Appendix L

Soil Pesticide Assessment

# Soil Pesticide Assessment

Silo Ridge Golf Course Town of Amenia, Dutchess County, NY

Prepared for:

Millbrook Ventures 5021 Route 44 Amenia, NY 12501

Prepared By:

Roy T. Budnik & Associates, Inc. 317 Main Street Poughkeepsie, NY 12601

July 8, 2008

## Silo Ridge Golf Course Town of Amenia, Dutchess County Soil Pesticide Assessment

## Introduction

A reconnaissance assessment was conducted at the Silo Ridge Golf Course to evaluate soil pesticide levels at selected locations. The subject property is located south of Route 44 and west of Route 22 in the Town of Amenia (see *Location Map*). The course was constructed approximately 20 years ago on former agricultural lands.

## Sampling Protocol

Samples were collected on May 14, 2008 at 10 locations (see Figure 3), approved in advance by Audubon International. These locations were selected in order to provide a diverse cross section of the site and include locations in close proximity to Wetland AM-15 and the Cascade Amenia Brook. The sampling sites included portions of the property that are maintained areas within the golf course (green, fairway, and rough) as well as unmaintained perimeter areas (woods and wetland). Pesticides (herbicides, fungicides, and insecticides) are generally applied to the greens to maintain required turf characteristics.

Table 1 – Sample Locations				
LOCATION	SAMPLE			
green	SR-1, SR-7			
fairway	SR-4, SR-9			
rough	SR-2, SR-3, SR-5			
woods	SR-6, SR-8			
wetland	SR-10			

Table 1 – Sample Locations

At each location, samples were taken by use of a JMC 12" sampling tube. Several <sup>3</sup>/<sub>4</sub>" diameter cores (to a depth of about 3") were taken within a 3-foot radius at each location and composited to insure more representative samples and an adequate volume of material to fill a sample jar. Fragments of turf, roots, and stones were rejected from the samples.

# Testing Protocol

The soil samples were sent by overnight express to the Brookside Laboratories, Inc. soil pesticide analysis facility in New Knoxville, OH where the samples were analyzed using EPA Method 8270. The list of required analytes (Table 2) was provided to the operator by Shawn Williams, Staff Ecologist with Audubon International, in consultation with Charles Peacock, Senior Scientist with Audubon International. A summary of the results of the analyses are presented in Table 3; the laboratory reports are enclosed.

ANALYTE	USE
Deltamethrin*	pyrethroid insecticide
Iprodione*	fungicide
Chlorothalonil*	organochlorine fungicide
Chlorpyrifos	organophosphate insecticide
PCNB*	organochlorine fungicide
Cyfluthrin	pyrethroid insecticide

Table 2 – Pesticide Use

Note: Pesticides indicated by \* have been used at the Silo Ridge Golf Course in the past 12 months

Table 3 - Samples exceeding Method Detection Level

SAMPLE	EXCEEDANCES	LOCATIONS
SR-1	1, 2, 3, 5	green
SR-2	none	rough
SR-3	none	rough
SR-4	none	fairway
SR-5	none	rough
SR-6	none	woods
SR-7	1, 2, 3, 5	green
SR-8	none	woods
SR-9	5	fairway
SR-10	none	wetland

MDL Exceedances Key

- 1 = Deltamethrin
- 2 = Iprodione
- 3 = Chlorothalonil
- 4 = Chlorpyrifos
- 5 = Pentachloronitrobenzene (PCNB)
- 6 = Cyfluthrin

## Future Soil-Disturbance Activities

Reconstruction of the golf course is currently anticipated to commence in the fall of 2009, pending receipt of all applicable permits. The construction activities would require disturbance of golf greens and fairways that have been shown in this assessment to contain residues of soil pesticides.

It is unlikely that the construction activities will result in elevated pesticide levels in the adjacent water resources for the following reasons:

- 1. Application of pesticides will cease no less than 3 months prior to reconstruction;
- 2. The half-lives for the pesticides routinely applied at Silo Ridge are 3 months or less. As a result, the residues from these pesticides will be largely or completely dissipated prior to the start of construction;

ANALYTE	USE
Deltamethrin*	pyrethroid insecticide
Iprodione*	fungicide
Chlorothalonil*	organochlorine fungicide
Chlorpyrifos	organophosphate insecticide
PCNB*	organochlorine fungicide
Cyfluthrin	pyrethroid insecticide

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Note: Pesticides indicated by \* have been used at the Silo Ridge Golf Course in the past 12 months

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SAMPLE	EXCEEDANCES	LOCATIONS
SR-1	1, 2, 3, 5	green
SR-2	none	rough
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SR-4	none	fairway
SR-5	none	rough
SR-6	none	woods
SR-7	1, 2, 3, 5	green
SR-8	none	woods
SR-9	5	fairway
SR-10	none	wetland

MDL Exceedances Key

- 1 = Deltamethrin
- 2 = Iprodione
- 3 = Chlorothalonil
- 4 = Chlorpyrifos
- 5 = Pentachloronitrobenzene (PCNB)
- 6 = Cyfluthrin

## Future Soil-Disturbance Activities

Reconstruction of the golf course is currently anticipated to commence in Spring, 2009, pending receipt of all applicable permits. The construction activities would require disturbance of golf greens and fairways that have been shown in this assessment to contain residues of soil pesticides.

It is unlikely that the construction activities will result in elevated pesticide levels in the adjacent water resources for the following reasons:

- 1. Application of pesticides will cease no less than 3 months prior to reconstruction;
- 2. The half-lives for the pesticides routinely applied at Silo Ridge are 3 months or less. As a result, the residues from these pesticides will be largely or completely dissipated prior to the start of construction;

- 3. Although the golf course has been operated for about 20 years, the study did not find evidence of pesticide residues outside of the areas where they were directly applied, suggesting that they are relatively immobile in the environment;
- 4. Pesticides become attached to clay particles in the soil. Effective erosion and sediment control measures will limit the movement of soil to nearby surface water resources and, hence, the release of pesticides to those resources.

	Analyte Characteri	stics
CHEMICAL	SOIL HALF-LIFE (DAYS)	HALF-LIFE IN WATER
Deltamethrin*	13#	3-4 days <sup>+</sup>
Iprodione*	84#	5-10 minutes <sup>++</sup>
Chlorothalonil*	22 <sup>@</sup>	10 weeks**
Chlorpyrifos	50 <sup>@</sup>	3 - 4 weeks**
PCNB*	39#	2-5 days**
Cyfluthrin	33 <sup>#</sup>	1 day**

Table 4	
Analyte Characteristics	

Notes: \*Pesticides that have been used at the Silo Ridge Golf Course in the past

12 months. Half-life is the time required for half of the residue to lose its analytical identity whether through dissipation, decomposition, metabolic alteration or other factors (information from Extoxnet.orst.edu).

Data Sources:

#Natural Resources Management Plan for Silo Ridge, prepared by Audubon

@ Audubon International staff (personal communication).

+ California EPA pesticide database website

++Cornell pesticide database website

\*\* Extoxnet pesticide database website

## Conclusions

The May, 2008 soil sampling and testing program has detected residues of soil pesticides used at the Silo Ridge golf course in those areas to which they have been directly applied. No residues were found in areas were they have not been applied on the golf course or in adjacent areas. Reconstruction of the course and other construction activities in 2009 will not result in the release of pesticides to the adjacent surface water resources for the reasons discussed above.

Figures Figure 1 Location Map Figure 2 Aerial Photograph Figure 3 Sample Locations



FIGURE 1 – LOCATION MAP From: Jimapco: Dutchess County Map North to Top Not to Scale







Laboratory Results (All results reported on a dry-weight basis)

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P.O. Box 456, 308 S. Main St. New Knoxville, OH 45871 Phone: (419) 753-2448 Fax: (419) 753 2949

Analytical Report

Client Number:63807Client Name:Roy T. Budnik & Associates, Inc.Consultant Name:Home OfficeDate Collected:05/14/2008 10:20:00 AMDate Received:05/15/2008

Lab Number: SE0515018 Location: SR-1 Description: Sub Description:

Code Procedure Name IN097 DELTAMETHRIN (DELTAGARD) IO113 IPRODIONE (CHIPCO) IO118 CHLOROTHALONIL (BRAVO) IO120 CHLORPYRIFOS	Prep <u>Method</u> 8270 8270 8141 8141	Analysis <u>Method</u> 8270 8270 8270 8270 8270	Analysis <u>Complete</u> 05/20/2008 05/20/2008 05/20/2008 05/20/2008	<u>Analyst</u> SRE SRE SRE SRE	<u>Result</u> 0.034965 mg/kg 0.210289 mg/kg 0.228271 mg/kg < 0.0099 mg/kg	<u>MDL</u> 0.00999 0.00999 0.00999 0.00999
(PCNB)	8270	8270	05/20/2008	SRE	0.034065 mg/kg	0.00999
	0141	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00999

Approval:

Thomas H. Batten Environmental Services Coordinator



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Analytical Report

Client Number:63807Client Name:Roy T. Budnik & Associates, Inc.Consultant Name:Home OfficeDate Collected:05/14/2008 10:30:00 AMDate Received:05/15/2008

Lab Number: SE0515019 Location: SR-2 Description: Sub Description:

	Prep	Analysis	Analysis			
Code Procedure Name	Method	Method	Complete	Analyst	Result	MDL
IN097 DELTAMETHRIN (DELTAGARD)	8270	8270	05/20/2008	SRE	< 0.0099 ma/ka	0.00996
IO113 IPRODIONE (CHIPCO)	8270	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00996
IO118 CHLOROTHALONIL (BRAVO)	8141	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00996
IO120 CHLORPYRIFOS (LORSBAN,DURSBAN)	8141	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00996
IO285 PENTACHLORONITROBENZENE (PCNB)	8270	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00996
10648 CYFLUTHRIN (BAYTHROID)	8141	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00996

Approval:

Thomas H. Batten Environmental Services Coordinator



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Analytical Report

Client Number:63807Client Name:Roy T. Budnik & Associates, Inc.Consultant Name:Home OfficeDate Collected:05/14/2008 11:15:00 AMDate Received:05/15/2008

Lab Number: SE0515020 Location: SR-3 Description: Sub Description:

	Prep	Analysis	Analysis			
Code Procedure Name	Method	Method	Complete	Analyst	Result	MDL
IN097 DELTAMETHRIN (DELTAGARD)	8270	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00995
IO113 IPRODIONE (CHIPCO)	8270	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00995
IO118 CHLOROTHALONIL (BRAVO)	8141	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00995
IO120 CHLORPYRIFOS (LORSBAN,DURSBAN)	8141	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00995
IO285 PENTACHLORONITROBENZENE (PCNB)	8270	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00995
10648 CYFLUTHRIN (BAYTHROID)	8141	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00995

Approval:

Thomas H. Batten Environmental Services Coordinator



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Analytical Report

Client Number:63807Client Name:Roy T. Budnik & Associates, Inc.Consultant Name:Home OfficeDate Collected:05/14/2008 11:00:00 AMDate Received:05/15/2008

Lab Number: SE0515021 Location: SR-4 Description: Sub Description:

	Prep	Analysis	Analysis			
Code Procedure Name	Method	Method	Complete	Analyst	Result	MDL
IN097 DELTAMETHRIN (DELTAGARD)	8270	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00995
IO113 IPRODIONE (CHIPCO)	8270	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00995
IO118 CHLOROTHALONIL (BRAVO)	8141	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00995
IO120 CHLORPYRIFOS (LORSBAN,DURSBAN)	8141	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00995
IO285 PENTACHLORONITROBENZENE (PCNB)	8270	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00995
10648 CYFLUTHRIN (BAYTHROID)	8141	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00995

Approval:

Thomas H. Batten Environmental Services Coordinator



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Analytical Report

Client Number:63807Client Name:Roy T. Budnik & Associates, Inc.Consultant Name:Home OfficeDate Collected:05/14/2008 10:45:00 AMDate Received:05/15/2008

Lab Number: SE0515022 Location: SR-5 Description: Sub Description:

	Prep	Analysis	Analysis			
Code Procedure Name	Method	Method	Complete	Analyst	Result	MDL
IN097 DELTAMETHRIN (DELTAGARD)	8270	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00993
IO113 IPRODIONE (CHIPCO)	8270	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00993
IO118 CHLOROTHALONIL (BRAVO)	8141	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00993
IO120 CHLORPYRIFOS (LORSBAN,DURSBAN)	8141	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00993
IO285 PENTACHLORONITROBENZENE (PCNB)	8270	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00993
IO648 CYFLUTHRIN (BAYTHROID)	8141	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00993

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Analytical Report

Client Number:63807Client Name:Roy T. Budnik & Associates, Inc.Consultant Name:Home OfficeDate Collected:05/14/2008 11:45:00 AMDate Received:05/15/2008

Lab Number: SE0515023 Location: SR-6 Description: Sub Description:

	Prep	Analysis	Analysis			
Code Procedure Name	Method	Method	Complete	Analyst	Result	MDL
IN097 DELTAMETHRIN (DELTAGARD)	8270	8270	05/20/2008	SRE	< 0.01 mg/kg	0.01
IO113 IPRODIONE (CHIPCO)	8270	8270	05/20/2008	SRE	< 0.01 mg/kg	0.01
IO118 CHLOROTHALONIL (BRAVO)	8141	8270	05/20/2008	SRE	< 0.01 mg/kg	0.01
IO120 CHLORPYRIFOS (LORSBAN,DURSBAN)	8141	8270	05/20/2008	SRE	< 0.01 mg/kg	0.01
10285 PENTACHLORONITROBENZENE (PCNB)	8270	8270	05/20/2008	SRE	< 0.01 mg/kg	0.01
IO648 CYFLUTHRIN (BAYTHROID)	8141	8270	05/20/2008	SRE	< 0.01 mg/kg	0.01

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Page: 6 of 10



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Analytical Report

Client Number:63807Client Name:Roy T. Budnik & Associates, Inc.Consultant Name:Home OfficeDate Collected:05/14/2008 11:35:00 AMDate Received:05/15/2008

Lab Number: SE0515024 Location: SR-7 Description: Sub Description:

	Prep	Analysis	Analysis			
Code Procedure Name	Method	Method	Complete	Analyst	Result	MDL
IN097 DELTAMETHRIN (DELTAGARD)	8270	8270	05/20/2008	SRE	0.041334 ma/ka	0 00996
IO113 IPRODIONE (CHIPCO)	8270	8270	05/20/2008	SRE	0.085656 mg/kg	0.00996
IO118 CHLOROTHALONIL (BRAVO)	8141	8270	05/20/2008	SRE	0.149898 mg/kg	0.00996
IO120 CHLORPYRIFOS (LORSBAN,DURSBAN)	8141	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00996
IO285 PENTACHLORONITROBENZENE (PCNB)	8270	8270	05/20/2008	SRE	0.014442 mg/kg	0.00996
IO648 CYFLUTHRIN (BAYTHROID)	8141	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00996

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Analytical Report

Client Number:63807Client Name:Roy T. Budnik & Associates, Inc.Consultant Name:Home OfficeDate Collected:05/14/2008 11:55:00 AMDate Received:05/15/2008

Lab Number: SE0515025 Location: SR-8 Description: Sub Description:

Codo Broosdure News	Prep	Analysis	Analysis			
code Flocedule Name	Method	Method	<u>Complete</u>	Analyst	Result	MDL
IN097 DELTAMETHRIN (DELTAGARD)	8270	8270	05/20/2008	SRE	< 0.0099 ma/ka	0.00999
IO113 IPRODIONE (CHIPCO)	8270	8270	05/20/2008	SRE	< 0.0099 ma/ka	0 00999
IO118 CHLOROTHALONIL (BRAVO)	8141	8270	05/20/2008	SRE	< 0.0099  ma/ka	0.00999
IO120 CHLORPYRIFOS (LORSBAN,DURSBAN)	8141	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00999
IO285 PENTACHLORONITROBENZENE (PCNB)	8270	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00999
IO648 CYFLUTHRIN (BAYTHROID)	8141	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00999

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Page: 8 of 10



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Analytical Report

Client Number:63807Client Name:Roy T. Budnik & Associates, Inc.Consultant Name:Home OfficeDate Collected:05/14/2008 12:45:00 PMDate Received:05/15/2008

Lab Number: SE0515026 Location: SR-9 Description: Sub Description:

Code Procedure Name	Prep Mothod	Analysis Mothod	Analysis	Analusá	D#	
	Method	Methou	complete	Analyst	Result	MDL
IN097 DELTAMETHRIN (DELTAGARD)	8270	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00991
IO113 IPRODIONE (CHIPCO)	8270	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00991
IO118 CHLOROTHALONIL (BRAVO)	8141	8270	05/20/2008	SRE	< 0.0099 ma/ka	0.00991
IO120 CHLORPYRIFOS (LORSBAN,DURSBAN)	8141	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00991
IO285 PENTACHLORONITROBENZENE (PCNB)	8270	8270	05/20/2008	SRE	0.017937 mg/kg	0.00991
IO648 CYFLUTHRIN (BAYTHROID)	8141	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00991

Approval:

Thomas H. Batten Environmental Services Coordinator

Comments:

Page: 9 of 10



**Analytical Report** 

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Client Number:63807Client Name:Roy T. Budnik & Associates, Inc.Consultant Name:Home OfficeDate Collected:05/14/2008 12:30:00 PMDate Received:05/15/2008

Lab Number: SE0515027 Location: SR-10 Description: Sub Description:

	Prep	Analysis	Analysis			
Code Procedure Name	Method	Method	Complete	Analyst	Result	MDL
IN097 DELTAMETHRIN (DELTAGARD)	8270	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00998
IO113 IPRODIONE (CHIPCO)	8270	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00998
IO118 CHLOROTHALONIL (BRAVO)	8141	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00998
IO120 CHLORPYRIFOS (LORSBAN,DURSBAN)	8141	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00998
IO285 PENTACHLORONITROBENZENE (PCNB)	8270	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00998
10648 CYFLUTHRIN (BAYTHROID)	8141	8270	05/20/2008	SRE	< 0.0099 mg/kg	0.00998

Approval:

Thomas H. Batten Environmental Services Coordinator

Comments:

Page: 10 of 10