



Department of Agriculture and Food
AGWEST Animal Health Laboratories



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Case Number: AS-10-0078-F-V1

Final Report

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Date: 5-FEB-2010

Enquiries: Dr Shane Besier(Pathology Perth)

Your Ref: AHL Chain of Custody procedures
were applied to the submission.

To: Matt Swan
Department of Environment &
Conservation

cc.

Locked Bag 104 Bentley Delivery Centre
Bentley
WA 6983



Owner:

Project: Animal disease diagnosis

Species: Avian - Carnaby's Cockatoo

Samples Received: 21 birds

Date Collected: Not Supplied

Date Received: 11-JAN-2010

Submission Number:

History

Sudden mass mortality of Carnaby's cockatoos at Hopetoun with smaller numbers of other bird species affected.

Mortalities were noted in Hopetoun between 6/1/10 and 8/1/10 with approximately 180 Carnaby's cockatoos and smaller numbers of other bird species (Red Capped Parrots, Spinebills and honeyeaters) found dead. Many of these birds were found on the Hopetoun golf course with smaller numbers found throughout the town. Lethargic cockatoos were observed by DEC officers inspecting the golf course. No history of herbicide/pesticide use on the golf course within the last 12 months.

Deaths of Carnaby's cockatoos and other species (including kestrels, magpies and ravens) were observed on 8/1/10 at Munglinup.

Both areas had experienced extreme hot weather at the time of bird deaths (high 40°C+). A provisional diagnosis of heat stress made with refrigerated and frozen Cockatoos submitted for testing.

Necropsy findings

21 Carnaby cockatoos submitted for examination. Numbers 1 to 10 and 21 were fresh (refrigerated) while numbers 11 to 20 had been frozen. Birds 1 to 20 had been collected from Hopetoun. Number 21 had been collected from Munglinup.

These birds were all assessed by DEC to be in fair to good body condition. DEC also aged and sexed the birds prior to necropsy.

Birds 1 to 20 inclusive were flyblown around the oral cavity, nasal sinuses and in some cases the cloaca. Bird 1 to 10 exhibited marked autolysis (all tissues softened, diffusely reddened) while pectoral musculature was pale, dry and friable (presumed thermal damage, presumed post-mortem). The skin was frequently, diffusely erythematous. The lungs of all birds were mildly heavy with clear fluid easily



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expressed on palpation, while in some birds the pleura was expanded by clear transudate (pulmonary oedema). Spleens were uniformly small, ovoid (approx 5mm x 4mm diameter); this may represent splenic contracture although uncertain of normal in this species.

Further individual findings

Bird 1 – 1+ year old female. Little gastrointestinal content except 2 large grubs.

Bird 2 – adult male. Moderate volume of flat, white, oblong seeds (approx 5x5x1mm) in the crop and proventriculus. Bilateral, mild pulmonary oedema.

Bird 3 – adult male. Alimentary tract empty except for grit in ventriculus.

Bird 4 – 1+ year old male. Alimentary tract except for grit in ventriculus.

Bird 5 – adult female. White seeds (as in Bird 2) in crop and proventriculus. A 1x1x1cm blood clot was present on the cranial aspect of the liver; no grossly obvious hepatic/vascular injury.

Bird 6 – adult female. White seeds as in bird 2 present in crop and proventriculus.

Bird 7 – adult female. White seeds as in bird 2 present in crop and proventriculus.

Bird 8 – adult male. White seeds (as in bird 2) and small, round black/brown seeds 1mm in diameter present in crop and proventriculus.

Bird 9 – 1+ year old male. Multifocal subcutaneous haemorrhage over the dorsal aspect of the skull. Alimentary tract empty except for grit.

Bird 10 – adult male. Gastrointestinal tract empty except for grit.

Bird 21 – adult male. In relatively good post-mortem condition (less autolysis, not fly-blown). Prolonged skin tenting and tacky breast musculature (presumed dehydration) was noted. Bilateral, moderate pulmonary oedema, mild hepatic and meningeal congestion was present with multifocal petechiation over the dorsal aspect of the skull. The spleen was small and pale. Large numbers of small round, black/brown seeds mm

Cloacal swabs, fresh brain, liver, kidney and ventricular content were collected with a range of formalin fixed tissues from birds 1 to 10 and 21. Brain tissue was collected from birds 11 to 20 with the remainder of these carcasses retained.

Histopathology

Bird 1

Slide 1A – heart, kidney, liver, ventriculus	1C – duodenum/pancreas, brain, lung
1B – brain	1D – proventriculus, liver, lung, skeletal muscle x2, spleen



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Lung – diffuse, marked vascular congestion with expansion of the pleura and vascular adventitia by non-staining material with moderate volumes of eosinophilic fluid within parabronchiolar spaces (mild pulmonary oedema with marked pulmonary vascular congestion).

Liver – diffuse, marked vascular and sinusoidal congestion. Diffuse loss of hepatocellular detail, erythrocyte lysis and proliferation of clostridial bacteria (autolysis with proliferation of post mortem opportunist bacteria).

Kidney – diffuse vascular congestion with marked autolysis.

Spleen – marked autolysis.

Brain – diffuse vascular congestion with mild expansion of perivascular spaces by non-staining material (perivascular oedema). Mild, diffuse vacuolar change of the cerebellar/brainstem white matter (mild autolytic change).

Proventriculus – diffuse epithelial loss (artefactual sloughing) and moderate autolysis.

Duodenum – total loss of cellular detail (severe autolysis).

Pancreas – total loss of cellular detail (severe autolysis).

Bird 2

Slide 2A – liver, kidney, heart	2C – testicle, kidney, intestine, adrenal, lung, skeletal muscle, skin, brain
2B – brain	2D – duodenum/pancreas, ventriculus, lung

Lung – marked pulmonary oedema (see bird 1)

Remaining tissues – similar congestive and autolytic changes to bird 1.

Bird 3

Slide 3A – brain	3C – lung, proventriculus/ventriculus, skeletal muscle/skin, testicle, duodenum/pancreas
3B – heart, brain, kidney, liver, spleen	

Lung – moderate pulmonary oedema (changes similar to bird 1).

Remaining tissues – similar congested and autolytic changes to bird 1.

Bird 4

Slide 4A – lung, heart	4D – proventriculus, oesophagus
4B – brain	4E – kidney, liver, ventriculus, testicle, duodenum/pancreas
4C – spleen, brain, skeletal muscle/skin, lung	

Lung – moderate pulmonary oedema (similar changes to bird 1).

Remaining tissues – similar congestive and autolytic changes to bird 1.



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*Bird 5*

Slide 5A – brain, spleen	5C – liver, kidney, skeletal muscle/skin, lung
5B – heart, lung, proventriculus	5D – duodenum/pancreas, brain

Heart – an extensive focus of haemorrhage is present in the epicardium and myocardium of the right ventricle. No host response or agent noted.

Liver – several small, discrete foci of hepatocellular loss and replacement by an infiltrate of lymphocytes and plasma cells. No agent seen.

Lung – mild pulmonary oedema (similar changes to bird 1).

Remaining tissues – similar congestive and autolytic changes to bird 1.

Bird 6

Slide 6A – brain, heart	6C – spleen, brain, ventriculus
6B – brain, liver	

Tissues similar to Bird 1.

Bird 7

Slide 7A – brain	7C – skeletal muscle/skin, kidney, brain, spleen, lung, ventriculus
7B – brain, heart, liver	7D – ovary, kidney, intestine

Lung – mild expansion of the vascular adventitia and mild parabronchial accumulation of proteinaceous fluid (mild pulmonary oedema).

Kidney, spleen, intestine – severe autolysis.

Remaining tissues – similar congestive and autolytic changes to bird 1.

Bird 8

Slide 8A – brain	8C – brain, lung, duodenum, liver
8B – skeletal muscle, lung, heart	8D – skeletal muscle, ventriculus

Lung – mild pulmonary oedema (similar to bird 1)

Remaining tissues – similar congestive and autolytic changes to bird 1.

Bird 9

Slide 9A – heart, kidney, skeletal muscle/skin	9C – duodenum/pancreas, lung, liver
9B – brain, spleen	9D – ventriculus

Heart – two small foci of endocardial haemorrhage. No inflammatory reaction, no agent noted.

Liver – rare, randomly distributed, small foci of hepatocellular loss and replacement by a dense infiltrate of heterophils, macrophages and lymphocytes. No agent noted.



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Lung – mild pulmonary oedema changes, similar to bird 1.

Remaining tissues – similar congestive and autolytic changes to bird 1.

Bird 10

Slide 10A – heart , liver, skeletal muscle/skin	10B – lung, spleen, kidney, duodenum/pancreas, ventriculus
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Lung – similar to bird 2.

Spleen, kidney, duodenum/pancreas – severe autolysis.

Remaining tissues – similar congestive and autolytic changes to bird 1.

Bird 21

Slide 21A – brain, liver, duodenum/pancreas	21C – liver, kidney, proventriculus, lung, brain, spleen
21B – skeletal muscle/skin, lung, heart	21D – ventriculus, ileum, testes

Tissues mildly autolysed compared to preceding birds.

Lung – perivascular spaces/adventitia are diffusely, moderately expanded by non-staining material (low protein oedema; mild pulmonary oedema).

Skin - mild expansion of the dermis by non-staining material (low protein oedema).

Liver –a single, small focus of hepatocellular loss and heterophilic infiltration is present (considered incidental).

Remaining tissues – similar congestive and autolytic changes to bird 1.

All birds

Remaining tissues do not contain significant changes other than congestion and autolysis

Morphological diagnoses

Birds 1, 2, 3, 4, 5, 7, 8, 9, 10 and 21

Lungs – mild to moderate, acute, diffuse pulmonary oedema with marked vascular congestion

All tissues – marked, diffuse, acute vascular congestion

Birds 5 and 9

Liver – mild, multifocal, chronic lymphohistiocytic hepatitis

Heart – mild, multifocal, acute myocardial haemorrhage

Bird 21

Liver – slight, focal, subacute heterophilic hepatitis

Skin – mild, diffuse, acute subcutaneous oedema



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Aetiological diagnoses

See comments

Comments

While there are no gross or microscopic lesions exclusive to heat stress both the absence of other disease processes and the consistent pathological changes of congestion, pulmonary oedema and haemorrhage support the provisional diagnosis.

Few significant changes were found on either gross or microscopic examination of the cockatoos. The only consistent findings between birds were the presence of mild to moderate pulmonary oedema and diffuse, severe congestion of all tissues. Similar changes were found in bird 21 (collected from Munghlinup), with this bird also exhibiting mild subcutaneous oedema.

Pulmonary oedema may reflect compromise of vascular integrity (considered probable) or pulmonary hypertension (considered unlikely). Subcutaneous oedema in bird 21 and the small, multi-organ haemorrhages noted in multiple birds reflects a loss of vascular integrity. Diffuse congestion suggests systemic circulatory failure (shock).

These changes can be induced by several processes including infection, sepsis, trauma, cardiac failure and heat stress. Evidence of infection, sepsis, primary cardiac disease or trauma was not found in these cases. These changes may occur in heat stress due to the high demand for blood flow to the skin/extremities for effective thermoregulation with a concurrent demand for perfusion of the internal organs. This may lead to hypoperfusion of vital organs (liver, kidney, brain) leading to multiorgan failure and death.

The mild liver lesions found in birds 5, 9 and 21 are felt to be incidental and unrelated to death.

The interpretation of both gross and histological specimens was severely hampered by the degree of autolysis (post-mortem tissue degradation), especially in birds 1 to 10. Despite this, no further significant inflammatory or degenerative changes are believed to be present.

Testing of frozen brain (birds 11 to 20) for acetylcholinesterase activity (depressed by organophosphate toxicity) indicated levels well above those usually found in birds poisoned by these chemicals.

Samples from birds 1 to 10 and 21 were forwarded to the Chemistry Centre of WA (CCWA) for heavy metal, organophosphate and organochlorine analysis.

Heavy metal detection by ICP on liver samples did not detect significant tissue levels of the elements tested and comparison with levels in poultry (*from* Puls, R., 1994, "Mineral Levels in Animal Health", Sherpa International) indicated levels well below those expected to cause toxicity. Elements tested and poultry toxicity levels are listed below.

Analysis of the gut content for organophosphates and organochlorines did not detect toxic levels of these compounds, with all compounds tested being below the CCWA level of reporting. Compounds tested are listed below.



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Potential toxins tested at CCWA.

Heavy Metals	
Element	Toxic liver level in poultry (mg/kg wet weight)
Aluminium	Not given
Arsenic	5-10
Cadmium	15-200
Chromium	13-150
Cobalt	50-165
Copper	20-150 acute
Lead	18-90
Mercury	3-130
Manganese	>9
Molybdenum	6-10
Nickel	1-1.4
Selenium	4-40
Uranium	Not given
Vanadium	>0.48 kidney
Zinc	200-1900

Organophosphates
Compound
Dichlorvos
Methidathion
Ethyl Parathion
Malathion
Chlorpyrifos
Demeton-S-methyl
Diazinon
Demethoate
Fenamiphos
Fenitrothion
Mevinphos
Phorate
Fenthion

Organochlorines
Compound
Hexachlorobenzene
Lindane
Heptachlor
Aldrin
Heptachlor epoxide
trans-Chlordane
cis-Chlordane
a-Endosulfan
p,p-DDE
p,p-DDT
Dieldrin
Endrin
p,p-DDD
b-Endosulfan
Endosulfan sulfate

Animal Health Laboratories Results

Biochemistry Results

Specimen Type:

Spec No.	Spec ID	Cholinesterase
		Units
56	11	39
57	12	38
58	13	42
59	14	42
60	15	34
Reference range:		

Comment: Cholinesterase units are umol/min/g as received



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Virology Results

Test Type: Influenza Type A Real Time PCR (NATA accreditation does not cover the performance of this service)

Spec No.	Spec ID	Spec Description	Avian Influenza RT PCR
33	fresh 1	cloacal swab in VTM	virus antigen negative
34	fresh 2	cloacal swab in VTM	virus antigen negative

Yours faithfully

Dr Shane Besier
VETERINARY PATHOLOGIST

14. JAN. 2010 12:38

BIO SCIENCES LAB

NO. 193

P. 1/3

BIOSECURITY SCIENCES LABORATORY

Department of Primary Industries & Fisheries Animal Research Institute 665 Fairfield Road YEERONGHILLY QLD 4105

SUBMITTER :

G Doncon
Animal Health Labs Agric W A
Locked Bag 4
BENTLEY D S WA 6983

Your submitter code is :

DONGBEN

Please quote this code on future accessions.

Pathology Report

Enquiries : Ph: (07)33629471 Fax: (07)33629440

(Ref:AS100078)

Date Sent : 13/01/10

Date Received: 13/01/10

Reason for Submission: referral

Accession No: 10-100925

Species : bird

Pathologist : G.J. Storie

Property No: WBXX5000

Owner : G Doncon

Animal Health Laboratories

Dept Of Agri & Food

BENTLEY

WA 6983

BIOCHEMISTRY

Quantitative Results :

Animal: 1		
brain	AChE	38.61 umol/min/g
Animal: 2		
brain	AChE	38.14 umol/min/g
Animal: 3		
brain	AChE	41.67 umol/min/g
Animal: 4		
brain	AChE	42.28 umol/min/g
Animal: 5		
brain	AChE	33.85 umol/min/g

Comment :

To interpret these results, we recommend the following references:

Results provided on samples as received. Responsibility for sampling and delivery rests with submitter.

Distribution

*** fax : (08)94741881 ***

SUBMITTER

FILE

RESULTS
REC'D AHL
14/1/10
MH

ENTERED SW
MH 14/1/10

Report of Examination

APL10/835
09E1107; 3.1.1
Jenny McGuire

Department of Agriculture and Food,
Animal Health Laboratories
Locked Bag 4
Bentley Delivery Service WA 6983

Attention : Grant Doncon

Report On:
6 samples received on 13/01/2010

CCWA ID	Material	Client Description
09E1107 / 001	liver	AS-10-0078/1
09E1107 / 002	liver	AS-10-0078/2
09E1107 / 003	liver	AS-10-0078/3
09E1107 / 004	liver	AS-10-0078/4
09E1107 / 005	liver	AS-10-0078/5
09E1107 / 006	liver	AS-10-0078/21

CCWA ID	09E1107/001	09E1107/002	09E1107/003	09E1107/004
Client ID	AS-10-0078/1	AS-10-0078/2	AS-10-0078/3	AS-10-0078/4
Sampled				
Analyte	Unit			
Al	mg/kg	<2	<2	<2
As	mg/kg	<0.01	<0.01	<0.01
Cd	mg/kg	0.40	0.040	0.15
Co	mg/kg	0.005	0.005	0.011
Cr	mg/kg	<0.2	<0.2	<0.2
Cu	mg/kg	3.2	3.0	3.0
Hg	mg/kg	<0.01	<0.01	<0.01
Mn	mg/kg	2.5	4.8	2.5
Mo	mg/kg	0.29	0.30	0.25
Ni	mg/kg	<0.01	<0.01	<0.01
Pb	mg/kg	0.005	<0.005	0.006
Se	mg/kg	0.93	1.1	1.1
U	mg/kg	<0.001	<0.001	<0.001
V	mg/kg	<0.1	<0.1	<0.1
Zn	mg/kg	23	20	19



**Chemistry Centre of Western Australia
Environmental Chemistry Section**

Report of Examination

CCWA ID	09E1107/005	09E1107/006
Client ID	AS-10-0078/5	AS-10-0078/21
Sampled		

Analyte	Unit		
Al	mg/kg	2	<2
As	mg/kg	<0.01	<0.01
Cd	mg/kg	0.033	0.061
Co	mg/kg	0.006	0.009
Cr	mg/kg	<0.2	<0.2
Cu	mg/kg	2.7	3.6
Hg	mg/kg	<0.01	<0.01
Mn	mg/kg	3.5	3.1
Mo	mg/kg	0.31	0.38
Ni	mg/kg	<0.01	<0.01
Pb	mg/kg	<0.005	<0.005
Se	mg/kg	1.1	0.81
U	mg/kg	<0.001	<0.001
V	mg/kg	<0.1	<0.1
Zn	mg/kg	22	32

Analyte	Method	Description
Al	iMET1BTICP	Aluminium, as recd.
As	iMET1BTMS	Arsenic, total as recd.
Cd	iMET1BTMS	Cadmium, as recd.
Co	iMET1BTMS	Cobalt, as recd.
Cr	iMET1BTICP	Chromium, as recd.
Cu	iMET1BTICP	Copper, as recd.
Hg	iMET1BTMS	Mercury total, as recd.
Mn	iMET1BTICP	Manganese, as recd.
Mo	iMET1BTMS	Molybdenum, as recd.
Ni	iMET1BTMS	Nickel, as recd.
Pb	iMET1BTMS	Lead, as recd.
Se	iMET1BTMS	Selenium, as recd.
U	iMET1BTMS	Uranium, as recd.
V	iMET1BTICP	Vanadium, as recd.
Zn	iMET1BTICP	Zinc, as recd.

**Chemistry Centre of Western Australia
Environmental Chemistry Section
Report of Examination**

The OC/OP pesticides will be reported separately.

These results apply only to the sample(s) as received. Unless arrangements are made to the contrary, these samples will be disposed of after 30 days of the issue of this report.

This report may only be reproduced in full.



**Jenny McGuire
Science Business Manager
Environmental Chemistry Section**

19/01/2010

ChemCentre ID	Method Code	Units	Limit of Reporting	09E1107/001	09E1107/002	09E1107/003	09E1107/004	09E1107/005	09E1107/006
Client ID				AS-10-0078/1	AS-10-0078/2	AS-10-0078/3	AS-10-0078/4	AS-10-0078/5	AS-10-0078/21
Sampled									
Al	IMET1BTICP	mg/kg	2	<2	<2	<2	<2	2	<2
As	IMET1BTMS	mg/kg	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cd	IMET1BTMS	mg/kg	0.001	0.4	0.04	0.04	0.15	0.033	0.061
Co	IMET1BTMS	mg/kg	0.001	0.005	0.005	0.005	0.011	0.006	0.009
Cr	IMET1BTICP	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Cu	IMET1BTICP	mg/kg	0.01	3.2	3	3.1	3	2.7	3.6
Hg	IMET1BTMS	mg/kg	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mn	IMET1BTICP	mg/kg	0.05	2.5	4.8	2.6	2.5	3.5	3.1
Mo	IMET1BTMS	mg/kg	0.01	0.29	0.3	0.34	0.25	0.31	0.38
Ni	IMET1BTMS	mg/kg	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pb	IMET1BTMS	mg/kg	0.005	0.005	<0.005	<0.005	0.006	<0.005	<0.005
Se	IMET1BTMS	mg/kg	0.001	0.93	1.1	1.1	1.1	1.1	0.81
U	IMET1BTMS	mg/kg	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
V	IMET1BTICP	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zn	IMET1BTICP	mg/kg	1	23	20	25	19	22	32

09EH0293
P Taylor
9422 9915

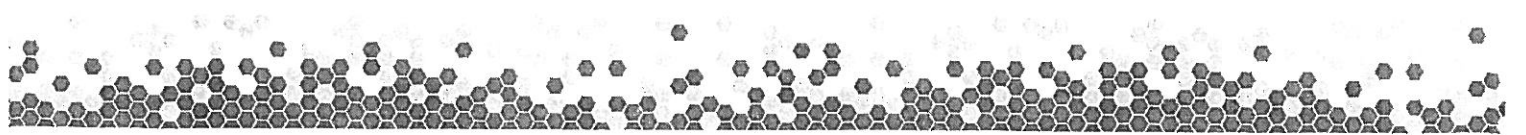
Grant Doncon
Animal Health Laboratories
Department of Agriculture and Food
Locked Bag 4
Bentley Delivery Service
WA 6983

ATTENTION: Grant Doncon

REPORT OF EXAMINATION OF: 6 crop contents
RECEIVED FROM: Animal Health Laboratories
ON: 13th January 2010

RESULTS

Organophosphorous Pesticides			
Lab No	09EH0293-1	09EH0293-2	09EH0293-3
Sample ID	AS-10-0078 -1 # 35	AS-10-0078 -2 # 36	S-10-0078 -3 # 37
Analyte	mg/kg	mg/kg	mg/kg
Dichlorvos	<0.010	<0.010	<0.013
Methidathion	<0.010	<0.010	<0.013
Ethyl Parathion	<0.010	<0.010	<0.013
Malathion	<0.010	<0.010	<0.013
Chlorpyrifos	<0.010	<0.010	<0.013
Demeton-S-methyl	<0.010	<0.010	<0.013
Diazinon	<0.010	<0.010	<0.013
Dimethoate	<0.010	<0.010	<0.013
Fenamiphos	<0.010	<0.010	<0.013
Fenitrothion	<0.010	<0.010	<0.013
Mevinphos	<0.010	<0.010	<0.013
Phorate	<0.010	<0.010	<0.013
Fenthion	<0.010	<0.010	<0.013



Organophosphorous Pesticides			
Lab No	09EH0293-4	09EH0293-5	09EH0293-6
Sample ID	AS-10-0078 -4 # 38	AS-10-0078 -5 # 39	AS-10-0078 - 21 # 45
Analyte	mg/kg	mg/kg	mg/kg
Dichlorvos	<0.011	<0.018	<0.010
Methidathion	<0.011	<0.018	<0.010
Ethyl Parathion	<0.011	<0.018	<0.010
Malathion	<0.011	<0.018	<0.010
Chlorpyrifos	<0.011	<0.018	<0.010
Demeton-S-methyl	<0.011	<0.018	<0.010
Diazinon	<0.011	<0.018	<0.010
Dimethoate	<0.011	<0.018	<0.010
Fenamiphos	<0.011	<0.018	<0.010
Fenitrothion	<0.011	<0.018	<0.010
Mevinphos	<0.011	<0.018	<0.010
Phorate	<0.011	<0.018	<0.010
Fenthion	<0.011	<0.018	<0.010

Organochlorines Pesticides			
Lab No	09EH0293-1	09EH0293-2	09EH0293-3
Sample ID	AS-10-0078 - 1 # 35	AS-10-0078 -2 # 36	S-10-0078 -3 # 37
Analyte	mg/kg	mg/kg	mg/kg
Hexachlorobenzene	<0.0041	<0.0040	<0.0051
Lindane	<0.0041	<0.0040	<0.0051
Heptachlor	<0.0041	<0.0040	<0.0051
Aldrin	<0.0041	<0.0040	<0.0051
Heptachlor epoxide	<0.0041	<0.0040	<0.0051
trans-Chlordane	<0.0041	<0.0040	<0.0051
cis-Chlordane	<0.0041	<0.0040	<0.0051
a-Endosulfan	<0.0041	<0.0040	<0.0051
p,p-DDE	<0.0041	<0.0040	<0.0051
p,p DDT	<0.010	<0.010	<0.013
Dieldrin	<0.0041	<0.0040	<0.0051
Endrin	<0.0041	<0.0040	<0.0051
p,p-DDD	<0.0041	<0.0040	<0.0051
b-Endosulfan	<0.0041	<0.0040	<0.0051
Endosulfan Sulfate	<0.0041	<0.0040	<0.0051

Organochlorines Pesticides			
Lab No	09EH0293-4	09EH0293-5	09EH0293-6
Sample ID	AS-10-0078 - 4 # 38	AS-10-0078 -5 # 39	AS-10-0078 - 21 # 45
Analyte	mg/kg	mg/kg	mg/kg
Hexachlorobenzene	<0.0043	<0.0073	<0.0040
Lindane	<0.0043	<0.0073	<0.0040
Heptachlor	<0.0043	<0.0073	<0.0040
Aldrin	<0.0043	<0.0073	<0.0040
Heptachlor epoxide	<0.0043	<0.0073	<0.0040
trans-Chlordane	<0.0043	<0.0073	<0.0040
cis-Chlordane	<0.0043	<0.0073	<0.0040
a-Endosulfan	<0.0043	<0.0073	<0.0040
p,p-DDE	<0.0043	<0.0073	<0.0040
p,p DDT	<0.011	<0.018	<0.010
Dieldrin	<0.0043	<0.0073	<0.0040
Endrin	<0.0043	<0.0073	<0.0040
p,p-DDD	<0.0043	<0.0073	<0.0040
b-Endosulfan	<0.0043	<0.0073	<0.0040
Endosulfan Sulfate	<0.0043	<0.0073	<0.0040

METHOD: OC/OPs in Meat(Avian) & Grain

Samples were dispersed in hydromatrix extracted with ethyl acetate, cleaned up by SPE and analysed by GC-FPD and GC-ECD.

These results apply only to the sample(s) as received.

Unless requested otherwise, sample(s) will be disposed of after 60 days of the issue of this report.

Dr Peter Taylor
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19th January 2009

