § 158, Subdivision N, Chemistry, Environmental Fate 163-1. There were no deviations from this test guideline. The primary deviations from the current OECD guidelines are the lack of a preliminary and screening study as defined in the OECD guideline.

Four soils and one marine sediment were placed into 50 ml Teflon centrifuge tubes and 30 ml of 0.01M $CaCl_2$ containing either 0.25, 0.50, 0.75, 1.0, or 1.5 ppm ^{14}C DCOIT was added. The tubes were shaken in a water bath in the dark and at 25°C. After 24 hours the supernatant was removed and radioassayed. Desorption was measured by resuspending the soil/sediment pellet with 0.01M $CaCl_2$ (without ^{14}C DCOIT). The tubes were shaken in a water bath in the dark and at 25°C. After 24 hours, the supernatant and the soil were radioassayed. The soil was extracted and aliquots chromatographed (HPLC).

5.2 Results and discussion

DCOIT adsorbed tightly to the soils and sediment examined and did not desorb to any significant extent. The solubility of the test compound appears to have been an issue in the preliminary study. At 2 and 3 ppm, possibly the colloidal properties and/or presence of $CaCl_2$ in the aqueous suspension appears to have reduced the test compounds solubility. For the definitive study, lower concentrations were used. HPLC analysis demonstrated that the test compound was stable in the test system and that no metabolite was greater than 10%. x

Section A7.1.3.b Adsorption and Desorption test - Soil and Sediment

Annex Point IIA VII.7.7.

5.2.1 Adsorbed a.s. [%] The percent adsorbed ranged from 38.9 to 78.1 (Table A7.1.3.b-4)

5.2.2 K_a(L/kg) The adsorption coefficient ranges from 41 (loamy sand) to 214 (sandy loam) for soil and from 698 to1147 for sediment when omitting the outlier at 0.5 mg/L (Table A7.1.3.b-6)

5.2.3 K_d (L/kg) The desorption coefficient ranges from 101 (loamy sand) to 798 (silt loam) for soil and from 1413 to 2401 for sediment when omitting the outlier at 0.5 mg/L for (Table A7.1.3.b-6)

5.2.4 Ka_{oc} (L/kg) The adsorption constant ranges from 5659 (silt loam) to 25237 (loamy sand) for soil and from 17232 to 28320 for aquatic sediment when omitting the outlier at 0.5 mg/L for (Table A7.1.3.b-7). For soil, the arithmetic mean value for Koc of all soil types and concentrations is 12169.

5.2.5 Kd_{oc} (L/kg) The desorption constant ranges from 18052 (sandy loam) to 64250 (loamy sand) for soil and from 34887 to 59282 for sediment when omitting the outlier at 0.5 mg/L for (Table A7.1.3.b-7)

5.2.6 Freundlich distribution parameters(ads/des)

	K^F_a	1/n	K^F_d	1/n
Loamy Sand	31.5	0.6083	48.5	0.6019
Sandy Loam	73.5	0.6109	98.9	0.5425
Silt Loam	76.6	0.6012	102.5	0.5242
Silty Clay Loam	42.5	0.5689	64.4	0.5972
Aquatic Sediment	625.9	0.6776	866.2	0.6939
(outlier omitted)	(655)	(0.7672)		

5.2.7 Degradation products The test compound accounted for 89.3% to 98.0% (mean 94.8%) of the radiocarbon extracted from the soil/sediment. No degradation product was detected at greater than 10%.

5.3 Conclusion The study provided is satisfactory to describe the mobility of DCOIT in soil and sediment. According to the US EPA any compound with a K_{oc} greater than 5000 is considered nonmobile. Additionally, DCOIT will not readily desorb from soil/sediment.The test compound accounted for 89.3% to 98.0% (mean 94.8%) of the radiocarbon. No degradation product was detected at greater than 10%.

5.3.1 Reliability 1-The study was conducted in full compliance with the US EPA guidelines and in good agreement with the current OECD guidelines (the differences with current guidelines do not affect the integrity, results, or conclusions).

5.3.2 Deficiencies There are no deficiencies from the guidelines employed (U.S. Environmental Protection Agency, 40 CFR § 158, Subdivision N, Chemistry, Environmental Fate 163-1). The only significant difference from the current OECD guidelines is the performance of the preliminary and screening test as defined by the guidelines.

Evaluation by Competent Authorities	
	Evaluation by Rapporteur Member State
Date	29 July 2007, revised 22 January 2009, revised May 2013
Materials and Methods	**Comment 3.6.2**: According to OECD Guideline 106, paragraph 47, the minimum amount of soil on which the experiment can be carried out depends on the laboratory facilities and the performance of analytical method used. It is recommended to use at least 1 g, and preferably 2 g, in order to obtain reliable results from the test. However, due to very high adsorption to the aquatic sediment, this requirement was probably difficult to meet in this case. To meet this requirement each container would have needed 600 ml of $CaCl_2$ solution; something that is impractical to conduct.
Results and discussion	**Comment 5.2:** Freundlich exponents 1/n are calculated to be in the range of 0.5-0.7, while usual values are in the range of 0.7-1.1. The reason for this might be that the concentration interval was 0.25 – 1.5 ppm and that the data show a rapid decline of sorption at higher concentrations. If lower concentrations had been tested, higher Freundlich exponents would have been obtained. Thus, with the Freundlich exponents being in the range of 0.5-0.7, sorption will be underestimated for concentrations below the lower end of the tested concentrations. However, sorption is so high that the substance must definitely be considered as immobile at 1.5 ppm or lower. **Comment 5.3:** Reliability was changed from 1 to 2 due to testing of narrow concentration interval
Conclusion	Agree with applicant's version
Reliability	2, valid with restrictions
Acceptability	Acceptable with the restrictions noted above
Remarks	-

Document III-A / Section A7.1.3, A7.1.4, A7.2 and A7.3

Section A7.1.3.b	Adsorption and Desorption test - Soil and Sediment **TABLES AND FIGURES**

Table A7.1.3.b-1: Classification and Physiochemical Characteristics of Soils and Sediment Used as Absorbents

Parameter	Soil Type				
	Loamy sand	**Sandy Loam**	**Silt Loam**	**Silty Clay Loam**	**Aquatic Sediment**
Percent Organic Matter	0.8	2.3	2.7	1.3	8.1
Percent Sand	83	74	16	10	20
Percent Silt	9	18	67	51	60
Percent Sand	8	8	17	39	20
CEC[1] (meq/100g)	3	8	18	29	35
pH	7.7	7.4	6.8	7.9	6.6
Field Capacity[2]	10	17	36	39	58
Bulk Density	1.49	1.24	1.37	1.59	-

[1] CEC = Cation Exchange Capacity
[2] Field Capacity based on g water/100g dry soil

Table A7.1.3.b-2: Equilibration Between Solution and Soil/Sediment (1 ppm ^{14}C DCOIT)

Soil/Quantity	**Percent of ^{14}C-Activity Adsorbed to Soil/Sediment at Various Exposure Times**			
	3 hr	**6 hr**	**12 hr**	**24 hr**
Loamy Sand				
50 mg	**7.9**	**3.8**	**3.2**	**ND**
100 mg	**7.4**	**6.4**	**3.6**	**3.1**
250 mg	**10.5**	**8.3**	**10.2**	**11.6**
500 mg	**15.5**	**13.9**	**16.6**	**19.5**
1000 mg	**26.6**	**24.0**	**21.5**	**16.8**
Sandy Loam				
50 mg	**11.8**	**10.1**	**12.9**	**15.6**
100 mg	**14.5**	**13.8**	**15.2**	**15.1**
250 mg	**24.8**	**24.8**	**28.8**	**30.3**
500 mg	**44.9**	**45.5**	**47.3**	**47.5**
1000 mg	**68.9**	**71.4**	**73.7**	**74.8**
Silt Loam				
50 mg	**0.7**	**3.7**	**3.2**	**3.1**
100 mg	**13.4**	**14.1**	**16.1**	**19.8**
250 mg	**40.4**	**43.6**	**18.6**	**43.8**
500 mg	**51.9**	**57.9**	**63.8**	**69.3**
1000 mg	**73.7**	**78.6**	**82.6**	**86.4**
Silty Clay Loam				
50 mg	**4.5**	**1.0**	**1.9**	**3.0**
100 mg	**11.9**	**7.5**	**6.5**	**3.6**
250 mg	**23.0**	**22.5**	**25.1**	**33.8**
500 mg	**38.5**	**37.6**	**41.3**	**44.1**
1000 mg	**56**	**55.2**	**57.1**	**59.9**

Table A7.1.3.b-3: Recovery of Applied Radiocarbon

Soil /Sediment Type	Average Percent Recovery[1]				
	0.25 ppm	0.50 ppm	0.75 ppm	1.0 ppm	1.5 ppm
Loamy Sand	90.9	90.1	90.4	101.4	106.6
Sandy Loam	87.6	92.7	92.8	103.7	105.9
Silt Loam	89.2	93.1	91.6	98.6	107.2
Silty Clay Loam	88.2	91.6	93.7	100.7	102.8
Aquatic Sediment	83.9	89.9	86.8	92.9	92.6
Average	87.9±3.2	91.5±3.3	91.0±2.8	99.4±8.0	103.0±11

[1] Each recovery percent is the average of duplicates

Document III-A / Section A7.1.3, A7.1.4, A7.2 and A7.3

Table A7.1.3.b-4: Summary of Percent Radiocarbon Adsorbed and Desorbed

Soil/Sediment Type **Type**	**Nominal Concentration (ppm)**	**Percent Adsorbed**	**Percent Desorbed**
Loamy Sand	0.25	77.1	10.3
	0.50	66.4	16.8
	0.75	61.6	21.5
	1.00	61.5	20.9
	1.50	58.0	25.7
Sandy Loam	0.25	75.4	7.5
	0.50	78.1	11.3
	0.75	69.9	17.6
	1.00	64.9	18.3
	1.50	58.9	22.9
Silt Loam	0.25	59.1	13.0
	0.50	55.7	26.3
	0.75	52.0	28.7
	1.00	44.7	31.6
	1.50	38.9	33.3
Silty Clay Loam	0.25	67.7	16.0
	0.50	58.7	25.0
	0.75	53.5	27.5
	1.00	45.9	27.3
	1.50	46.6	34.5
Aquatic Sediment	0.25	65.7	20.5
	0.50	72.1	18.0
	0.75	61.1	27.3
	1.00	53.8	27.3
	1.50	56.9	29.9

Table A7.1.3.b-5: Freundlich Adsorption and Desorption Results

Soil/Sediment Type	**Study Phase**	**Organic Matter (%)**	**Organic Carbon (%)**[a]	**K_d** $\mu g^{1-1/n}$ $(cm^3)^{1/n} g^{-1}$	**K_{oc}**[b] $\mu g^{1-1/n}$ $(cm^3)^{1/n} g^{-1}$	**n**[c]	**r^2**
Loamy Sand	Adsorption	0.8	0.4	31.465	7864	1.6439	0.9859
	Desorption			48.473	12118	1.6614	0.9635
Sandy Loam	Adsorption	2.3	1.15	73.486	6389	1.6369	0.9360
	Desorption			98.924	8602	1.8433	0.9834
Silt Loam	Adsorption	2.7	1.35	76.577	5672	1.6633	0.9683
	Desorption			102.542	7596	1.9077	0.9568
Silty Clay Loam	Adsorption	1.3	0.65	42.482	6536	1.7578	0.9839
	Desorption			64.432	9913	1.6745	0.9790
Aquatic Sediment	Adsorption	8.1	4.05	625.839 (655.239)*	15459 (16179)*	1.4758 (1.3030)*	0.8977 (0.9808)*
	Desorption			866.164	21386	1.4411	0.9300

* Outlier at 0.5 mg/L omitted

[a] Percent Organic Carbon = percent organic matter/2

[b] $$Koc = \frac{K_d \times 100}{\text{percent organic matter}}$$

[c] $$n = \frac{1}{\text{slope}}$$

Table A7.1.3.b-6: Concentration specific distribution coefficients, Ka and Kd (L/kg)

		Nominal concentration (mg/L)				
Soil/Sediment Type	**Study Phase**	**0.25**	**0.5**	**0.75**	**1.0**	**1.5**
Loamy Sand	Adsorption	100.9	59.8	48.1	47.8	41.3
	Desorption	257.0	170.6	109.9	113.3	100.7
Sandy Loam	Adsorption	181.8	213.9	138.7	110.9	86.1
	Desorption	735.5	467.3	281.1	278.8	207.6
Silt Loam	Adsorption	172.7	151.1	130.0	96.8	76.4
	Desorption	798.0	335.0	297.9	268.1	249.3
Silty Clay Loam	Adsorption	125.4	85.0	68.8	50.9	52.4
	Desorption	310.0	178.7	158.5	164.6	119.4
Aquatic Sediment	Adsorption	1146.9	1548.6	944.5	697.9	791.5
	Desorption	2400.9	2709.4	1598.5	1582.5	1412.9

Table A7.1.3.b-7: Concentration specific distribution constants Ka_{oc} and Kd_{oc} (L/kg)

		Nominal concentration (mg/L)				
Soil/Sediment Type	**Study Phase**	**0.25**	**0.5**	**0.75**	**1.0**	**1.5**
Loamy Sand	Adsorption	25237	14956	12021	11962	10328
	Desorption	64250	42655	27472	28331	25173
Sandy Loam	Adsorption	15808	18598	12065	9640	7484
	Desorption	63957	40635	24442	24242	18052
Silt Loam	Adsorption	12793	11190	9628	7171	5659
	Desorption	59111	24814	22067	19862	18466
Silty Clay Loam	Adsorption	19285	13084	10586	7827	8056
	Desorption	47692	27490	24377	25327	18364
Aquatic Sediment	Adsorption	28320	38237*	23320	17232	19542
	Desorption	59282	66898*	39468	39075	34887

[*] Outlier

Table A7.1.3.b-8: Characterization of Radiocarbon in Soil Extracts

		% of extract as			
Soil/Sediment Type	**Dose (ppm)**	**DCOIT[1]**	**Unknown 1[2]**	**Unknown 2[3]**	**Unknown 3[4]**
Loamy Sand	1	94.8	3.5	1.7	ND[5]
	1.5	97.8	2.2	ND	ND
Sandy Loam	1	96.7	3.3	ND	ND
	1.5	98.0	2.0	ND	ND
Silt Loam	1	93.0	6.2	0.8	ND
	1.5	92.6	4.7	2.8	ND
Silty Clay Loam	1	89.3	6.8	2.7	1.2
	1.5	95.5	4.5	ND	ND
Aquatic Sediment	1	96.1	2.0	2.0	ND
	1.5	94.5	3.4	2.1	ND

[1] Retention time, 16.5 minutes
[2] Retention time, 26.5 minutes
[3] Retention time, 28.5 minutes
[4] Retention time, 32.0 minutes
[5] ND= not det

Section A7.1.3.c Annex Point IIIA XII.2.2.	**Adsorption / Desorption of metabolites in water/sediment system**	
	Justification for non-submission of data	Official use only
Other existing data [X] **Limited exposure [ ]**	**Technically not feasible [ ]** **Scientifically unjustified [ ]** **Other justification [ ]**	
Detailed justification:	Detailed justification is considered as confidential information. [redacted] [redacted] [redacted] [redacted] [redacted] [redacted]	
Undertaking of intended data submission [ ]	No	

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	Evaluation by Competent Authorities
	Evaluation by Rapporteur Member State
Date	20 August 2007
Evaluation of applicant's justification	According to TNsG, screening tests on metabolites are required for compounds which at any sampling time during the degradation study account for more than 10 % of the active substance added. Metabolites found at concentrations above 10 % in the water sediment studies were N-(n-octyl) acetamide and N-(n-octyl) malonamic acid. Several metabolites are common to both freshwater and marine sediments under both aerobic and anaerobic conditions. In the soil degradation studies the metabolites were not identified, but their chromatographic behaviour indicated that they were essentially the same compounds as in the aquatic studies. The water-sediment studies have confirmed that extractable metabolites are primarily found in the sediments, and it seems justified that the major metabolites adsorb to the same extent as the parent DCOIT. The Aged Column Leaching test performed on four soils showed that DCOIT was essentially non-mobile, but the metabolites were present in very low concentrations and could not be quantified. However, lack of mobility for the metabolites can be assumed, as no radioactivity was detected below the first 6 cm of the column and in the leachate in the Aged Column Leaching Test, but distribution coefficients (K_D) cannot be calculated. Nevertheless, because of the large number of metabolites, the column leaching study is of particular relevance.
Conclusion	No further testing considered necessary
Remarks	-

Document III-A / Section A7.1.3, A7.1.4, A7.2 and A7.3

Section A7.1.4.1
Annex Point x.y

Field study on accumulation in the sediment

Justification for non-submission of data

Official use only

Other existing data [x] **Technically not feasible** [ ] **Scientifically unjustified** [ ]
Limited exposure [x] **Other justification** [ ]

Detailed justification:

Detailed justification is considered as confidential information. [redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]		[redacted]	
	[redacted]	[redacted]	[redacted]	[redacted]
	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]				
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

Section A7.1.4.1 **Annex Point x.y**	**Field study on accumulation in the sediment**	
Undertaking of intended data submission [ ]	*No*	
	Evaluation by Competent Authorities	
	Evaluation by Rapporteur Member State	
Date	20 August 2007	
Evaluation of applicant's justification	In the fresh water studies NER is increasing over time while in the seawater studies the bound residue is high from day 0 and remains more or less constant over the course of the study. There is one value of the non-extractable residues exceeding 70 % of the initial dose. This value was observed in the aerobic marine study at one dosing level at day 20 and declined to 67% at day 26 and further to 63.5 % at day 30. The results of the other three water/sediment studies support the conclusion that the non-extractable residues are below 70 %. The mineralisation rate was ≥ 5 % in all four sediment/water studies.	
Conclusion	No further testing is considered necessary	
Remarks	-	

Section A7.2.1 Aerobic Degradation in soil including extent and nature of bound residues

Annex Point IIIA, VII.4
IIIA , XII.1.1

Official use only

1 REFERENCE

1.1	**Reference**	Reference type: Study report Year: 1999 Report date: 9 March 1999 [redacted]
1.2	**Data protection**	Yes
1.2.1	Data owner	Rohm and Haas Company
1.2.2		
1.2.3	Criteria for data protection	[redacted] [redacted]

2 GUIDELINES AND QUALITY ASSURANCE

2.1	**Guideline Study**	Yes. U.S. Environmental Protection Agency, 40 CFR § 158, Subdivision N, Chemistry, Environmental Fate 162-1 and Environmental Chemistry and Fate Guidelines for Registration of Pesticides in Canada (T-1255, October 1987), Soil Biotransformation.
2.2	**GLP**	Yes
2.3	**Deviations**	GLP deviations were minor. The ^{12}C reference standards were not GLP characterized or were used after expiration dates. However chromatography was consistent and no metabolite identification was employed using these standards. Also, sterility plate counts were not conducted under GLP guidelines. The only study guideline deviation was that the one metabolite greater than 10% of the applied activity were not definitively identified.

3 MATERIAL AND METHODS

3.1	**Test Material**	^{14}C-DCOIT (RH-5287). [redacted]
3.1.1	Lot/Batch number	[redacted]
3.1.2	Purity	[redacted]
3.1.3	Further relevant properties	[redacted] [redacted]
3.2	**Reference substances**	[redacted] [redacted]

Section A7.2.1 Annex Point IIIA, VII.4 IIIA, XII.1.1 — Aerobic Degradation in soil including extent and nature of bound residues

[redacted]

3.3 Soil types

The soils used for this study were a silt loam obtained from the Rohm and Haas Research Farm, Newtown, Pennsylvania, USA and a loamy sand obtained from Camilla, Georgia, USA. The physical and chemical characteristics of the soils appear in Table A7.2.1-1.

3.4 Test procedures

3.4.1 Test system

[redacted]

[redacted]

[redacted]

3.4.2 Preparation of test solution

[redacted]

3.4.3 Initial Test substance concentration

[redacted]

3.4.4 Duration of test

[redacted]

3.4.5 Sampling details

[redacted]

Section A7.2.1 Aerobic Degradation in soil including extent and nature of bound residues

Annex Point IIIA, VII.4
IIIA , XII.1.1

	[redacted]
	[redacted]
	[redacted]
3.4.6 Replicates	[redacted]
3.4.7 Extraction procedures	[redacted]
	[redacted]
3.4.8 Bound residues-extent and nature	[redacted]
	[redacted]
3.4.9 Analytical methods	[redacted]
	[redacted]
3.4.10 Degradation	[redacted]

products [redacted]

3.4.11 Calculations [redacted]

4 RESULTS

4.1 Preliminary studies

Preliminary studies were utilized to develop an extraction procedure, to determine the appropriate dosing rate, and to determine the appropriate sampling interval. The extraction procedure was established by dosing silt loam soil with ^{14}C DCOIT and after 3 days the soil was extracted with acetonitrile:HCl. This procedure extracted about 19% of the applied activity. Subsequent extractions employed methanol:KOH, methanol Soxhlet, and 1N HCl. There was little difference in extraction efficiency between methanol:KOH and methanol Soxhlet. Both extracted an additional 15-20% of the radiocarbon. HCl extracted less than 3% additional. Thus the extraction of soil initially employ acetonitrile:HCl followed by methanol:KOH.

In a second preliminary study, silt loam was dosed at 0.1 ppm, 1 ppm and 5 ppm ^{14}C DCOIT. The results indicated that either 0.1 or 1 ppm would be acceptable dose rates. At 5 ppm there appeared to be inhibition of microbial activity since there was a decrease in the percentage of $^{14}CO_2$ production and in incorporated into the PES. Additionally, the half-life was estimated to be about 1-2 days and therefore sampling intervals of 0, 0.25. 0.5, 0.75, 1, 1.5, 2, 3, 7, 16 and 32 days were selected.

4.2 Definitive study at 25°C

4.2.1 Distribution and recovery of radioactivity

The distribution of ^{14}C-activity in the silt loam and loamy sand is summarized in Tables A7.2.1-2 and A7.2.1-3, respectively. The initial extraction with acetonitrile:aqueous HCl showed a decline in the percent extractable with time. In silt loam, the percentage declined from about 88% on Day 0 to 25% by Day 1 and 15% by Day 32. The decline in loamy sand was slower going from 94% on Day 0 to 70% on Day 1 and 26% on Day 32. Over 93% of acetonitrile:HCl extractable activity in both soils partitioned into methylene chloride.Subsequent extraction of the silt loam soil with KOH:methanol reveals a gradual increase in extractable activity to about 25% on Day 1.5 and then a decline to about 16% on Day 32. In the loamy sand, the extractable activity also increased gradually to about 18% on Day 2 and then slowly declined. Similar to the acetonitrile:aqueous HCl extraction, most of this activity partitioned into methylene chloride (ca. 70-80%).

The activity in the post extraction solids (PES) of the silt loam increased dramatically to almost 41% of the applied activity on Day 0.25 and continued to gradually increase to 54% by Day 1.5. By Day 32 the PES activity had declined to about 41%. In the loamy sand, there was a rapid increase in the PES activity to 12% on Day 0.25 and then after Day 3 it remained relatively constant at about 40% of the applied dose.

In the silt loam soil, evolved $^{14}CO_2$ (confirmed by $BaCO_3$ precipitation) increased continually with time to over 21% by Day 32. In the loamy sand, evolved $^{14}CO_2$ increased with time to over 11% by Day 32.

Recovery of applied ^{14}C-activity ranged from 93.85% to 111.03% in the silt loam soil and 91.03% to 107.40% in the loamy sand. Average recovery in the silt loam and loamy sand soils was 100.35 ± 6.17 and 98.34 ± 5.37, respectively.

4.2.2 Half-life

Since degradation in soil is based on a complex series of reactions, the Timme model was used to determine the half-life of RH-5287 in soil. This model examines several linear transformations of the data and the half-life associated with the lowest sum of square residual is used. In silt loam the half-life of ^{14}C DCOIT is 0.58 days while in loamy sand it is 1.08 days. Percent parent detected at each sampling interval is presented in Table A7.2.1-4 for the silt loam and 7.2.1-5 for the loamy sand.

4.2.3 Characterization of organosoluble fraction

The organosoluble extracts (methylene chloride phases) were analyzed using reversed phase HPLC to quantitate parent and metabolites. The result for the silt loam soil is in Table A7.2.1-4 and for the loamy sand in Table A7.2.1-5. There were 16 metabolites detected in the organosoluble fractions and for both soils, over 50% of the detected peaks (16 metabolites at 10 non-Day 0 sampling intervals) were less than 1% of the applied activity. There was only one metabolite and at only one sample interval that was detected at greater than 10% (silt loam, M13, Day 1.5). The identity of this metabolite was not determined.

4.3 Definitive study at 6°C

4.3.1 Distribution and recovery of radioactivity

The distribution of ^{14}C-activity in two separate experiments where silt loam soil is dosed with ^{14}C DCOIT and incubated at 6°C are summarized in Tables A7.2.1-6 and A7.2.1-7. Similar to the soils incubated at 25°C, the initial extraction with acetonitrile:aqueous HCl showed a decline in the percent extractable with time. In the first replicate, the percentage declined from about 88% on Day 0 to 16% on Day 32. The decline in second replicate was similar, albeit slower going from about 93% on Day 0 to 40% on Day 7. Over 93% of the extractable activity in both soils partitioned into methylene chloride.

Subsequent extraction of the silt loam soil incubated at 6°C with KOH:methanol reveals between Days 0.5 and 32 that the percent of radioactivity extracted remained relatively constant. Similar to the acetonitrile:aqueous HCl extraction, a majority of this activity partitioned into methylene chloride (ca. 70-80%).

The activity of the post extraction solids (PES) in the first replicate increased from 7.4% on Day 0 to 45.6% at Day 0.5. At subsequent sampling intervals the PES ranged from about 32 to 44% of the applied activity. In the second replicate, the PES continually increased from 4% on Day 0 to approximately 38% on Day 7

In the first replicate, evolved $^{14}CO_2$ (confirmed by $BaCO_3$ precipitation) increased continually with time to over 9% on Day 8 and 13% by Day 32. In the second replicate, evolved $^{14}CO_2$ increased with time to over 5% by Day 7.

Recovery of applied ^{14}C-activity ranged from 91.08% to 102.43% in the first replicate at 6°and 95.49% to 105.80% in the second 6°C replicate. Average recovery in the first and second replicates was 95.69 ± 3.81 and 100.23 ± 3.25, respectively.

4.3.2 Half-life

Similar to the soils incubated at 25°C, the Timme model was used to determine the half-life of DCOIT in silt loam soil incubated at 6°C. In the initial study, the half-life at 6°C was determined to be 0.13 days which was essentially the same as the kinetic values obtained at 25°C. A second study was performed with sampling over 7 days (versus 32 in the first replicate) and the half-life was determined to be 2.01 days. Percent parent detected at each sampling interval for the two 6°C experiments is presented in Table A7.2.1-8 and A7.2.1-9. x

4.3.3 Characterization of organosoluble fraction

The organosoluble extracts (methylene chloride phases) from the first replicated incubated at 6°C was analyzed using reversed phase HPLC to quantitate parent and metabolites. The results appear in Table A7.2.1-8. Similar to the soils incubated at 25°C, there were 16 metabolites detected in the organosoluble fractions and over 60% of the detected peaks (16 metabolites at 10 non-Day 0 sampling intervals) were less than 1% of the applied activity. Identical to the silt loam soil at 25°C, metabolite M13 was the only one detected (on Day 1 only) at greater than 10%. The identity of this metabolite was not determined.Since the second 6°C replicate was performed only to verify the half-life, only DCOIT was quantitated. The results appear in Table A7.2.1-9.

4.4 Sterile samples—distribution and characterization of organosoluble fraction

The distribution of ^{14}C-activity in the sterile silt loam and loamy sand soils incubated at 25°C was similar to the non-sterile soils discussed above and is presented in Table A7.2.1-10. The decline of ^{14}C activity extracted by acetonitrile:aqueous HCl was somewhat faster in the silt loam; about 88% extractables on Day 3 declining to 28% by Day 32 whereas in loamy sand the decline was from 89% on Day 3 to 39% on Day 32. Over 96% of the acetonitrile:aqueous HCl extractable ^{14}C-activity partitioned into methylene chloride. Subsequent extraction of the soils with methanol:KOH showed an increase in the ^{14}C-activity with increasing incubation time. In both soil types, the post extraction solids increased from about 5% on Day 3 to over 40% by Day 32. Evolved $^{14}CO_2$ was less than 2% after 32 days.

Results of the distribution of ^{14}C-activity in the second experiment with sterile silt loam soil incubated at 6°C are presented in Table A7.2.1-11. These results are different than the non-sterile replicates. There was essentially no decline with time in the ^{14}C-activity extracted with acetonitrile:aqueous HCl and over 99% of this activity partitioned into methylene chloride. The PES was about 2% on Day 3 and only increased to 4.6% on Day 30. Finally, there was essentially no $^{14}CO_2$ evolved over the course of the 30 days.

HPLC analysis of the methylene chloride fraction from the sterile soils incubated at 25°C showed a decline in DCOIT concentration with time. In the silt loam soil, DCOIT comprised about 87% of the applied activity on Day 3 and decreased to 17% on Day 32 whereas in loamy sand parent declined from about 88% of the applied activity on Day 3 to 29% on Day 32. The results from the 6°C repeat study are presented in Table A7.2.1-9. DCOIT is approximately 100% of the applied activity over the course of the 30 day experiment (essentially no decline with

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incubation time).

4.5 Extend and nature of bound residues

The bound ^{14}C-residue remaining after extensive extraction with acetonitrile:aqueous HCl and methanol:KOH was subjected to a reflux extraction with HCl and then an extraction with NaOH. The results are presented in Table A7.2.1-12. Acid reflux extracted about 15% of the bound residue and was much less efficient than NaOH which extracted about 65% of the ^{14}C-activity from the PES. The ^{14}C-activity extractable by acid partitioned about equally between ethyl acetate and aqueous phases. After extraction with NaOH, the acid soluble fraction, the fulvic acid fraction, comprised about 15% of the PES while the acid insoluble fraction, the humic acid fraction, comprised about 46%. The base insoluble fraction (humin), which is essentially the inorganic soil lattice, comprised about 22% of the PES.

5 APPLICANT'S SUMMARY AND CONCLUSION

5.1 Materials and methods

The test guidelines were U.S. Environmental Protection Agency, 40 CFR § 158, Subdivision N, Chemistry, Environmental Fate 162-1 and Environmental Chemistry and Fate Guidelines for Registration of Pesticides in Canada (T-1255, October 1987), Soil Biotransformation.

To a series of biometer flasks with side-arms about 50 g (dry weight basis) of either a silt loam or a loamy sand was added. Ten mls of 1N KOH was added to the side-arms to trap evolved $^{14}CO_2$. ^{14}C DCOIT at either 1 ppm or 5 ppm (nominal) was added dropwise to the surface of the soil and subsequently incorporated into the soil. The flasks were stoppered and incubated at either 6° or 25°C. Sterile systems were prepared in a similar manner except steam sterilized glassware and soil was employed.

Duplicate samples were removed periodically and the soil extracted initially with acetonitrile:0.01N HCl followed by an extraction with 0.15 N KOH:methanol. Both of the extracting solutions were partitioned with methylene chloride and the organosoluble fraction chromatographed using HPLC. All fractions were quantitated by radioassay. The KOH traps were also radioassayed. Presence of $^{14}CO_2$ was confirmed by precipitation with $BaCl_2$.

The nature and extent of the bound residues remaining after extraction with KOH:methanol was determined initially by reflux extraction with 0.25 N HCl. The soil was subsequently extracted with 0.5 N NaOH and the extract acidified with HCl. The resulting supernatant (fulvic acid), acid precipitate (humic acid) and NaOH insoluble residue (humin) were radioassayed.

5.2 Results and Discussion

5.2.1 Half-life and recovery of applied ^{14}C-activity

The measured half-lives and recovery of applied ^{14}C-activity are tabulated below. x

Soil	Temperature	Half-Life (days)	Average Recovery of ^{14}C Activity
32 day Study			
Silt Loam	25°C	0.58	100.4%
Loamy Sand	25°C	1.08	98.3%
Silt Loam	6°C	0.13	95.7%
7 day Repeat Study	6°	2.01	100.2%

Thus, DCOIT is rapidly biodegraded in soil. It is interesting to note that the half-life of DCOIT in soil incubated at 6°C is the same or nearly the same as in soil incubated at 25°C. The uniqueness of this finding is what instigated a repeat study at 6°C.

5.2.2 Chromatography of organosoluble fraction

Parent was extracted into the methylene chloride fraction. HPLC analysis of this organosoluble fraction showed that parent declined rapidly as would be expected given the short half-lives. Sixteen metabolites were detected in the organosoluble fraction. Over 50% of these metabolites at all examined time intervals were less than 1% and a large majority were less than 5%. Only one metabolite other than $^{14}CO_2$, and at only one time interval was present at greater than 10% (*ca.* 11%). Therefore, DCOIT is rapidly metabolized in soil.

5.2.3 Metabolites

Except for CO_2, the one metabolite greater than 10% of the applied dose was not identified. The presence of $^{14}CO_2$ demonstrates that the isothiazolone ring is cleaved and significant metabolism has occurred. That is, after cleavage of the ring, subsequent metabolism must occur to oxidize the labeled carbon(s). Extensive metabolite identification work has been performed in sediment (see section A7.1.2.2.2) and water (see section A7.1.2.2.1) and the result demonstrate that DCOIT is biodegraded by ring cleavage and subsequent oxidation of the resulting metabolites. Additionally, some of these metabolites have been shown to be readily biodegradable (see section A7.1.2.3). Based on the chromatographic nature of the metabolites detected in these soil studies, the metabolites in soil will be similar to those in sediment and water. x

5.2.4 Nature and extent of bound residues

Approximately 40-50% of the applied ^{14}C-activity becomes incorporated into the bound residue. Since parent can be readily extracted from soil (see Day 0 results), these bound residues must be ring cleaved metabolites. Acid hydrolysis extracted only a small portion of the bound residues. NaOH extraction released about 65% of the bound residues of which a significant portion was associated with the humic acid fraction. x

5.3 Conclusion

DCOIT rapidly biodegrades in soil with a half-life of less than 2 days in soils incubated at both 6°C and 25°C. As demonstrated by the presence of 16 metabolites, mainly present at 5% or less, metabolism is very extensive. The presence of significant quantities of $^{14}CO_2$ demonstrates that the isothiazolone ring is cleaved and that extensive oxidation has x

		occurred. These results demonstrate that the metabolites will be similar to those seen in sediment and water studies. About 40-50% of the applied activity becomes incorporated into the bound residues (none of which is parent).
5.3.1	Reliability	2-valid with restrictions
5.3.2	Deficiencies	Incomplete metabolite identification. This should have only a minimal impact as metabolites have been identified in a number of sediments and in seawater. The metabolic pathway in all cases is similar.

Evaluation by Competent Authorities

Evaluation by Rapporteur Member State

Date	29 June 2007, revised 22 January 2009
Materials and Methods	Agree with applicant's version
Results and discussion	**Comment (4.2.3):** The Timme model is no longer recommended by the Scientific Committee on Plants (Guidance document on Estimating Persistence and Degradation Kinetics from Environmental Fate Studies on Pesticides in EU Registration, Sanco/10058/2005, version 2.0, June 2006). For DT50 value calculation see comment 5.2.1 below.
Conclusion	**Comment 5.2.1**: A half-life of 0.13 days at 6°C (silt loam) has to be considered as invalid. Very fast degradation may occur under certain conditions, but does not seem usual under aerobic conditions. The half-life of 2.01 days found in the repeat study with the same soil is more reasonable compared to the degradation rates obtained at 25°C. Results from two soil types, silt loam (two temperatures and two replicates for the low temperature study) and loamy sand are available. DCOIT disappears more slowly in loamy sand than in silt loam at 25°C, so degradation in loamy sand is a worst case. Based on the Square root 1. order rate constant determined by the Timme model a DT_{50} of 1.08 days is suggested by the applicant, but this half life is only valid for the first halving at this particular concentration. When calculating degradation rates and corresponding half-lives to be used in models for calculating environmental concentrations, single first-first order kinetics have to be used because of the limitations of existing mechanistic models (provided the fit is acceptable). The only reasonable single first order (SFO) half life can be obtained by including measurements from the first three days. The 12 hrs measurement is an outlier, and should be omitted. Applying SFO kinetics to selected data adjusted to 12°C, according to TGD gives DT_{50} = 4.7 days (k = 0.1472 $days^{-1}$; R^2 = 0.95). A more conservative option would be to use SFO kinetics on all data, but this would give a very conservative DT_{50}. Since more than 75 % of DCOIT is degraded within the first three days in loamy sand a DT_{50} of 4.7 days seems justified. Ideally, the regression analysis should have been done with individual measured values of both replicates; however, for DCOIT regression analysis was performed with the average of measured values for both replicates. When performing the regression analysis with individual measured values of both replicates a slightly lower correlation coefficient is achieved but half-lives are identical. **Comment (5.2.3)**: In the soil degradation studies the metabolites were not identified, but their chromatographic behaviour indicated that they were mostly the same compounds as in the sediment/water studies. The rates and pathway of DCOIT degradation in aquatic systems has been extensively elucidated and due to

	the similar patterns revealed in different environmental compartments under both aerobic and anaerobic conditions it seems reasonable to bridge these studies to the soil degradation study. For the same reason, testing of two soils instead of three is also accepted. **Comment (5.2.4)**: ^{14}C-label is rapidly incorporated into bound residues. However, DCOIT is not suspected to be contained in this fraction. In the sterile 6°C repeat study only 4.6% of ^{14}C-label was recovered in the PES fraction. In cases where sterility has been achieved DCOIT is completely extractable after prolonged incubation in soil and sediment (A7.2.1; Table A7.2.1-11). **Comment (5.3)**: DCOIT biodegrades in soil with a half-life of 4.7 days at 12°C. As demonstrated by the presence of 16 metabolites, mainly present at a quantity of 5% or less, metabolism is very extensive. The presence of significant quantities of $^{14}CO_2$ (11-21% after 32 days) demonstrates that the isothiazolone ring is cleaved and that extensive oxidation has occurred. Cleavage of the ring indicates that the metabolites will be similar or the same to those seen in water-sediment microcosm studies. About 40-50% of the applied activity becomes incorporated into the bound residues (none of which is parent).
Reliability	2, valid with restrictions
Acceptability	Acceptable with the restrictions noted above
Remarks	-

Document III-A / Section A7.1.3, A7.1.4, A7.2 and A7.3

Section A7.2.1	Aerobic Degradation in soil including extent and nature of bound residues – **TABLES AND FIGURES**

Table A7.2.1-1: Physical and Chemical Properties of Silt Loam and Loamy Sand

Characteristic	**Silt Loam**	**Loamy Sand**	**Silt Loam**[1]
Percent Sand	25	83	11
Percent Silt	54	10	68
Percent Clay	21	7	21
Percent Organic Matter	2.7	0.2	1.2
CEC[2] (meq/100 g)	10.5	3.9	9.5
pH	6.7	5.8	6.5
Percent Moisture (1/3 bar)	31.6	4.7	30.4
Bulk Density (g/cc)	0.99	1.43	1.05

[1] Second batch of Silt Loam obtained from the same site for a repeat study at 6°C

[2] CEC= cation exchange capacity

Table A7.2.1-2: Distribution of radioactivity in Silt Loam Soil Incubated at 25°C

Fraction	**Percent of Applied on Sampling Day**[1]										
	0	**0.25**	**0.5**	**0.75**	**1**	**1.5**	**2**	**3**	**7**	**16**	**32**
CH_3CN:HCl	87.78	30.64	39.62	21.96	25.12	21.19	19.76	20.25	17.49	15.86	15.52
CH_2Cl_2	87.74	29.16	37.88	21.16	23.62	20.02	18.46	19.29	16.77	15.10	14.94
Aqueous	0.05	1.48	1.74	0.80	1.50	1.18	1.30	0.96	0.72	0.76	0.58
CH_3OH:KOH	5.01	19.80	19.22	22.52	24.10	25.39	24.10	20.17	16.53	13.74	16.73
CH_2Cl_2	3.19	15.57	15.39	17.24	18.75	20.15	18.89	15.47	13.33	11.74	13.14
Aqueous	1.82	4.24	3.83	5.28	5.35	5.24	5.21	4.70	3.43	2.00	3.59
PES	7.42	40.64	43.05	49.48	48.37	54.04	49.87	45.05	47.29	46.51	40.82
KOH	NA[2]	2.78	5.49	7.57	8.88	10.41	10.19	10.11	14.43	17.30	21.55
Total Recovery	100.21	93.85	107.37	101.52	106.47	111.03	103.91	95.57	95.96	93.40	94.60

[1] All percentages are the average of two replicates

[2] NA = Not Applicable

Table A7.2.1-3: Distribution of radioactivity in Loamy Sand Soil Incubated at 25°C

Fraction	**Percent of Applied on Sampling Day**[1]										
	0	**0.25**	**0.5**	**0.75**	**1**	**1.5**	**2**	**3**	**7**	**16**	**32**
CH_3CN:HCl	93.88	80.33	65.54	72.26	69.95	65.19	55.38	40.48	28.81	29.44	26.35
CH_2Cl_2	93.86	79.80	64.62	71.64	69.08	64.67	54.30	38.85	27.74	27.14	25.27
Aqueous	0.02	0.53	0.93	0.62	0.87	0.53	1.08	1.63	1.07	2.30	1.08
CH_3OH:KOH	2.21	9.30	13.37	11.60	14.57	9.88	18.16	16.76	15.36	12.30	15.51
CH_2Cl_2	1.37	6.10	9.14	7.98	9.90	6.79	12.70	11.62	11.66	10.05	11.78
Aqueous	0.85	3.20	4.24	3.62	4.67	3.10	5.46	5.14	3.94	2.25	3.73
PES	0.93	12.40	20.45	17.46	21.43	16.15	28.92	38.49	42.82	40.82	38.14
KOH	NA[2]	0.31	1.14	0.81	1.46	1.47	2.81	3.29	5.74	8.48	11.49
Total Recovery	97.02	102.33	100.50	102.12	107.40	92.68	105.26	99.01	92.95	91.03	91.48

[1] All percentages are the average of two replicates

[2] NA = Not Applicable

Table 7.2.1-4: Average Percent of DCOIT and Metabolites in the Organosoluble-Extracts from Silt Loam Soil at 25°C

Compound	**Percent of Applied ^{14}C-Activity Detected as Parent or Metabolite on Indicated Sampling Day**										
	0	**0.25**	**0.5**	**0.75**	**1**	**1.5**	**2**	**3**	**7**	**16**	**32**
DCOIT	85.45	15.75	17.54	4.23	11.57	5.45	4.35	5.02	4.71	2.24	1.25
M1	0.06	0.86	1.15	1.28	2.32	0.56	2.03	0.09	ND	1.24	0.18
M2	0.34	3.32	2.28	0.29	3.45	1.13	3.35	0.28	ND	3.15	0.48
M3	0.05	0.37	0.64	0.39	0.74	0.30	0.87	0.24	ND	0.57	0.07
M4	0.11	0.09	0.47	0.49	0.36	0.09	0.27	0.13	ND	0.51	0.01
M5	ND	0.18	0.44	0.27	0.27	0.22	0.46	0.20	ND	0.38	0.10
M6	0.43	2.10	1.98	1.44	0.27	0.54	0.94	0.57	0.52	0.81	0.46
M7	0.07	0.36	0.78	0.31	0.39	0.22	0.34	0.39	0.34	0.17	0.23
M8	0.12	1.50	1.11	0.62	0.44	0.34	0.72	0.39	0.53	0.46	0.44
M9	0.50	1.79	1.58	0.63	0.72	0.49	0.72	0.39	0.27	0.54	0.43
M10	0.20	1.07	0.97	0.91	0.79	0.58	1.15	0.57	0.33	1.06	0.80
M11	0.11	0.86	0.78	0.71	0.78	0.31	0.73	0.31	0.56	0.45	0.75
M12	0.63	4.84	5.94	4.11	2.70	3.72	2.62	4.10	3.28	3.05	2.88
M13	1.78	4.99	6.61	9.31	6.97	10.82	9.16	8.85	7.56	4.31	6.44
M14	0.06	3.72	5.59	5.52	3.10	4.81	2.76	6.82	6.44	4.93	4.36
M15	0.04	1.95	3.45	5.05	4.67	7.27	5.22	3.37	3.32	2.07	4.69
M16	0.02	1.02	1.99	2.96	2.89	3.36	1.70	3.07	2.25	0.91	4.56

ND = Not Detected

Table A7.2.1-5: Average Percent of DCOIT and Metabolites in the Organosoluble-Extracts from Loamy Sand Soil at 25°C

Compound	Percent of Applied ^{14}C-Activity Detected as Parent or Metabolite on Indicated Sampling Day									
	0	**0.25**	**0.5**	**0.75**	**1**	**1.5**	**2**	**3**	**7**	**16**	**32**
DCOIT	93.17	71.88	48.27	60.27	62.18	53.86	42.85	22.95	13.98	6.12	2.53
M1	0.02	0.06	0.35	ND	0.58	0.03	0.90	0.04	1.04	0.67	0.50
M2	0.10	0.70	0.48	ND	1.66	0.06	2.76	0.16	0.13	1.35	0.75
M3	0.01	ND	0.19	ND	0.71	0.06	0.82	0.10	ND	0.73	0.30
M4	0.02	ND	1.18	0.24	ND	0.04	0.08	0.60	0.65	1.53	0.37
M5	ND	0.16	1.40	0.57	0.12	0.59	0.23	0.11	1.53	1.21	0.68
M6	0.32	0.55	0.61	ND	0.57	1.45	0.73	0.82	2.30	2.33	1.09
M7	0.08	0.09	0.50	ND	0.17	0.20	0.13	0.86	1.25	0.37	1.01
M8	0.16	0.46	0.72	ND	0.40	0.40	0.49	0.60	0.81	0.96	0.80
M9	0.23	0.49	0.30	ND	0.45	0.51	0.41	0.84	1.45	1.20	1.32
M10	0.26	0.36	0.47	ND	0.40	0.47	1.04	0.81	2.50	2.16	1.95
M11	0.03	0.32	0.82	ND	0.10	0.53	0.14	0.73	1.84	1.28	0.73
M12	0.84	3.44	5.62	3.66	1.88	2.91	2.26	3.96	2.58	3.93	4.36
M13	ND	3.16	5.69	2.05	6.22	3.86	7.74	6.53	5.87	7.03	6.68
M14	ND	2.64	3.99	3.07	0.92	2.81	3.37	4.13	1.49	3.23	4.90
M15	ND	1.12	2.74	1.82	2.20	2.15	2.14	3.96	1.14	2.25	4.79
M16	ND	0.50	0.45	ND	0.47	1.57	0.96	3.28	0.86	0.90	4.34

ND = Not Detected

Table A7.2.1-6: Distribution of Radioactivity in Silt Loam Soil Incubated at 6°C-First Replicate

Fraction	Percent of Applied on Sampling Day[1]									
	0	**0.25**	**0.5**	**0.75**	**1**	**1.5**	**2**	**3**	**8**	**14**	**32**
CH_3CN:HCl	87.78	64.35	22.96	36.90	36.98	41.13	28.69	31.65	28.36	20.53	16.10
CH_2Cl_2	87.74	61.89	21.32	35.89	33.35	40.47	26.38	30.30	26.80	18.99	15.34
Aqueous	0.05	2.46	1.65	1.02	3.64	0.66	2.32	1.35	1.56	1.55	0.77
CH_3OH:KOH	5.01	14.23	17.91	19.12	19.02	18.01	19.76	17.22	18.30	20.30	20.08
CH_2Cl_2	3.19	10.34	14.84	15.11	13.90	13.68	15.83	14.43	13.94	17.37	15.71
Aqueous	1.82	3.90	3.07	4.02	5.12	4.33	3.93	2.79	4.36	4.93	4.37
PES	7.42	23.28	45.58	33.50	38.44	32.38	37.85	42.29	41.48	44.39	43.37
KOH	NA[2]	0.58	5.60	1.66	3.58	2.08	4.78	4.71	9.04	10.83	13.49
Total Recovery	100.21	102.43	92.05	91.18	98.02	93.59	91.08	95.85	97.16	98.04	93.03

[1] All percentages are the average of two replicates

[2] NA = Not Applicable

Table A7.2.1-7: Distribution of Radioactivity in Silt Loam Soil Incubated at 6°C-Second Replicate

Fraction	**Percent of Applied on Sampling Day**[1]								
	0	**0.25**	**0.5**	**0.75**	**1**	**1.5**	**2**	**3**	**7**
CH_3CN:HCl	92.81	71.58	56.84	49.62	64.73	64.04	46.48	40.24	40.28
CH_2Cl_2	92.67	70.04	54.95	48.81	63.06	62.55	45.48	39.03	38.85
Aqueous	0.14	1.54	1.89	1.12	1.67	1.49	1.00	1.22	1.43
CH_3OH:KOH	3.91	13.07	17.47	18.79	13.75	14.65	17.38	18.22	19.36
CH_2Cl_2	2.45	7.09	11.24	12.71	9.83	10.75	12.58	13.62	14.90
Aqueous	1.46	5.98	6.24	6.09	3.92	3.90	4.80	4.60	4.46
PES	4.07	12.96	24.23	28.88	23.17	25.61	29.09	34.50	38.15
KOH	NA	0.31	0.87	1.36	1.29	1.51	2.56	4.67	5.44
Total Recovery	100.78	97.91	99.40	98.95	102.93	105.80	95.49	97.63	103.22

[1] All percentages are the average of two replicates
[2] NA = Not Applicable

Table A7.2.1-8: Average Percent of DCOIT and Metabolites in the Organosoluble-Extracts from Silt Loam Soil at 6°C-First Replicate

Compound	**Percent of Applied ^{14}C-Activity Detected as Parent or Metabolite on Indicated Sampling Day**									
	0	**0.25**	**0.5**	**0.75**	**1**	**1.5**	**2**	**3**	**8**	**14**	**32**
DCOIT	86.45	55.40	6.39	21.54	5.53	28.30	13.20	16.61	14.61	6.66	2.60
M1	0.06	ND	0.19	0.29	0.61	0.42	0.07	0.12	0.11	0.20	0.15
M2	0.34	0.12	0.06	0.18	0.62	0.29	0.03	0.16	ND	0.12	0.13
M3	0.05	ND	0.13	0.31	0.38	0.28	0.08	0.24	0.13	0.21	0.16
M4	0.01	0.25	0.04	0.43	2.13	0.35	ND	0.15	0.10	0.13	ND
M5	ND	ND	0.13	0.43	1.91	0.54	0.21	0.14	0.20	0.08	0.23
M6	0.43	1.82	1.05	1.14	0.96	0.67	0.86	0.92	0.78	0.94	0.27
M7	0.07	0.22	0.24	0.49	0.88	0.58	0.52	0.47	0.69	0.50	0.52
M8	0.12	0.85	0.34	0.64	1.21	0.51	0.44	0.30	0.67	1.59	0.66
M9	0.50	1.03	0.15	0.54	0.54	0.64	0.47	0.43	0.56	0.92	0.41
M10	0.20	0.49	0.53	0.76	1.30	0.67	0.67	0.76	0.78	1.21	1.26
M11	0.11	0.89	0.65	0.96	1.31	1.02	0.54	0.54	0.78	0.97	0.50
M12	0.63	4.27	3.88	4.56	8.68	3.30	4.55	4.20	3.27	5.23	3.91
M13	1.78	5.18	7.06	7.30	10.98	6.29	7.33	6.29	7.95	9.15	8.37
M14	0.06	1.21	5.44	4.51	3.38	3.55	4.58	4.37	3.49	5.17	4.94
M15	0.04	0.52	6.03	4.36	3.18	4.34	5.69	5.66	3.61	2.39	4.29
M16	0.02	ND	3.90	2.58	3.24	2.43	3.02	3.42	3.05	0.92	2.69

ND = Not Detected

Table A7.2.1-9: Average Percent of DCOIT in the Organosoluble Extracts from the Repeat Study in Silt Loam Soil at 6°C Using Non-Sterile and Sterile Soils

Day	DCOIT as Percent of Applied Dose[1]		
	CH_2Cl_2-1[2]	CH_2Cl_2-2[3]	Total
0	90.52	0.06	90.58
0.25	65.85	0.20	66.05
0.5	47.07	0.27	47.34
0.75	40.97	0.24	41.21
1	56.08	0.30	56.38
1.5	55.88	0.39	56.27
2	36.80	0.32	37.12
3	28.72	0.28	29.00
7	30.64	0.33	30.97
3-sterile	103.51	0.15	103.66
7-sterile	102.89	0.06	102.95
14-sterile	102.93	0.18	103.11
30-sterile	100.45	0.06	100.51

[1] Average of duplicate samples

[2] Methylene chloride partition fraction from extraction of the soil with acetonitrile:aqueous HCl

[3] Methylene chloride partition fraction from extraction of the soil with methanol:KOH

Table A7.2.1-10: Distribution of radioactivity in Sterile Silt Loam and Loamy Sand Soil Incubated at 25°C

Fraction	**Percent of Applied on Sampling Day[1]**					
	Silt Loam			**Loamy Sand**		
	3	**16**	**32**	**3**	**16**	**32**
CH_3CN:HCl	87.90	64.46	27.73	88.87	68.03	39.42
CH_2Cl_2	87.85	64.08	26.74	88.84	67.94	38.93
Aqueous	0.06	0.38	1.00	0.04	0.10	0.49
CH_3OH:KOH	5.71	8.06	11.82	3.78	4.41	6.76
CH_2Cl_2	3.09	5.17	6.98	2.44	2.98	3.42
Aqueous	2.62	2.89	4.84	1.34	1.44	3.34
PES	5.11	24.96	48.87	4.83	20.03	43.27
KOH	0.06	0.87	6.90	0.03	0.52	1.89
Total Recovery	98.78	98.34	95.31	97.50	92.98	91.33

[1] All percentages are the average of duplicate samples.

Table A7.2.1-11: Distribution of Radioactivity in Sterile Silt Loam Soil Incubated at 6°C-Repeat Study

Fraction	**Percent of Applied on Sampling Day**[1]			
	3	**7**	**14**	**30**
CH_3CN:HCl	107.69	106.52	104.45	102.56
CH_2Cl_2	107.58	106.46	104.40	102.35
Aqueous	0.12	0.06	0.05	0.20
CH_3OH:KOH	3.51	4.19	4.53	5.88
CH_2Cl_2	1.73	1.74	2.21	3.19
Aqueous	1.78	2.45	2.33	2.70
PES	1.82	2.34	3.14	4.55
KOH	0.01	0.02	0.03	0.04
Total Recovery	113.03	113.06	112.14	113.01

[1] All percentages are the average of duplicate samples

Table A7.2.1-12: Nature and Extent of Bound Residues

Fraction	**Percentage of Applied Radioactivity (Percentage of PES)**		
	Loamy Sand Day 7 25°C	**Silt Loam Day 1.5 25°C**	**Silt Loam Day 0.5 6°C**
Post Extraction Solids[1]	42.82	54.04	45.58
Acid Hydrolysis	6.44 (15)	8.03 (15)	6.25 (14)
Ethyl Acetate Partition	3.81	3.77	2.55
Aqueous Partition	2.63	4.26	3.70
NaOH Hydrolysis	27.67 (65)	33.82 (63)	29.48 (65)
Fulvic Acid (acid soluble)	8.46 (13)	9.06 (17)	7.93 (17)
Humic Acid (acid insoluble)	19.21 (45)	24.76 (46)	21.55 (47)
Humin (NaOH insoluble)	8.71 (20)	12.20 (23)	9.85 (22)

[1] Presented as percent of applied activity and determined by radiocombustion and assay.

Section A7.2.2	**Aerobic degradation in soil, further studies**	
	Justification for non-submission of data	Official use only
Other existing data [ ] **Limited exposure [ ]**	**Technically not feasible [ ]** **Scientifically unjustified [ ]** **Other justification [x]**	
Detailed justification:	Detailed justification is considered as confidential information. [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted]	

Section A7.2.2	Aerobic degradation in soil, further studies

[redacted]

[redacted]	[redacted]	
	[redacted]	[redacted]
[redacted]		[redacted]
[redacted]	[redacted]	
[redacted]		[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

Section A7.2.2 **Aerobic degradation in soil, further studies**

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	[redacted]	
	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]		[redacted]

[redacted]

[redacted]

Section A7.2.2	Aerobic degradation in soil, further studies
	[redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted]

Section A7.2.2	**Aerobic degradation in soil, further studies**	
	[redacted] [redacted] [redacted] [redacted] [redacted]	
Undertaking of intended data submission [ ]	*No*	

Document III-A / Section A7.1.3, A7.1.4, A7.2 and A7.3

	Evaluation by Competent Authorities
	Evaluation by Rapporteur Member State
Date	21 August 2007
Evaluation of applicant's justification	**Detailed justification is considered as confidential information.** [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted]
Conclusion	No further testing is considered necessary
Remarks	-

Section A7.2.3.1 — Adsorption / Desorption in soils : Aged Column Leaching Study

Annex Point III, XII.1.2

			Official use only
		1 REFERENCE	
1.1	**Reference**	Reference type: Study report Year: 1991 Report date: 30 January 1991 [redacted]	
1.2	**Data protection**	Yes	
1.2.1	Data owner	Rohm and Haas Company	
1.2.2			
1.2.3	Criteria for data protection	[redacted] [redacted]	
		2 GUIDELINES AND QUALITY ASSURANCE	
2.1	**Guideline study**	Yes. U.S. Environmental Protection Agency, 40 CFR § 158, Subdivision N, Chemistry, Environmental Fate 163-1.	
2.2	**GLP**	Yes	
2.3	**Deviations**	No GLP deviations or deviations from the US EPA guidelines.	
		3 MATERIALS AND METHODS	
3.1	**Test material**	^{14}C-DCOIT (RH-5287) . [redacted]	
3.1.1	Lot/Batch number	[redacted]	
3.1.2	Specification	[redacted]	
3.1.3	Purity	[redacted]	
3.1.4	Further relevant properties	[redacted] [redacted]	

Section A7.2.3.1 **Annex Point III, XII.1.2**	**Adsorption / Desorption in soils : Aged Column Leaching Study**

[redacted]

3.1.5 Method of analysis	[redacted]
	[redacted]
3.2 Degradation products	[redacted]
3.3 Reference substance	[redacted]
3.4 Soil types	[redacted]
3.5 Testing procedure	
3.5.1 Test conditions-Half life determination	[redacted]
	[redacted]

Section A7.2.3.1 Adsorption / Desorption in soils : Aged Column Leaching Study

Annex Point III, XII.1.2

		[redacted]
3.5.2	Test solution for half-life determination	[redacted]
3.5.3	Test conditions- Aging of soil	[redacted] [redacted]
3.5.4	Test solution for aged leach study	[redacted] [redacted]
3.5.5	Test conditions for leaching study	[redacted] [redacted]