RECAP Ecological Checklist

Appendix A

April 21, 2017
Project No. 0399871

Environmental Resources Management
CityCentre Four
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024
281-600-1000

RECAP FORM 18
ECOLOGICAL CHECKLIST

Section 1 - Facility Information

1. Name of facility: **Guidry Property**

2. Location of facility: **Along Highway 94, 1.5 miles east of the Lafayatte/St. Martin Parish Boundary**

   Parish: **St. Martin**

3. Mailing address: **Not Applicable**

4. Type of facility and/or operations associated with AOC: **Historical pasture land and oil field production (Anse La Butte Dome Field).**

5. Name of AOC or AOI: **Not Applicable**

6. If available, attach a USGS topographic map of the facility and/or aerial or other photographs of the release site and surrounding areas. **(See Figures 1 and 2).**

Section 2 - Land Use Information

1. Describe land use at and in the vicinity of the AOC/AOI: **The subject property was previously classified as Grass/Pasture, however, its current habitat type is largely upland scrub/woody habitat with maintained rights-of-way interspersed.**

2. Describe land use adjacent to the facility: **The site is currently surrounded by "Developed/Open Space", "Developed/Low Intensity", "Grass/Pasture", and "Woody Wetlands" habitat (Figure 3). Limited commercial development is within the vicinity of the site. Limited residential with some commercial development, open pastures and woody areas are located in the vicinity of the site.**

3. Provide the following information regarding the nearest surface water body which has been impacted or has the potential to be impacted by COC migrating from the AOC/AOC:

a) Name of the surface water body: **Not Applicable**

b) Type of surface water body:

   [ ] freshwater river or stream
   [ ] freshwater swamp/marsh/wetland
   [ ] saltwater or brackish swamp/marsh/wetland
   [ ] lake or pond
   [ ] bayou or estuary
   [x] drainage ditch
   [ ] other: _____

c) Designated use of the segment/subsegment of the surface water body (LAC 33:IX): **Not Applicable**

d) Distance from the AOC/AOI to nearest surface water body: **The Vermillion River is approximately ¾ of a mile from the site (at its nearest point) (Figure 4).**

4. Do any potentially sensitive environmental areas exist adjacent to or in proximity to the site, e.g., federal and state parks, national and state monuments, wetlands, etc? [**x**] Yes [ ] No

If yes, explain: **Bottomland hardwood wetlands east of the site (Figure 4).**

Section 3 - Release Information

1. Nature of the release: **Historical Oil Field Production Operations**

2. Location of the release (within the facility): **Unknown**

3. Location of the release with respect to the facility property boundaries: **Unknown**

4. Constituents known or suspected have been released: **Based on analytical data, it appears that the following constituents are present:**

5. Indicate which media are known or suspected to be impacted and if sampling data are available:

[**x**]	soil 0 - 3 feet bgs	[**X**] yes [ ] no
[ ]	soil 0 - 15 feet bgs	[ ] yes [ ] no
[ ]	soil >15 feet bgs	[ ] yes [ ] no
[ ]	groundwater	[ ] yes [ ] no
[ ]	surface water/sediment	[ ] yes [ ] no

6. Has migration occurred outside the facility property boundaries? [ ] yes [**X**] no

If yes, describe the designated use of the offsite land impacted:
_____

Section 4 - Criteria for Further Assessment

If the AOI meets **all** of the criteria presented below, then typically no further ecological evaluation shall be required. If the AOI **does not** meet **all** of the criteria, then a screening level ecological risk shall be conducted. The Submitter should make the initial decision regarding whether or not a screening level ecological risk assessment is warranted based on compliance of the AOI with criteria listed below. After review of the ecological checklist and other available site information, the Department will make a final determination on the need for a screening level ecological risk assessment. If site conditions at the AOI change such that one or more of the criteria are not met, then a screening level ecological risk assessment shall be conducted. Answers shall be based on current site conditions (i.e., shall not consider future remedial actions or institutional or engineering controls).

Indicate if the AOI meets the following criteria:

(1) The area of impacted soil is approximately 5 acres or less in size (based on the AOI identified for the human health assessment) and it is not expected that the COC will migrate such that the soil AOI becomes greater than 5 acres in size. [ ] yes [**X**] no

(2) There is no current release or demonstrable long-term threat of release (via runoff or groundwater discharge) of COC from the AOI to a surface water body. [ ] yes [**X**] no

(3) Recreational species, commercial species, threatened or endangered species, and/or their habitats are not currently being exposed, or expected to be exposed, to COC present at or migrating from the AOI.
[ ] yes [**X**] no

(4) There are no obvious impacts to ecological receptors or their habitats and none are expected in the future.

[**X**] yes [ ] no

Is further ecological evaluation required at this AOI? [**X**] yes [ ] no
This determination is subject to Department concurrence.

Section 5 - Site Summary

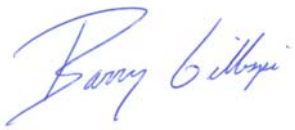
The ecological checklist submittal shall include a site summary that presents sufficient information to verify that the AOI meets or does not meet the criteria for further assessment.

Section 6 - Submitter Information

Date: **April 10, 2017**

Name of person submitting this checklist: **Dr. W. Barry Gillespie, Jr., Ph.D.**

Affiliation: **Environmental Resources Management (ERM)**

Signature:  Date: April 20, 2017

Additional Preparers: **Not Applicable**

Site Photographs

Appendix B

April 21, 2017
Project No. 0399871

Environmental Resources Management
CityCentre Four
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APPENDIX B

Site Photographs

Guidry Property
St. Martin Parish, Louisiana

Photograph #1. Representative overstory at the Guidry property. Largely dominated by *Triadica sebifera* (Chinese tallow).

Photograph #2. *Duchesnea indica* (Mock Strawberry) illustrating understory vegetation present in various parts of the site.

Photograph #3. *Rubus* (sp.) scattered throughout the understory.

Photograph #4. Illustration of diversity of understory and developing hardwood vegetation at the site.

Photograph #5. Various birds were observed utilizing the overstory and understory as foraging habitat.

Photograph #6. *Procambarus clarkii* (Crawfish) chimneys located predominately within the main ditches traversing the site and low lying areas of the maintained rights-of-way.

Photograph #7. *Procyon sp*. (Raccoon) track in the drainage ditch exiting the Guidry property.

Photograph #8. *Dasypus sp.* (Armadillo) burrow. Several different burrows were observed around the site.

Threatened and Endangered Species

Appendix C

April 21, 2017
Project No. 0399871

Environmental Resources Management
CityCentre Four
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024
281-600-1000

APPENDIX C
TABLE 1

Summary of Threatened and Endangered Species in St. Martin Parish, Louisiana

Guidry Property
St. Martin Parish, Louisiana

Group	Common Name	Scientific Name	State Status	Federal Status	Habitat
Bird	Bald Eagle	*Haliaeetus leucocephalus*	Endangered	Delisted	Nests primarily in the tops of cypress trees near open water; Feeds in open lakes
Fish	Pallid Sturgeon	*Scaphirhynchus albus*	Endangered	Endangered	Large rivers in southeast U.S.; Prefers main channels of excessively turbid rivers in areas with strong currents over firm sandy bottom
Mammal	Louisiana Black Bear	Ursus americanus luteolus	Threatened	Recovery	Primarily restricted to large tracts of heavily wooded bottomland hardwoods and swamps; Dens in large tree cavities, slash piles, thickets, or thick vegetation during the winter

Sources:

Louisiana Department of Wildlife and Fisheries (LDWF), 2017. Species by Parish List. Retrieved from: https://ecos.fws.gov/ecp0/reports/species-by-current-range-county?fips=22099

United States Fish & Wildlife Service (USFWS), 2017. Species by County Report. Retrieved from: https://ecos.fws.gov/ecp0/reports/species-by-current-range-county?fips=22099

Louisiana Natural Heritage Program

- Louisiana Natural Heritage Program
- Explanation of Endangered Species Rankings
- How to Request Data
- Natural Areas Registry Program
- Natural Communities
- Natural Heritage Program Staff
- Rare Animal Species
- Rare Plant Species
- Species by Parish List

Wildlife

- Alligator Program
- Black Bear Program
- Forestry Program
- Land Management Assistance
- Louisiana Natural Heritage Program
- Nutria Control Program
- Prescribed Fire
- Statewide Environmental Investigations
- Urban and Nuisance Wildlife
- Wildlife Action Plan
- Natural Areas Registry
- Scenic Rivers
- State Wildlife Grant Programs
- Wildlife Rehabilitators

Species by Parish List

Explanation of Ranking Categories Employed by Natural Heritage Programs Nationwide

Federal Ranks (USESA FIELD):

Global Element Ranks:

State Element Ranks:

State Protection Status:

State status are contained in Title 56 of the Louisiana Revised Statutes as well as relevant rules and regulations adopted by the Louisiana Wildlife and Fisheries Commission and the Secretary of the Department of Wildlife and Fisheries. The Secretary of the Department of Wildlife and Fisheries is authorized to implement additional restrictions in emergency situations in order to protect fish and wildlife resources.

- Endangered = Taking or harassment of these species is a violation of state and federal laws.
- Threatened = Taking or harassment of these species is a violation of state and federal laws.
- Threatened/Endangered = Taking or harassment of these species is a violation of state and federal laws.
- Prohibited = Possession of these species is prohibited. No legal harvest or possession.
- Restricted Harvest = There are restrictions regarding the taking and possession of these species.

Filter By Parish St. Martin | **Filter by Type** <Any> | Apply

Rare Plant Species

Scientific Name	Common Name	State Rank	Global Rank	State Status	Federal Status	Fact Sheet	Parishes
Carex decomposita	Cypress-knee Sedge	S3	G3			Carex decomposita	Bienville, Bossier, Caddo, Evangeline, Franklin, Grant, Iberia, Jackson, Lafayette, Lafourche, Ouachita, St. Martin, St. Mary, St. Tammany, Tensas
Ceratopteris pteridoides	Floating Antler-fern	S2	G5?			Ceratopteris pteridoides	Jefferson, Lafourche, St. Charles, St. John the Baptist, St. Martin, St. Mary, Terrebonne
Didiplis diandra	Water-purslane	S2?	G5				Acadia, Avoyelles, East Feliciana, Jackson, Lafayette, Natchitoches,

Scientific Name	Common Name	State Rank	Global Rank	State Status	Federal Status	Fact Sheet	Parishes
							St. Helena, St. Landry, St. Martin, Vermilion
Platythelys querceticola	Low Erythrodes	S1	G3G5				East Baton Rouge, East Feliciana, St. Martin, West Feliciana, Winn
Rudbeckia triloba	Three-lobed Coneflower	S3	G5			Rudbeckia triloba	Bossier, DeSoto, Iberia, Lafayette, Natchitoches, Sabine, St. Martin, Vermilion
Thalia dealbata	Powdery Thalia	S2S3	G4			Thalia dealbata	Acadia, Cameron, East Baton Rouge, East Feliciana, Iberia, Iberville, Jefferson Davis, Lafayette, Morehouse, St. Landry, St. Martin, Vermilion, Vernon
Tradescantia subaspera	Broad-leaved Spiderwort	S2	G5			Tradescantia subaspera	Acadia, Iberia, Lafayette, St. Landry, St. Martin, St. Mary

Natural Communities

Scientific Name	Common Name	State Rank	Global Rank	State Status	Federal Status	Fact Sheet	Parishes
Cypress-Tupelo Swamp		S4	G3G5				Ascension, Assumption, Bossier, East Baton Rouge, Franklin, Iberia, Iberville, Livingston, Natchitoches, Pointe Coupee, Rapides, St. Charles, St. James, St. John the Baptist, St. Landry, St. Martin, St. Mary, St. Tammany, Terrebonne, West Feliciana, Winn

Rare Animal Species

Scientific Name	Common Name	State Rank	Global Rank	State Status	Federal Status	Fact Sheet	Parishes
Elanoides forficatus	American Swallow-tailed Kite	S1S2B	G5			Elanoides forficatus	Beauregard, Calcasieu, East Baton Rouge, Iberville, Pointe Coupee, St. Landry, St. Martin, St. Tammany, Tangipahoa, Washington
Fallicambarus macneesei	Old Prairie Crawfish	S2	G3				Acadia, Calcasieu, Jefferson Davis, Lafayette, St. Landry, St. Martin, Vermilion
Haliaeetus leucocephalus	Bald Eagle	S3	G5	E	Delisted	Haliaeetus leucocephalus	Ascension, Assumption, Avoyelles, Beauregard, Bossier, Caddo, Calcasieu, Claiborne, Concordia, DeSoto, East Baton Rouge, East Feliciana, Franklin, Iberia, Iberville, Jackson, Jefferson, Lafourche, LaSalle, Livingston, Morehouse, Natchitoches, Orleans, Ouachita, Plaquemines, Pointe Coupee, Rapides, Richland, Sabine, St. Bernard, St. Charles, St. James, St. John the Baptist, St. Landry, St. Martin, St. Mary, St. Tammany, Tangipahoa, Tensas, Terrebonne, Union, Vermilion, West Baton Rouge, West Feliciana
Pandion haliaetus	Osprey	S3	G5			Pandion haliaetus	Grant, Iberville, Lafourche, Natchitoches, Plaquemines, Rapides, St. John the

Scientific Name	Common Name	State Rank	Global Rank	State Status	Federal Status	Fact Sheet	Parishes
							Baptist, St. Martin, St. Tammany, Winn
Platalea ajaja	Roseate Spoonbill	S3	G5			Platalea ajaja	Calcasieu, Cameron, Evangeline, Iberia, Jefferson Davis, Lafourche, Plaquemines, St. Bernard, St. Martin, St. Mary, Terrebonne, Vermilion
Polyodon spathula	Paddlefish	S4	G4			Polyodon spathula	Acadia, Avoyelles, Caddo, Calcasieu, Cameron, Catahoula, Concordia, Evangeline, Franklin, Iberia, Jefferson Davis, LaSalle, Orleans, Ouachita, Rapides, Sabine, St. Bernard, St. Charles, St. John the Baptist, St. Martin, St. Mary, St. Tammany, Tangipahoa, Tensas, Union
Reithrodontomys humulis	Eastern Harvest Mouse	S3	G5				Acadia, Beauregard, Caddo, Calcasieu, East Baton Rouge, East Feliciana, Jefferson Davis, Lafayette, St. Landry, St. Martin, St. Tammany, Vermilion, Vernon, Washington
Scaphirhynchus albus	Pallid Sturgeon	S1	G2	E	E	Scaphirhynchus albus	Ascension, Avoyelles, Concordia, East Baton Rouge, East Carroll, East Feliciana, Iberia, Iberville, Jefferson,

Scientific Name	Common Name	State Rank	Global Rank	State Status	Federal Status	Fact Sheet	Parishes
							Madison, Orleans, Plaquemines, Pointe Coupee, St. Bernard, St. Charles, St. James, St. John the Baptist, St. Landry, St. Martin, St. Mary, Tensas, Terrebonne, West Baton Rouge, West Feliciana
Ursus americanus luteolus	Louisiana Black Bear	S3	G5T2	T	T	Ursus americanus luteolus	Avoyelles, Catahoula, Concordia, East Carroll, Franklin, Iberia, Iberville, Madison, Pointe Coupee, Richland, St. Landry, St. Martin, St. Mary, St. Tammany, Tensas, Vermilion, West Baton Rouge, West Carroll, West Feliciana

‹ Plant Tracking List and Fact Sheets up

1-800-256-2749 | (225) 765-2800 | Louisiana Department of Wildlife and Fisheries, P.O. Box 98000
2000 Quail Dr. Baton Rouge, Louisiana 70898

U.S. Fish & Wildlife Service

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ECOS Environmental Conservation Online System

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ECOS / Species Reports / Species By County Report

Species By County Report

The following report contains Species that are known to or are believed to occur in this county. Species with range unrefined past the state level are now excluded from this report. If you are looking for the Section 7 range (for Section 7 Consultations), please visit the IPaC application.

County: St. Martin, Louisiana

CSV

Need to contact a FWS field office about a species? Follow this link to find your local FWS Office.

Group	Name	Population	Status	Lead Office	Recovery Plan	Recovery Plan Action Status	F F S
Fishes	Pallid sturgeon (*Scaphirhynchus albus*)	Wherever found	Endangered	Missouri River Coordinator Office	Final Revised Recovery Plan for the Pallid Sturgeon (Scaphirhynchus albus)	Implementation Progress	F F 1
Mammals	Louisiana black bear (*Ursus americanus luteolus*)	Wherever found	Recovery	Louisiana Ecological Services Field Office	Louisiana Black Bear	Implementation Progress	F

Development of Ecological Exposure Point Concentrations

Appendix D

April 21, 2017
Project No. 0399871

Environmental Resources Management
CityCentre Four
840 West Sam Houston Parkway North, Suite 600
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281-600-1000

APPENDIX D
TABLE 1

Summary of 95% UCL on the Mean

Guidry Property
St. Martin Parish, Louisiana

Constituents	95% UCL on the Mean (mg/kg)	Dataset Distribution	UCL Method
Total Barium	988	Not Discerned	95% Chebyshev (Mean, Sd) UCL
True Total Barium	1676	Not Discerned	95% Chebyshev (Mean, Sd) UCL
Total Cadmium	0.384	Approximate Normal	95% KM (t) UCL
Total Chromium	15	Normal	95% Student's-t UCL
Total Lead	16.71	Not Discerned	95% Student's-t UCL
Total Mercury	4.297	Not Discerned	97.5% KM (Chebyshev) UCL
Total Strontium	41.75	Not Discerned	95% Student's-t UCL
Total Zinc	46.15	Approximate Gamma	95% Adjusted Gamma UCL

NOTES:

Results based on soil samples 0-2 and 2-4 feet below ground surface (GC-1 through GC-16, GH-4, GH-7, and SB-1 through SB-8). Results for split samples collected by ICON and HET were averaged prior to inclusion in the UCL calculations.

1	**UCL Statistics for Uncensored Full Data Sets**											
2												
3	User Selected Options											
4	Date/Time of Computation	4/3/2017 3:00:23 PM										
5	From File	ProUCL data.xls										
6	Full Precision	OFF										
7	Confidence Coefficient	95%										
8	Number of Bootstrap Operations	2000										
9												
10												
11	**Total Barium**											
12												
13	**General Statistics**											
14	Total Number of Observations			29			Number of Distinct Observations				29	
15							Number of Missing Observations				0	
16	Minimum			132			Mean				524.7	
17	Maximum			2576			Median				285.2	
18	SD			572.4			Std. Error of Mean				106.3	
19	Coefficient of Variation			1.091			Skewness				2.264	
20												
21	**Normal GOF Test**											
22	Shapiro Wilk Test Statistic			0.683			**Shapiro Wilk GOF Test**					
23	5% Shapiro Wilk Critical Value			0.926			Data Not Normal at 5% Significance Level					
24	Lilliefors Test Statistic			0.287			**Lilliefors GOF Test**					
25	5% Lilliefors Critical Value			0.165			Data Not Normal at 5% Significance Level					
26	**Data Not Normal at 5% Significance Level**											
27												
28	**Assuming Normal Distribution**											
29	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
30	95% Student's-t UCL			705.5			95% Adjusted-CLT UCL (Chen-1995)				747.3	
31							95% Modified-t UCL (Johnson-1978)				713	
32												
33	**Gamma GOF Test**											
34	A-D Test Statistic			1.78			**Anderson-Darling Gamma GOF Test**					
35	5% A-D Critical Value			0.764			Data Not Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic			0.243			**Kolmogrov-Smirnoff Gamma GOF Test**					
37	5% K-S Critical Value			0.166			Data Not Gamma Distributed at 5% Significance Level					
38	**Data Not Gamma Distributed at 5% Significance Level**											
39												
40	**Gamma Statistics**											
41	k hat (MLE)			1.441			k star (bias corrected MLE)				1.315	
42	Theta hat (MLE)			364.2			Theta star (bias corrected MLE)				399.2	
43	nu hat (MLE)			83.55			nu star (bias corrected)				76.24	
44	MLE Mean (bias corrected)			524.7			MLE Sd (bias corrected)				457.6	
45							Approximate Chi Square Value (0.05)				57.13	
46	Adjusted Level of Significance			0.0407			Adjusted Chi Square Value				56.14	
47												
48	**Assuming Gamma Distribution**											
49	95% Approximate Gamma UCL (use when n>=50))			700.3			95% Adjusted Gamma UCL (use when n<50)				712.6	
50												
51	**Lognormal GOF Test**											
52	Shapiro Wilk Test Statistic			0.901			**Shapiro Wilk Lognormal GOF Test**					
53	5% Shapiro Wilk Critical Value			0.926			Data Not Lognormal at 5% Significance Level					
54	Lilliefors Test Statistic			0.191			**Lilliefors Lognormal GOF Test**					

55	5% Lilliefors Critical Value					0.165	Data Not Lognormal at 5% Significance Level					
56	**Data Not Lognormal at 5% Significance Level**											
57												
58	**Lognormal Statistics**											
59	Minimum of Logged Data					4.883	Mean of logged Data					5.877
60	Maximum of Logged Data					7.854	SD of logged Data					0.822
61												
62	**Assuming Lognormal Distribution**											
63	95% H-UCL					710.7	90% Chebyshev (MVUE) UCL					742.8
64	95% Chebyshev (MVUE) UCL					856	97.5% Chebyshev (MVUE) UCL					1013
65	99% Chebyshev (MVUE) UCL					1322						
66												
67	**Nonparametric Distribution Free UCL Statistics**											
68	**Data do not follow a Discernible Distribution (0.05)**											
69												
70	**Nonparametric Distribution Free UCLs**											
71	95% CLT UCL					699.5	95% Jackknife UCL					705.5
72	95% Standard Bootstrap UCL					695.3	95% Bootstrap-t UCL					813.7
73	95% Hall's Bootstrap UCL					765.5	95% Percentile Bootstrap UCL					714.4
74	95% BCA Bootstrap UCL					771.5						
75	90% Chebyshev(Mean, Sd) UCL					843.6	95% Chebyshev(Mean, Sd) UCL					988
76	97.5% Chebyshev(Mean, Sd) UCL					1188	99% Chebyshev(Mean, Sd) UCL					1582
77												
78	**Suggested UCL to Use**											
79	95% Chebyshev (Mean, Sd) UCL					988						
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
83	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
84	For additional insight the user may want to consult a statistician.											
85												

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	4/3/2017 3:02:28 PM
From File	ProUCL data.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Total Cadmium

General Statistics

Total Number of Observations	29	Number of Distinct Observations	26
Number of Detects	16	Number of Non-Detects	13
Number of Distinct Detects	16	Number of Distinct Non-Detects	10
Minimum Detect	0.317	Minimum Non-Detect	0.309
Maximum Detect	0.525	Maximum Non-Detect	0.59
Variance Detects	0.00471	Percent Non-Detects	44.83%
Mean Detects	0.385	SD Detects	0.0686
Median Detects	0.373	CV Detects	0.178
Skewness Detects	1.046	Kurtosis Detects	0.102
Mean of Logged Detects	-0.967	SD of Logged Detects	0.168

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.851	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.887	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.207	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.222	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.362	Standard Error of Mean	0.0132
SD	0.063	95% KM (BCA) UCL	0.385
95% KM (t) UCL	0.384	95% KM (Percentile Bootstrap) UCL	0.384
95% KM (z) UCL	0.383	95% KM Bootstrap t UCL	0.389
90% KM Chebyshev UCL	0.401	95% KM Chebyshev UCL	0.419
97.5% KM Chebyshev UCL	0.444	99% KM Chebyshev UCL	0.493

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.781	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.736	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.187	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	36.54	k star (bias corrected MLE)	29.73
Theta hat (MLE)	0.0105	Theta star (bias corrected MLE)	0.013
nu hat (MLE)	1169	nu star (bias corrected)	951.3
MLE Mean (bias corrected)	0.385	MLE Sd (bias corrected)	0.0707

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	32.93	nu hat (KM)	1910
Approximate Chi Square Value (N/A, α)	1809	Adjusted Chi Square Value (N/A, β)	1804
95% Gamma Approximate KM-UCL (use when n>=50)	0.382	95% Gamma Adjusted KM-UCL (use when n<50)	0.383

56												
57	**Gamma ROS Statistics using Imputed Non-Detects**											
58	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
59	GROS may not be used when kstar of detected data is small such as < 0.1											
60	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
61	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
62					Minimum	0.249				Mean	0.344	
63					Maximum	0.525				Median	0.334	
64					SD	0.0764				CV	0.222	
65					k hat (MLE)	22.07				k star (bias corrected MLE)	19.81	
66					Theta hat (MLE)	0.0156				Theta star (bias corrected MLE)	0.0174	
67					nu hat (MLE)	1280				nu star (bias corrected)	1149	
68					MLE Mean (bias corrected)	0.344				MLE Sd (bias corrected)	0.0774	
69										Adjusted Level of Significance (β)	0.0407	
70					Approximate Chi Square Value (N/A, α)	1071				Adjusted Chi Square Value (N/A, β)	1067	
71					95% Gamma Approximate UCL (use when n>=50)	0.369				95% Gamma Adjusted UCL (use when n<50)	0.371	
72												
73	**Lognormal GOF Test on Detected Observations Only**											
74					Shapiro Wilk Test Statistic	0.879				**Shapiro Wilk GOF Test**		
75					5% Shapiro Wilk Critical Value	0.887				Detected Data Not Lognormal at 5% Significance Level		
76					Lilliefors Test Statistic	0.176				**Lilliefors GOF Test**		
77					5% Lilliefors Critical Value	0.222				Detected Data appear Lognormal at 5% Significance Level		
78	**Detected Data appear Approximate Lognormal at 5% Significance Level**											
79												
80	**Lognormal ROS Statistics Using Imputed Non-Detects**											
81					Mean in Original Scale	0.348				Mean in Log Scale	-1.075	
82					SD in Original Scale	0.072				SD in Log Scale	0.197	
83					95% t UCL (assumes normality of ROS data)	0.371				95% Percentile Bootstrap UCL	0.37	
84					95% BCA Bootstrap UCL	0.372				95% Bootstrap t UCL	0.373	
85					95% H-UCL (Log ROS)	0.371						
86												
87	**UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed**											
88					KM Mean (logged)	-1.031				95% H-UCL (KM -Log)	0.381	
89					KM SD (logged)	0.16				95% Critical H Value (KM-Log)	1.733	
90					KM Standard Error of Mean (logged)	0.0339						
91												
92	**DL/2 Statistics**											
93	**DL/2 Normal**									**DL/2 Log-Transformed**		
94					Mean in Original Scale	0.308				Mean in Log Scale	-1.243	
95					SD in Original Scale	0.108				SD in Log Scale	0.381	
96					95% t UCL (Assumes normality)	0.342				95% H-Stat UCL	0.355	
97	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
98												
99	**Nonparametric Distribution Free UCL Statistics**											
100	**Detected Data appear Approximate Normal Distributed at 5% Significance Level**											
101												
102	**Suggested UCL to Use**											
103					95% KM (t) UCL	0.384				95% KM (Percentile Bootstrap) UCL	0.384	
104												
105	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
106	Recommendations are based upon data size, data distribution, and skewness.											
107	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
108	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
109												

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	4/18/2017 1:18:33 PM
From File	ProUCL data.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Total Chromium

General Statistics

Total Number of Observations	29	Number of Distinct Observations	29
		Number of Missing Observations	0
Minimum	9.1	Mean	14.25
Maximum	18.92	Median	14.31
SD	2.379	Std. Error of Mean	0.442
Coefficient of Variation	0.167	Skewness	-0.157

Normal GOF Test

Shapiro Wilk Test Statistic	0.977	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.926	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.0998	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.165	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	15	95% Adjusted-CLT UCL (Chen-1995)	14.96
		95% Modified-t UCL (Johnson-1978)	15

Gamma GOF Test

A-D Test Statistic	0.352	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.744	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.102	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.162	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	35.2	k star (bias corrected MLE)	31.58
Theta hat (MLE)	0.405	Theta star (bias corrected MLE)	0.451
nu hat (MLE)	2042	nu star (bias corrected)	1832
MLE Mean (bias corrected)	14.25	MLE Sd (bias corrected)	2.535
		Approximate Chi Square Value (0.05)	1733
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	1728

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	15.06	95% Adjusted Gamma UCL (use when n<50)	15.1

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.954	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.926	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.115	**Lilliefors Lognormal GOF Test**

55	5% Lilliefors Critical Value					0.165	Data appear Lognormal at 5% Significance Level					
56	**Data appear Lognormal at 5% Significance Level**											
57												
58	**Lognormal Statistics**											
59	Minimum of Logged Data					2.208	Mean of logged Data					2.642
60	Maximum of Logged Data					2.94	SD of logged Data					0.175
61												
62	**Assuming Lognormal Distribution**											
63	95% H-UCL					15.11	90% Chebyshev (MVUE) UCL					15.65
64	95% Chebyshev (MVUE) UCL					16.29	97.5% Chebyshev (MVUE) UCL					17.16
65	99% Chebyshev (MVUE) UCL					18.89						
66												
67	**Nonparametric Distribution Free UCL Statistics**											
68	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
69												
70	**Nonparametric Distribution Free UCLs**											
71	95% CLT UCL					14.97	95% Jackknife UCL					15
72	95% Standard Bootstrap UCL					14.95	95% Bootstrap-t UCL					14.97
73	95% Hall's Bootstrap UCL					15.01	95% Percentile Bootstrap UCL					14.98
74	95% BCA Bootstrap UCL					14.94						
75	90% Chebyshev(Mean, Sd) UCL					15.57	95% Chebyshev(Mean, Sd) UCL					16.17
76	97.5% Chebyshev(Mean, Sd) UCL					17.01	99% Chebyshev(Mean, Sd) UCL					18.64
77												
78	**Suggested UCL to Use**											
79	95% Student's-t UCL					15						
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
83	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
84	For additional insight the user may want to consult a statistician.											
85												
86	**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
87	**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**											
88												

1	**UCL Statistics for Uncensored Full Data Sets**											
2												
3	User Selected Options											
4	Date/Time of Computation	4/3/2017 3:01:47 PM										
5	From File	ProUCL data.xls										
6	Full Precision	OFF										
7	Confidence Coefficient	95%										
8	Number of Bootstrap Operations	2000										
9												
10												
11	**Total Lead**											
12												
13	**General Statistics**											
14	Total Number of Observations	29			Number of Distinct Observations	29						
15					Number of Missing Observations	0						
16	Minimum	9.23			Mean	15.1						
17	Maximum	31.6			Median	13.03						
18	SD	5.096			Std. Error of Mean	0.946						
19	Coefficient of Variation	0.337			Skewness	2.047						
20												
21	**Normal GOF Test**											
22	Shapiro Wilk Test Statistic	0.762			**Shapiro Wilk GOF Test**							
23	5% Shapiro Wilk Critical Value	0.926			Data Not Normal at 5% Significance Level							
24	Lilliefors Test Statistic	0.232			**Lilliefors GOF Test**							
25	5% Lilliefors Critical Value	0.165			Data Not Normal at 5% Significance Level							
26	**Data Not Normal at 5% Significance Level**											
27												
28	**Assuming Normal Distribution**											
29	**95% Normal UCL**				**95% UCLs (Adjusted for Skewness)**							
30	95% Student's-t UCL	16.71			95% Adjusted-CLT UCL (Chen-1995)	17.04						
31					95% Modified-t UCL (Johnson-1978)	16.77						
32												
33	**Gamma GOF Test**											
34	A-D Test Statistic	1.724			**Anderson-Darling Gamma GOF Test**							
35	5% A-D Critical Value	0.745			Data Not Gamma Distributed at 5% Significance Level							
36	K-S Test Statistic	0.209			**Kolmogrov-Smirnoff Gamma GOF Test**							
37	5% K-S Critical Value	0.162			Data Not Gamma Distributed at 5% Significance Level							
38	**Data Not Gamma Distributed at 5% Significance Level**											
39												
40	**Gamma Statistics**											
41	k hat (MLE)	11.93			k star (bias corrected MLE)	10.72						
42	Theta hat (MLE)	1.266			Theta star (bias corrected MLE)	1.409						
43	nu hat (MLE)	692			nu star (bias corrected)	621.7						
44	MLE Mean (bias corrected)	15.1			MLE Sd (bias corrected)	4.612						
45					Approximate Chi Square Value (0.05)	564.9						
46	Adjusted Level of Significance	0.0407			Adjusted Chi Square Value	561.6						
47												
48	**Assuming Gamma Distribution**											
49	95% Approximate Gamma UCL (use when n>=50))	16.62			95% Adjusted Gamma UCL (use when n<50)	16.71						
50												
51	**Lognormal GOF Test**											
52	Shapiro Wilk Test Statistic	0.874			**Shapiro Wilk Lognormal GOF Test**							
53	5% Shapiro Wilk Critical Value	0.926			Data Not Lognormal at 5% Significance Level							
54	Lilliefors Test Statistic	0.195			**Lilliefors Lognormal GOF Test**							

	A	B	C	D	E	F	G	H	I	J	K	L
55	5% Lilliefors Critical Value					0.165	Data Not Lognormal at 5% Significance Level					
56	**Data Not Lognormal at 5% Significance Level**											
57												
58	**Lognormal Statistics**											
59	Minimum of Logged Data					2.222	Mean of logged Data					2.672
60	Maximum of Logged Data					3.453	SD of logged Data					0.28
61												
62	**Assuming Lognormal Distribution**											
63	95% H-UCL					16.55	90% Chebyshev (MVUE) UCL					17.41
64	95% Chebyshev (MVUE) UCL					18.48	97.5% Chebyshev (MVUE) UCL					19.98
65	99% Chebyshev (MVUE) UCL					22.91						
66												
67	**Nonparametric Distribution Free UCL Statistics**											
68	**Data do not follow a Discernible Distribution (0.05)**											
69												
70	**Nonparametric Distribution Free UCLs**											
71	95% CLT UCL					16.66	95% Jackknife UCL					16.71
72	95% Standard Bootstrap UCL					16.68	95% Bootstrap-t UCL					17.47
73	95% Hall's Bootstrap UCL					17.7	95% Percentile Bootstrap UCL					16.72
74	95% BCA Bootstrap UCL					16.92						
75	90% Chebyshev(Mean, Sd) UCL					17.94	95% Chebyshev(Mean, Sd) UCL					19.22
76	97.5% Chebyshev(Mean, Sd) UCL					21.01	99% Chebyshev(Mean, Sd) UCL					24.51
77												
78	**Suggested UCL to Use**											
79	95% Student's-t UCL					16.71	or 95% Modified-t UCL					16.77
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
83	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
84	For additional insight the user may want to consult a statistician.											
85												

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	4/3/2017 3:03:10 PM
From File	ProUCL data.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Total Mercury

General Statistics

Total Number of Observations	29	Number of Distinct Observations	25
Number of Detects	24	Number of Non-Detects	5
Number of Distinct Detects	24	Number of Distinct Non-Detects	1
Minimum Detect	0.0684	Minimum Non-Detect	0.1
Maximum Detect	16.38	Maximum Non-Detect	0.1
Variance Detects	11.07	Percent Non-Detects	17.24%
Mean Detects	0.911	SD Detects	3.327
Median Detects	0.0911	CV Detects	3.651
Skewness Detects	4.757	Kurtosis Detects	22.96
Mean of Logged Detects	-1.841	SD of Logged Detects	1.31

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.272	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.916	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.456	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.181	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.767	Standard Error of Mean	0.565
SD	2.979	95% KM (BCA) UCL	1.883
95% KM (t) UCL	1.729	95% KM (Percentile Bootstrap) UCL	1.879
95% KM (z) UCL	1.697	95% KM Bootstrap t UCL	20
90% KM Chebyshev UCL	2.463	95% KM Chebyshev UCL	3.231
97.5% KM Chebyshev UCL	4.297	99% KM Chebyshev UCL	6.39

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	5.211	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.833	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.372	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.191	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.38	k star (bias corrected MLE)	0.36
Theta hat (MLE)	2.401	Theta star (bias corrected MLE)	2.532
nu hat (MLE)	18.22	nu star (bias corrected)	17.28
MLE Mean (bias corrected)	0.911	MLE Sd (bias corrected)	1.519

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.0663	nu hat (KM)	3.847
Approximate Chi Square Value (3.85, α)	0.662	Adjusted Chi Square Value (3.85, β)	0.591

55	95% Gamma Approximate KM-UCL (use when n>=50)					4.457	95% Gamma Adjusted KM-UCL (use when n<50)					4.993
56	Gamma (KM) may not be used when k hat (KM) is < 0.1											
57												
58	**Gamma ROS Statistics using Imputed Non-Detects**											
59	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
60	GROS may not be used when kstar of detected data is small such as < 0.1											
61	For such situations, GROS method tends to yield inflated values of UCLs and BTVs											
62	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
63	Minimum					0.01	Mean					0.756
64	Maximum					16.38	Median					0.0791
65	SD					3.035	CV					4.015
66	k hat (MLE)					0.333	k star (bias corrected MLE)					0.321
67	Theta hat (MLE)					2.272	Theta star (bias corrected MLE)					2.353
68	nu hat (MLE)					19.3	nu star (bias corrected)					18.63
69	MLE Mean (bias corrected)					0.756	MLE Sd (bias corrected)					1.334
70							Adjusted Level of Significance (β)					0.0407
71	Approximate Chi Square Value (18.63, α)					9.85	Adjusted Chi Square Value (18.63, β)					9.469
72	95% Gamma Approximate UCL (use when n>=50)					1.43	95% Gamma Adjusted UCL (use when n<50)					1.487
73												
74	**Lognormal GOF Test on Detected Observations Only**											
75	Shapiro Wilk Test Statistic					0.669	**Shapiro Wilk GOF Test**					
76	5% Shapiro Wilk Critical Value					0.916	Detected Data Not Lognormal at 5% Significance Level					
77	Lilliefors Test Statistic					0.281	**Lilliefors GOF Test**					
78	5% Lilliefors Critical Value					0.181	Detected Data Not Lognormal at 5% Significance Level					
79	**Detected Data Not Lognormal at 5% Significance Level**											
80												
81	**Lognormal ROS Statistics Using Imputed Non-Detects**											
82	Mean in Original Scale					0.769	Mean in Log Scale					-1.969
83	SD in Original Scale					3.032	SD in Log Scale					1.239
84	95% t UCL (assumes normality of ROS data)					1.726	95% Percentile Bootstrap UCL					1.844
85	95% BCA Bootstrap UCL					2.533	95% Bootstrap t UCL					19.96
86	95% H-UCL (Log ROS)					0.576						
87												
88	**DL/2 Statistics**											
89	**DL/2 Normal**						**DL/2 Log-Transformed**					
90	Mean in Original Scale					0.763	Mean in Log Scale					-2.04
91	SD in Original Scale					3.033	SD in Log Scale					1.267
92	95% t UCL (Assumes normality)					1.721	95% H-Stat UCL					0.569
93	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
94												
95	**Nonparametric Distribution Free UCL Statistics**											
96	**Data do not follow a Discernible Distribution at 5% Significance Level**											
97												
98	**Suggested UCL to Use**											
99	97.5% KM (Chebyshev) UCL					4.297						
100												
101	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
102	Recommendations are based upon data size, data distribution, and skewness.											
103	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
104	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
105												

	A	B	C	D	E	F	G	H	I	J	K	L
1	**UCL Statistics for Uncensored Full Data Sets**											
2												
3	User Selected Options											
4	Date/Time of Computation			4/7/2017 12:16:52 PM								
5	From File			ProUCL data.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10												
11	**Total Strontium**											
12												
13	**General Statistics**											
14	Total Number of Observations					29	Number of Distinct Observations					28
15							Number of Missing Observations					0
16	Minimum					13.57	Mean					33.69
17	Maximum					142.3	Median					26.49
18	SD					25.51	Std. Error of Mean					4.736
19	Coefficient of Variation					0.757	Skewness					3.385
20												
21	**Normal GOF Test**											
22	Shapiro Wilk Test Statistic					0.57	**Shapiro Wilk GOF Test**					
23	5% Shapiro Wilk Critical Value					0.926	Data Not Normal at 5% Significance Level					
24	Lilliefors Test Statistic					0.328	**Lilliefors GOF Test**					
25	5% Lilliefors Critical Value					0.165	Data Not Normal at 5% Significance Level					
26	**Data Not Normal at 5% Significance Level**											
27												
28	**Assuming Normal Distribution**											
29	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
30	95% Student's-t UCL					41.75	95% Adjusted-CLT UCL (Chen-1995)					44.66
31							95% Modified-t UCL (Johnson-1978)					42.25
32												
33	**Gamma GOF Test**											
34	A-D Test Statistic					2.408	**Anderson-Darling Gamma GOF Test**					
35	5% A-D Critical Value					0.751	Data Not Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic					0.246	**Kolmogrov-Smirnoff Gamma GOF Test**					
37	5% K-S Critical Value					0.164	Data Not Gamma Distributed at 5% Significance Level					
38	**Data Not Gamma Distributed at 5% Significance Level**											
39												
40	**Gamma Statistics**											
41	k hat (MLE)					3.632	k star (bias corrected MLE)					3.28
42	Theta hat (MLE)					9.276	Theta star (bias corrected MLE)					10.27
43	nu hat (MLE)					210.7	nu star (bias corrected)					190.2
44	MLE Mean (bias corrected)					33.69	MLE Sd (bias corrected)					18.61
45							Approximate Chi Square Value (0.05)					159.3
46	Adjusted Level of Significance					0.0407	Adjusted Chi Square Value					157.6
47												
48	**Assuming Gamma Distribution**											
49	95% Approximate Gamma UCL (use when n>=50))					40.23	95% Adjusted Gamma UCL (use when n<50)					40.66
50												
51	**Lognormal GOF Test**											
52	Shapiro Wilk Test Statistic					0.844	**Shapiro Wilk Lognormal GOF Test**					
53	5% Shapiro Wilk Critical Value					0.926	Data Not Lognormal at 5% Significance Level					
54	Lilliefors Test Statistic					0.194	**Lilliefors Lognormal GOF Test**					

55	5% Lilliefors Critical Value					0.165	Data Not Lognormal at 5% Significance Level					
56	**Data Not Lognormal at 5% Significance Level**											
57												
58	**Lognormal Statistics**											
59	Minimum of Logged Data					2.608	Mean of logged Data					3.373
60	Maximum of Logged Data					4.958	SD of logged Data					0.475
61												
62	**Assuming Lognormal Distribution**											
63	95% H-UCL					38.82	90% Chebyshev (MVUE) UCL					41.46
64	95% Chebyshev (MVUE) UCL					45.51	97.5% Chebyshev (MVUE) UCL					51.14
65	99% Chebyshev (MVUE) UCL					62.18						
66												
67	**Nonparametric Distribution Free UCL Statistics**											
68	**Data do not follow a Discernible Distribution (0.05)**											
69												
70	**Nonparametric Distribution Free UCLs**											
71	95% CLT UCL					41.48	95% Jackknife UCL					41.75
72	95% Standard Bootstrap UCL					41.48	95% Bootstrap-t UCL					55.35
73	95% Hall's Bootstrap UCL					78.37	95% Percentile Bootstrap UCL					42.13
74	95% BCA Bootstrap UCL					46.34						
75	90% Chebyshev(Mean, Sd) UCL					47.9	95% Chebyshev(Mean, Sd) UCL					54.34
76	97.5% Chebyshev(Mean, Sd) UCL					63.27	99% Chebyshev(Mean, Sd) UCL					80.82
77												
78	**Suggested UCL to Use**											
79	95% Student's-t UCL					41.75	or 95% Modified-t UCL					42.25
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
83	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
84	For additional insight the user may want to consult a statistician.											
85												

UCL Statistics for Uncensored Full Data Sets		
User Selected Options		
Date/Time of Computation	4/18/2017 1:19:22 PM	
From File	ProUCL data.xls	
Full Precision	OFF	
Confidence Coefficient	95%	
Number of Bootstrap Operations	2000	

Total Zinc

General Statistics

Total Number of Observations	29	Number of Distinct Observations	29
		Number of Missing Observations	0
Minimum	20.36	Mean	42.36
Maximum	71.48	Median	42.77
SD	10.63	Std. Error of Mean	1.974
Coefficient of Variation	0.251	Skewness	0.792

Normal GOF Test

Shapiro Wilk Test Statistic	0.913	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.926	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.177	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.165	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	45.72	95% Adjusted-CLT UCL (Chen-1995)	45.92
		95% Modified-t UCL (Johnson-1978)	45.76

Gamma GOF Test

A-D Test Statistic	0.842	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.745	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.151	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.162	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	16.58	k star (bias corrected MLE)	14.89
Theta hat (MLE)	2.554	Theta star (bias corrected MLE)	2.845
nu hat (MLE)	961.8	nu star (bias corrected)	863.6
MLE Mean (bias corrected)	42.36	MLE Sd (bias corrected)	10.98
		Approximate Chi Square Value (0.05)	796.4
Adjusted Level of Significance	0.0407	Adjusted Chi Square Value	792.6

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	45.93	95% Adjusted Gamma UCL (use when n<50)	46.15

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.934	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.926	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.167	**Lilliefors Lognormal GOF Test**

55	5% Lilliefors Critical Value					0.165	Data Not Lognormal at 5% Significance Level					
56	**Data appear Approximate Lognormal at 5% Significance Level**											
57												
58	**Lognormal Statistics**											
59	Minimum of Logged Data					3.014	Mean of logged Data					3.716
60	Maximum of Logged Data					4.269	SD of logged Data					0.255
61												
62	**Assuming Lognormal Distribution**											
63	95% H-UCL					46.24	90% Chebyshev (MVUE) UCL					48.48
64	95% Chebyshev (MVUE) UCL					51.23	97.5% Chebyshev (MVUE) UCL					55.06
65	99% Chebyshev (MVUE) UCL					62.57						
66												
67	**Nonparametric Distribution Free UCL Statistics**											
68	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
69												
70	**Nonparametric Distribution Free UCLs**											
71	95% CLT UCL					45.61	95% Jackknife UCL					45.72
72	95% Standard Bootstrap UCL					45.65	95% Bootstrap-t UCL					46.18
73	95% Hall's Bootstrap UCL					46.84	95% Percentile Bootstrap UCL					45.58
74	95% BCA Bootstrap UCL					45.84						
75	90% Chebyshev(Mean, Sd) UCL					48.28	95% Chebyshev(Mean, Sd) UCL					50.96
76	97.5% Chebyshev(Mean, Sd) UCL					54.69	99% Chebyshev(Mean, Sd) UCL					62
77												
78	**Suggested UCL to Use**											
79	95% Adjusted Gamma UCL					46.15						
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
83	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
84	For additional insight the user may want to consult a statistician.											
85												

1	**UCL Statistics for Uncensored Full Data Sets**											
2												
3	User Selected Options											
4	Date/Time of Computation			4/3/2017 3:01:03 PM								
5	From File			ProUCL data.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10												
11	**True Total Barium**											
12												
13	**General Statistics**											
14	Total Number of Observations			29			Number of Distinct Observations				29	
15							Number of Missing Observations				0	
16	Minimum			181			Mean				884.5	
17	Maximum			3867			Median				437	
18	SD			977.6			Std. Error of Mean				181.5	
19	Coefficient of Variation			1.105			Skewness				1.887	
20												
21	**Normal GOF Test**											
22	Shapiro Wilk Test Statistic			0.693			**Shapiro Wilk GOF Test**					
23	5% Shapiro Wilk Critical Value			0.926			Data Not Normal at 5% Significance Level					
24	Lilliefors Test Statistic			0.326			**Lilliefors GOF Test**					
25	5% Lilliefors Critical Value			0.165			Data Not Normal at 5% Significance Level					
26	**Data Not Normal at 5% Significance Level**											
27												
28	**Assuming Normal Distribution**											
29	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
30	95% Student's-t UCL			1193			95% Adjusted-CLT UCL (Chen-1995)				1251	
31							95% Modified-t UCL (Johnson-1978)				1204	
32												
33	**Gamma GOF Test**											
34	A-D Test Statistic			2.089			**Anderson-Darling Gamma GOF Test**					
35	5% A-D Critical Value			0.767			Data Not Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic			0.274			**Kolmogrov-Smirnoff Gamma GOF Test**					
37	5% K-S Critical Value			0.166			Data Not Gamma Distributed at 5% Significance Level					
38	**Data Not Gamma Distributed at 5% Significance Level**											
39												
40	**Gamma Statistics**											
41	k hat (MLE)			1.309			k star (bias corrected MLE)				1.197	
42	Theta hat (MLE)			675.6			Theta star (bias corrected MLE)				739.1	
43	nu hat (MLE)			75.93			nu star (bias corrected)				69.41	
44	MLE Mean (bias corrected)			884.5			MLE Sd (bias corrected)				808.5	
45							Approximate Chi Square Value (0.05)				51.23	
46	Adjusted Level of Significance			0.0407			Adjusted Chi Square Value				50.3	
47												
48	**Assuming Gamma Distribution**											
49	95% Approximate Gamma UCL (use when n>=50))			1198			95% Adjusted Gamma UCL (use when n<50)				1221	
50												
51	**Lognormal GOF Test**											
52	Shapiro Wilk Test Statistic			0.891			**Shapiro Wilk Lognormal GOF Test**					
53	5% Shapiro Wilk Critical Value			0.926			Data Not Lognormal at 5% Significance Level					
54	Lilliefors Test Statistic			0.217			**Lilliefors Lognormal GOF Test**					

	A	B	C	D	E	F	G	H	I	J	K	L
55	5% Lilliefors Critical Value					0.165	Data Not Lognormal at 5% Significance Level					
56	**Data Not Lognormal at 5% Significance Level**											
57												
58	**Lognormal Statistics**											
59	Minimum of Logged Data					5.198	Mean of logged Data					6.357
60	Maximum of Logged Data					8.26	SD of logged Data					0.875
61												
62	**Assuming Lognormal Distribution**											
63	95% H-UCL					1239	90% Chebyshev (MVUE) UCL					1282
64	95% Chebyshev (MVUE) UCL					1487	97.5% Chebyshev (MVUE) UCL					1771
65	99% Chebyshev (MVUE) UCL					2330						
66												
67	**Nonparametric Distribution Free UCL Statistics**											
68	**Data do not follow a Discernible Distribution (0.05)**											
69												
70	**Nonparametric Distribution Free UCLs**											
71	95% CLT UCL					1183	95% Jackknife UCL					1193
72	95% Standard Bootstrap UCL					1178	95% Bootstrap-t UCL					1322
73	95% Hall's Bootstrap UCL					1211	95% Percentile Bootstrap UCL					1207
74	95% BCA Bootstrap UCL					1263						
75	90% Chebyshev(Mean, Sd) UCL					1429	95% Chebyshev(Mean, Sd) UCL					1676
76	97.5% Chebyshev(Mean, Sd) UCL					2018	99% Chebyshev(Mean, Sd) UCL					2691
77												
78	**Suggested UCL to Use**											
79	95% Chebyshev (Mean, Sd) UCL					1676						
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
83	and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.											
84	For additional insight the user may want to consult a statistician.											
85												

Exposure Intake Parameters

Appendix E

April 21, 2017
Project No. 0399871

Environmental Resources Management
CityCentre Four
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024
281-600-1000

APPENDIX E-1

Exposure Parameters for Avian Receptors

Guidry Property
St. Martin Parish, Louisiana

Exposure Parameters [a, b]	Units	American Robin		American Woodcock	
Feeding Guild	unitless	Omnivore		Insectivore	
Terrestrial Invertebrates in diet	%	50%	[1]	100%	[4]
Plants in diet	%	50%	[1]	0%	[4]
Birds in diet	%	0%		0%	
Body Weight	kg	8.0E-02	[2]	1.8E-01	[5]
IR (food)	kg dry weight/kg bw-day	1.6E-01		1.2E-01	
IR (soil)	kg dry weight/kg bw-day	8.4E-03		1.3E-02	
Receptor Home Range	hectare	4.8E-01	[3]	1.7E+01	[6]
Area Use Factor [c]	unitless	1.0E+00		6.3E-01	
Seasonal Use Factor [d]	unitless	4.2E-01	[7]	3.3E-01	[8]

NOTES:

IR - Ingestion Rate NA - Not Applicable

(a) Dietary composition, body weight, and home range were taken from the USEPA *Wildlife Exposure Factors Handbook* (WEFH), December 1993, EPA/600/R-93/187.
(b) See Table 4 for derivation of ingestion rates.
(c) The area use factor is based on a proportion of site property (approximately 26 acres, or 10.5 hectares) relative to the receptor home range. Area use factor = Guidry property / Receptor home range. Where the Guidry property is larger than the receptor home range, a value of 1 is conservatively assumed based on full-time presence.
(d) The seasonal use factor is based on the proportion of potential time spent in the area of the Guidry property given migration behavior. Seasonal use factor = Months in site vicinity / 12 months.
[1] Dietary composition averaged over all seasons in the WEFH (Wheelwright, 1986). Fruit intake was modeled as plant intake.
[2] Average body weight of adult male and female in all seasons in Pennsylvania and New York in the WEFH (Clench & Leberman, 1978; Wheelwright, 1986).
[3] Average foraging home range of 0.48 hectares for adults feeding nestlings and fledglings in summer in Ontario in the WEFH (Weatherhead & McRae, 1990).
[4] Assumed 100% soil invertebrates in diet. American woodcocks can consume plants as a minor part of the diet.
[5] Average body weight of adult males and females in Maine, central Massachusetts, Minnesota, and throughout range in the WEFH (Nelson & Martin, 1953; Dwyer et al., 1988; Sheldon, 1967; Marshall (unpublished).
[6] Average home range (ha) for Pennsylvania mixed forests with shrubs and fields, and Wisconsin woods, open areas, and brush in the WEFH (Hudgins et al., 1985; Gregg, 1984).
[7] The American robin is anticipated to winter in the general area from late October to late March (5 of 12 months). https://birdsna.org/Species-Account/bna/species/amerob/distribution
[8] The American woodcock is anticipated to winter in the general area from November through February (4 of 12 months). http://www.wlf.louisiana.gov/american-woodcock-2

APPENDIX E-2

Exposure Parameters for Mammalian Receptors

Guidry Property
St. Martin Parish, Louisiana

Exposure Parameters [a,b]	Units	Eastern cottontail		Raccoon		Least Shrew	
Feeding Guild	unitless	Herbivore		Omnivore		Insectivore	
Terrestrial Invertebrates in diet	%	0%		12.5%	[4]	100%	[7]
Plants in diet	%	100%	[1]	77%	[4]	0%	[7]
Mammals in diet	%	0%		10.5%	[4]	0%	
Body Weight	kg	1.2E+00	[2]	5.7E+00	[5]	4.5E-03	[8]
IR (food)	kg dry weight/kg bw-day	5.2E-02		3.5E-02		2.2E-01	
IR (soil invertebrates)	kg wet weight/day	NA		6.9E-01		3.4E-03	
IR (soil)	kg dry weight/kg bw-day	3.3E-03		3.3E-03		6.6E-03	
Receptor Home Range	ha	3.1E+00	[3]	1.2E+02	[6]	2.0E-01	[9]
Area Use Factor [c]	unitless	1.0E+00		8.8E-02		1.0E+00	
Seasonal Use Factor [d]	unitless	1.0E+00	[10]	1.0E+00	[10]	1.0E+00	[10]

NOTES:

IR - Ingestion Rate NA - Not Applicable

(a) Dietary composition, body weight, and home range were taken from the USEPA *Wildlife Exposure Factors Handbook* (WEFH), December 1993. EPA/600/R-93/187.

(b) See Table 5 for derivation of ingestion rates.

(c) The area use factor is based on a proportion of site property (approximately 26 acres, or 10.5 hectares) relative to the receptor home range. Area use factor = Guidry property / Receptor home range. Where the Guidry property is larger than the receptor home range, a value of 1 is conservatively assumed based on full-time presence.

(d) The seasonal use factor is based on the proportion of potential time spent in the area of the Guidry property given migration behavior. Seasonal use factor = Months in site vicinity / 12 months.

[1] Dietary composition from WEFH.

[2] Average of adult (male and female) body weights in the WEFH from western Maryland and West Virginia (Chapman & Morgan, 1973), Georgia (Pelton & Jenkins, 1970, all areas combined), and Illinois (Lord, 1963).

[3] Average home range (ha) for all values provided in the WEFH for Wisconsin and Pennsylvania (Dixon et al., 1981; Althoff and Storm, 1989; and Trent and Rongstad, 1974).

[4] See Table 3 for raccoon diet composition derivation.

[5] Average body weight for adult males and females in the WEFH (Sanderson, 1984; Nagel, 1943; and Johnson, 1970).

[6] Receptor home range of 120 hectares as indicated in the following study in Louisiana bottomland forest was assumed. Byrne, Michael E., "Influences of landscape characteristics on the nesting ecology of female wild turkeys and behavior of raccoons" (2011). LSU Doctoral Dissertations. 2383. http://digitalcommons.lsu.edu/gradschool_dissertations/2383

[7] Assumed 100% soil invertebrates. Least shrews primarily consume soil invertebrates and small insects, and small quanitites of fungi and plants (Ohl, A. and C. Kent 2012. "Cryptotis parva" (On-line), Animal Diversity Web. Accessed April 03, 2017 at http://animaldiversity.org/accounts/Cryptotis_parva/).

[8] Assumed midpoint body weight based on range of 3 to 6 grams. Ohl, A. and C. Kent 2012. "Cryptotis parva" (On-line), Animal Diversity Web. Accessed April 03, 2017 at http://animaldiversity.org/accounts/Cryptotis_parva/).

[9] Home range of 0.20 hectares. Choate, J., J. Jones, C. Jones. 1994. Handbook Of Mammals of the South Central States. Baton Rouge and London: Louisiana State University Press.

[10] Default of 1 assumed for potential year-round residence.

APPENDIX E-3

Derivation of Diet Composition for the Raccoon

Guidry Property
St. Martin Parish, Louisiana

Derivation of Raccoon Diet Composition

I. Data from Individual Studies

Tennessee/NS	Spring	Summer	Fall	Winter	Average of values	% of diet	% of Modeled food items	Food item
insects	22	3.5	2.4	0	7.0	7.1%	8%	soil invertebrates
persimmon	0	35.8	57.3	27.4	30.1	79.5%	89%	plant
corn	57.6	0	10	25.9	23.4			
grapes	0	0	10.2	0	2.6			
pokeberry	0	20.5	4.5	0	6.3			
acorns	0	0	5.4	4.2	2.4			
sugar hackberry	0	0	5.5	18.4	6.0			
cherry	0	29.5	0	0	7.4			
birds	0	0	0	8.4	2.1	2.1%	2%	bird
mammals	1.7	0	1.4	0	0.8	0.8%	1%	mammal
fish	1.2	0	0	0	0.3	0.3%	Not Included	fish
crayfish	1.6	4	1.5	1.4	2.1	2.2%	Not Included	benthic invertebrates
frogs	8.1	0	0	0	2.0	2.1%	Not Included	other animal
other/unspecified	7.8	6.7	1.8	7.2	5.9	6.0%	Not Included	unknown
Total =	100	100	100	92.9	98.225	100.0%	100.0%	

New York/NS	Spring	Summer	Fall	Winter	Average of values	% of diet	% of Modeled food items	Food item
insects		8.2			8.2	15.3%	17%	soil invertebrates
earthworms		7.2			7.2			
fruit		37.9			37.9	58.2%	65%	plants
vegetation		6.1			6.1			
grains		14.7			14.7			
birds		1.5			1.5	1.5%	2%	birds
mammals		14.3			14.3	14.2%	16%	mammals
molluscs		1.9			1.9	1.9%	Not Included	benthic invertebrates
reptiles		3			3	8.8%	Not Included	other animal
carrion		1.5			1.5			
amphibians		4.4			4.4			
unspecified		0.2			0.2	0.2%	Not Included	unknown
Total =		100.9			100.9	100.0%	100.0%	

II. Assignment of Modeled Diet Composition Based on Average Diet Composition

Food Item	Tennessee	New York	Average %	% to be modeled
soil invertebrates	8%	17%	12.50%	12.5%
plants	89%	65%	77.0%	77%
mammals	3%	18%	10.50%	10.5%

NOTES:

NS - Not Specified
Data based on USEPA Wildlife Exposure Factors Handbook (WEFH), December 1993, EPA/600/R-93/187. Tennessee study data is from Tabatabai & Kennedy, 1988. New York study data is from Hamilton, 1951.
Specific food items noted as trace amounts in diet were considered and shown as 0%.
Bird food item was modeled as mammal. Exposure to other food items were unlikely in upland terrestrial raccoon diet, and therefore excluded.

APPENDIX E-4

Calculation of Ingestion Rates: Avian Receptors

Guidry Property
St. Martin Parish, Louisiana

Parameters	Units	American Robin	American Woodcock
Feeding Guildl [a]	NA	Omnivore	Insectivore
Body weight [a]	kg	0.080	0.18
Calculation of Ingestion Rate of Food Items			
IR_{food} - birds [b]	kg dry weight/day	0.013	0.022
BW-normalized IR_{food} [c]	kg dry weight/kg BW-day	0.16	0.125
Calculation of Ingestion Rate of Soil			
% Soil [d]	%	10.4%	10.4%
Adjustment factor [d]	%	50%	100%
IR_{soil} [d]	kg dry weight/kg BW-day	0.0084	0.013

NOTES:

IR - Ingestion Rate NA - Not Applicable

(a) See Table 1.

(b) The ingestion rate for food was based on an allometric equations developed by Nagy, KA. 2001. Food requirements of wild animals: predictive equations for free living mammals, reptiles, and birds. Nutrition Abstracts and Reviews, Series B 71: 21R 31R. Equation for all birds used.

IR_{food} - birds (g dry weight/day) = 0.638 x (Body weight)$^{0.685}$, with body weight given in grams.

The IRfood - birds was converted to kg dry weight/day by dividing by 1000.

(c) The ingestion rate for food was normalized to the measurement receptor by dividing by the body weight. BW-normalized IR_{food} (kg dry weight/kg body weight-day) = IR_{food} (kg dry weight/day) / receptor body weight (kg).

(d) The ingestion rate for soil was based on a percentage of the food ingestion rate. IRsoil (kg dry weight/kg body weight - day) = BW-normalized IRfood x % soil x adjustment factor. Beyer et al. (1994) published percent (%) soil/sediment ingestion for 28 wildlife species. Percentages were not available for the American robin. The percent soil ingestion published for the American woodcock was assumed for the American robin, with an adjustment proportional to the percent soil intervertebrates in diet. Beyer, W., Connor, E., & Gerould, S. (1994). Estimates of Soil Ingestion by Wildlife. The Journal of Wildlife Management, 58(2), 375-382. doi:10.2307/3809405

APPENDIX E-5

Calculation of Ingestion Rates: Mammalian Receptors

Guidry Parish
St. Martin Parish, Louisiana

Parameters	Units	Eastern cottontail		Raccoon		Least Shrew	
Feeding Guild [a]	NA	Herbivore		Omnivore		Insectivore	
Body weight [a]	kg	1.2		5.7		0.0045	
Calculation of Ingestion Rate of Food Items							
IR_{food} - mammals [b]	kg dry weight/day	0.064		0.20		0.00099	
BW-normalized IR_{food} [c]	kg dry weight/kg bw-day	0.052		0.035		0.22	
Calculation of Ingestion Rate of Soil							
% Soil [d]	%	6.3%	[1]	9.4%	[2]	3.0%	[1]
Adjustment factor [d]	%	100%		100%		100%	
IR_{soil} [d]	kg dry weight/kg BW-day	0.0033		0.0033		0.0066	

NOTES:

IR - Ingestion Rate
(a) See Table 2.
(b) The ingestion rate for food was based on an allometric equations developed by Nagy, KA. 2001. Food requirements of wild animals: predictive equations for free living mammals, reptiles, and birds. Nutrition Abstracts and Reviews, Series B 71: 21R 31R. Equation for all mammals used.

IR_{food} - mammals (g dry weight/day) = 0.323 x (Body weight)$^{0.7440}$, with body weight given in grams.

The IRfood - mammals was converted to kg dry weight/day by dividing by 1000.

(c) The ingestion rate for food was normalized to the measurement receptor by dividing by the body weight. BW-normalized IR_{food} (kg/kg-day dry weight) = IR_{food} (kg/day dry weight) / receptor body weight (kg).

(d) The ingestion rate for soil was based on a percentage of the food ingestion rate. IRsoil (kg dry weight/kg body weight - day) = BW-normalized IRfood x % soil x adjustment factor.

[1] Percent soil was not available in Beyer et al. (1994) for the Eastern cottontail and least shrew. The percent soil reported for the black-tailed jackrabbit was used as a surrogate for the Eastern cottontail. Arthur, WJ and RJ Gates. 1988. Trace element intake via soil ingestion in pronghorns and in black-tailed jackrabbits. J. Range Manage. 41:162-166. The percent soil value assumed in USEPA, 2007 for the 90th percentile value based on Monte Carlo simulation for the short-tailed shrew was used as a surrogate for the least shrew. USEPA. 2007. Guidance for Developing Ecological Soil Screening Levels, Attachment 4-1. United States Environmental Protection Agency. Washington, D.C.

[2] Beyer et al. (1994) reported a percent soil/sediment ingestion of 9.4 for the raccoon. Beyer, W., Connor, E., & Gerould, S. (1994). Estimates of Soil Ingestion by Wildlife. The Journal of Wildlife Management, 58(2), 375-382. doi:10.2307/3809405

Receptor COPEC Dose and Hazard Quotient Calculations

Appendix F

April 21, 2017
Project No. 0399871

Environmental Resources Management
CityCentre Four
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024
281-600-1000

APPENDIX F-1

Eastern Cottontail - COPEC Dose and Hazard Quotient

Guidry Property
St. Martin Parish, Louisiana

Area Use Factor	1
Seasonal Use Factor	1

Dietary Factors	Plants	Invertebrates	Mammals	Soil
Diet Composition:	100%	0%	0%	-
Ingestion Rate:	5.2E-02	0.0E+00	0.0E+00	3.3E-03

	COPECs Ingested (mg/kg/d) From . . .				Oral Dose	TRV_{NOAEL}	NOAEL
COPEC	Vegetation	Invertebrates	Mammals	Soil	(mg/kg/d)	(mg/kg/d)	HQ
Total Barium	7.85E-01	0.00E+00	0.00E+00	3.26E+00	4.04E+00	6.38E+01	6.34E-02
True Total Barium	1.36E+00	0.00E+00	0.00E+00	5.53E+00	6.89E+00	6.38E+01	1.08E-01
Total Cadmium	1.94E-02	0.00E+00	0.00E+00	1.27E-03	2.06E-02	2.32E+00	8.89E-03
Total Chromium	3.25E-02	0.00E+00	0.00E+00	4.95E-02	8.19E-02	2.77E+00	2.96E-02
Total Lead	6.28E-02	0.00E+00	0.00E+00	5.51E-02	1.18E-01	4.70E+01	2.51E-03
Total Mercury	8.38E-04	0.00E+00	0.00E+00	1.42E-02	1.50E-02	1.00E+00	1.50E-02
Total Selenium	1.26E-03	0.00E+00	0.00E+00	2.97E-03	4.22E-03	5.43E-01	7.78E-03
Total Strontium	3.30E-01	0.00E+00	0.00E+00	1.38E-01	4.67E-01	2.63E+02	1.78E-03
Total Zinc	9.42E-01	0.00E+00	0.00E+00	1.52E-01	1.09E+00	8.68E+01	1.26E-02

NOTES:

COPEC - Constituent of Potential Ecological Concern
TRV - Toxicity Reference Value
NOAEL - No Observed Adverse Effects Level
HQ - Hazard Quotient

APPENDIX F-2

American Robin - COPEC Dose and Hazard Quotient

Guidry Property
St. Martin Parish, Louisiana

Area Use Factor	1
Seasonal Use Factor	0.42

Dietary Factors	Plants	Invertebrates	Mammals	Soil
Diet Composition:	50%	50%	0%	-
Ingestion Rate:	1.6E-01	1.6E-01	1.6E-01	8.4E-03

	COPECs Ingested (mg/kg/d) From . . .				Oral Dose	TRV_{NOAEL}	NOAEL
COPEC	Vegetation	Invertebrates	Mammals	Soil	(mg/kg/d)	(mg/kg/d)	HQ
Total Barium	5.02E-01	3.01E-01	0.00E+00	3.44E+00	4.24E+00	2.08E+01	2.04E-01
True Total Barium	8.70E-01	5.02E-01	0.00E+00	5.84E+00	7.21E+00	2.08E+01	3.46E-01
Total Cadmium	1.24E-02	1.31E-01	0.00E+00	1.34E-03	1.44E-01	2.77E+00	5.21E-02
Total Chromium	2.08E-02	1.57E-01	0.00E+00	5.22E-02	2.30E-01	3.04E+00	7.58E-02
Total Lead	4.02E-02	2.31E-01	0.00E+00	5.82E-02	3.29E-01	1.61E+01	2.04E-02
Total Mercury	5.36E-04	5.69E-04	0.00E+00	1.50E-02	1.61E-02	4.50E-01	3.57E-02
Total Selenium	8.03E-04	4.02E-03	0.00E+00	3.13E-03	7.95E-03	8.49E-01	9.37E-03
Total Strontium	2.11E-01	1.21E-01	0.00E+00	1.45E-01	4.77E-01	NA	NC
Total Zinc	6.03E-01	6.23E+00	0.00E+00	1.61E-01	6.99E+00	8.28E+01	8.44E-02

NOTES:

COPEC - Constituent of Potential Ecological Concern
TRV - Toxicity Reference Value
NOAEL - No Observed Adverse Effects Level
HQ - Hazard Quotient

APPENDIX F-3

Raccoon - COPEC Dose and Hazard Quotient

Guidry Property
St. Martin Parish, Louisiana

Area Use Factor	0.088
Seasonal Use Factor	1

Dietary Factors	Plants	Invertebrates	Mammals	Soil
Diet Composition:	77%	12.5%	10.5%	-
Ingestion Rate:	3.5E-02	3.5E-02	3.5E-02	3.3E-03

	COPECs Ingested (mg/kg/d) From . . .				Oral Dose	TRV_{NOAEL}	NOAEL
COPEC	Vegetation	Invertebrates	Mammals	Soil	(mg/kg/d)	(mg/kg/d)	HQ
Total Barium	3.59E-02	3.49E-03	2.18E-05	2.88E-01	3.28E-01	6.38E+01	5.13E-03
True Total Barium	6.21E-02	5.82E-03	3.59E-05	4.89E-01	5.57E-01	6.38E+01	8.73E-03
Total Cadmium	8.84E-04	1.51E-03	5.87E-05	1.12E-04	2.57E-03	2.32E+00	1.11E-03
Total Chromium	1.48E-03	1.82E-03	5.54E-04	4.38E-03	8.24E-03	2.77E+00	2.97E-03
Total Lead	2.87E-03	2.68E-03	1.14E-03	4.88E-03	1.16E-02	4.70E+01	2.46E-04
Total Mercury	3.82E-05	6.60E-06	1.40E-04	1.25E-03	1.44E-03	1.00E+00	1.44E-03
Total Selenium	5.74E-05	4.66E-05	7.50E-05	2.63E-04	4.41E-04	5.43E-01	8.13E-04
Total Strontium	1.51E-02	1.40E-03	1.37E-02	1.22E-02	4.23E-02	2.63E+02	1.61E-04
Total Zinc	4.30E-02	7.22E-02	3.03E-02	1.35E-02	1.59E-01	8.68E+01	1.83E-03

NOTES:

COPEC - Constituent of Potential Ecological Concern
TRV - Toxicity Reference Value
NOAEL - No Observed Adverse Effects Level
HQ - Hazard Quotient

APPENDIX F-4

American Woodcock - COPEC Dose and Hazard Quotient

Guidry Property
St. Martin Parish, Louisiana

Area Use Factor	0.63
Seasonal Use Factor	0.33

Dietary Factors	Plants	Invertebrates	Mammals	Soil
Diet Composition:	0%	100%	0%	-
Ingestion Rate:	0.0E+00	1.2E-01	0.0E+00	1.3E-02

	COPECs Ingested (mg/kg/d) From . . .				Oral Dose	TRV_{NOAEL}	NOAEL
COPEC	Vegetation	Invertebrates	Mammals	Soil	(mg/kg/d)	(mg/kg/d)	HQ
Total Barium	0.00E+00	2.36E-01	0.00E+00	2.69E+00	2.93E+00	2.08E+01	1.40E-01
True Total Barium	0.00E+00	3.93E-01	0.00E+00	4.56E+00	4.96E+00	2.08E+01	2.38E-01
Total Cadmium	0.00E+00	1.02E-01	0.00E+00	1.05E-03	1.03E-01	2.77E+00	3.72E-02
Total Chromium	0.00E+00	1.23E-01	0.00E+00	4.08E-02	1.64E-01	3.04E+00	5.39E-02
Total Lead	0.00E+00	1.81E-01	0.00E+00	4.55E-02	2.26E-01	1.61E+01	1.40E-02
Total Mercury	0.00E+00	4.45E-04	0.00E+00	1.17E-02	1.21E-02	4.50E-01	2.70E-02
Total Selenium	0.00E+00	3.14E-03	0.00E+00	2.45E-03	5.59E-03	8.49E-01	6.59E-03
Total Strontium	0.00E+00	9.43E-02	0.00E+00	1.14E-01	2.08E-01	NA	NC
Total Zinc	0.00E+00	4.87E+00	0.00E+00	1.26E-01	5.00E+00	8.28E+01	6.03E-02

NOTES:

COPEC - Constituent of Potential Ecological Concern
TRV - Toxicity Reference Value
NOAEL - No Observed Adverse Effects Level
HQ - Hazard Quotient

APPENDIX F-5

Least Shrew - COPEC Dose and Hazard Quotient

Guidry Property
St. Martin Parish, Louisiana

Area Use Factor	1
Seasonal Use Factor	1

Dietary Factors	Plants	Invertebrates	Mammals	Soil
Diet Composition:	0%	100%	0%	-
Ingestion Rate:	0.0E+00	2.2E-01	0.0E+00	6.6E-03

	COPECs Ingested (mg/kg/d) From . . .				Oral Dose	TRV_{NOAEL}	NOAEL
COPEC	Vegetation	Invertebrates	Mammals	Soil	(mg/kg/d)	(mg/kg/d)	HQ
Total Barium	0.00E+00	1.98E+00	0.00E+00	6.51E+00	8.49E+00	6.38E+01	1.33E-01
True Total Barium	0.00E+00	3.30E+00	0.00E+00	1.11E+01	1.44E+01	6.38E+01	2.25E-01
Total Cadmium	0.00E+00	8.58E-01	0.00E+00	2.53E-03	8.61E-01	2.32E+00	3.71E-01
Total Chromium	0.00E+00	1.03E+00	0.00E+00	9.89E-02	1.13E+00	2.77E+00	4.09E-01
Total Lead	0.00E+00	1.52E+00	0.00E+00	1.10E-01	1.63E+00	4.70E+01	3.47E-02
Total Mercury	0.00E+00	3.74E-03	0.00E+00	2.83E-02	3.21E-02	1.00E+00	3.21E-02
Total Selenium	0.00E+00	2.64E-02	0.00E+00	5.93E-03	3.23E-02	5.43E-01	5.95E-02
Total Strontium	0.00E+00	7.92E-01	0.00E+00	2.75E-01	1.07E+00	2.63E+02	4.06E-03
Total Zinc	0.00E+00	4.09E+01	0.00E+00	3.04E-01	4.12E+01	8.68E+01	4.75E-01

NOTES:

COPEC - Constituent of Potential Ecological Concern
TRV - Toxicity Reference Value
NOAEL - No Observed Adverse Effects Level
HQ - Hazard Quotient

Derivation of Ecological Toxicity Reference Values

Appendix G

April 21, 2017
Project No. 0399871

Environmental Resources Management
CityCentre Four
840 West Sam Houston Parkway North, Suite 600
Houston, Texas 77024
281-600-1000

APPENDIX G-1

Summary of Avian Toxicity Data: Barium

Guidry Property
St. Martin Parish, Louisiana

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Data Evaluation Score
	Johnson et al (1960)		chick			OR	4	w	1	d			MOR	MORT	WO	20.83	41.7	

NOTES:
Study results excerpted from the Eco-SSL document for Barium.
Johnson, D., A.L. Mehring, and H.W. Titus, 1960. Tolerance of Chickens for Barium. Proceedings of the Society for Experimental Biology and Medicine. 104: 436-438. Ref ID: 25921.

APPENDIX G-2

Summary of Mammalian Toxicity Data: Barium

Guidry Property
St. Martin Parish, Louisiana

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Data Evaluation Score
Reproduction																		
16	Dietz et al, 1992	18186	Rat (Rattus norvegicus)	6	UX	DR	92	d	43-44	d	JV	M	REP	RHIS	TE	121		74
17	Borzelleca et al, 1988	18734	Rat (Rattus norvegicus)	5	U	GV	10	d	37	d	JV	F	REP	RHIS	OV	138	198	87
18	Dietz et al, 1992	18186	Mouse (Mus musculus)	6	UX	DR	92	d	43-44	d	JV	F	REP	RHIS	TE	165	499	87
Growth																		
19	Schroeder and Mitchener, 1975	17086	Rat (Rattus norvegicus)	2	U	DR	520	d	21	d	JV	B	GRO	BDWT	WO	0.57		72
20	Stoewsand et al, 1988	18053	Rat (Rattus norvegicus)	2	U	FD	29	d	NR	NR	JV	M	GRO	BDWT	WO	16.5		76
21	Dietz et al, 1992	18186	Rat (Rattus norvegicus)	6	UX	DR	92	d	43-44	d	JV	M	GRO	BDWT	WO	61.1	121	87
22	Dietz et al, 1992	18186	Mouse (Mus musculus)	6	UX	DR	92	d	43-44	d	JV	M	GRO	BDWT	WO	165	436	87
23	Borzelleca et al, 1988	18734	Rat (Rattus norvegicus)	5	U	GV	10	d	37	d	JV	B	GRO	BDWT	WO	198		84
24	Schroeder and Mitchener, 1975	1858	Mouse (Mus musculus)	2	U	DR	10	d	19-20	d	JV	F	GRO	BDWT	WO		0.74	67
Survival																		
25	Dietz et al, 1992	18186	Rat (Rattus norvegicus)	6	UX	DR	92	d	43-44	d	JV	M	MOR	MORT	WO	61.1	121	88
26	Borzelleca et al, 1988	18734	Rat (Rattus norvegicus)	5	U	GV	10	d	37	d	JV	F	MOR	MORT	WO	137	197	91
27	Dietz et al, 1992	18186	Mouse (Mus musculus)	6	UX	DR	13	d	43-44	d	JV	M	MOR	MORT	WO	165	436	88

AR=adrenal; ATPT = adenosine triphosphate; B = both; BDWT = body weight changes; BL = blood; BLPR = blood pressure; bw = body weight; CHM = chemical; d = days; DR = drinking water; EDMA = edema; ENZ = enzyme; F = female; FCNS = food consumption; FD = food; FDB = feeding behavior; GRO = Growth; GV=gavage; HE= heart; HIS = histology; HTRT = heart rate; JV = juvenile; kg = kilogram; KI = kidney; LI = liver; LOAEL = lowest observed adverse effect level; M = measured; M = male; mg = milligram; mo = months; MOR = effects on survival; MORT = mortality; NOAEL = no observed adverse effect level; NR = not reported; ORW = organ weight changes; ORWT = organ weight; OV = ovary; PHOS = phosphate; PHY = physiology; REP = reproduction; RHIS = reproductive organ histology; Score = Total Data Evaluation Score as described in US EPA (2003; Attachment 4-3); SMIX = organ weight changes relative to body weight; SR = serum; TE = testes; U = unmeasured; UREA = urea; UX = reported as measured but measurements not reported; w = weeks; WCON = water consumption; WO = whole

Note: Study results excerpted from the Eco-SSL document for Barium.

Geometric Mean NOAEL	Geometric Mean LOAEL
63.81	118.95

APPENDIX G-3

Summary of Avian Toxicity Data: Trivalent Chromium

Guidry Property
St. Martin Parish, Louisiana

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Data Evaluation Score
Reproduction																		
11	Jensen and Maurice, 1980	9749	Chicken (Gallus domesticus)	2	U	FD	4	w	NR	NR	LB	F	REP	TPRD	WO	0.238		78
12	Maurice and Jensen, 1979	12571	Chicken (Gallus domesticus)	2	U	FD	12	w	40	w	LB	F	REP	TPRD	WO	0.483		70
13	Jensen and Maurice, 1980	9749	Chicken (Gallus domesticus)	2	U	FD	4	w	NR	NR	LB	F	REP	TPRD	WO	0.494		69
14	Haseltine et al., unpublished	3739	Black duck (Anas rubripes)	3	U	FD	180-190	d	NR	NR	LB	F	REP	RSUC	WO	0.569	2.78	78
15	Sauveur and Thapon, 1983	9621	Chicken (Gallus domesticus)	2	U	FD	8	w	40	w	LB	F	REP	TPRD	WO	0.744		79
16	Ousterhout and Berg, 1981	6508	Chicken (Gallus domesticus)	2	U	FD	6	d	50	w	LB	F	EGG	ESQU	SL	0.988		69
17	Meluzzi et al., 1996	2771	Chicken (Gallus domesticus)	4	U	FD	15	d	22	w	LB	F	EGG	ALWT	EG	37.7	75.4	81
Growth																		
18	Maurice and Jensen, 1979	12571	Chicken (Gallus domesticus)	2	U	FD	12	w	40	w	SM	F	GRO	BDWT	WO	0.483		68
19	Cupo and Donaldson, 1987	5971	Chicken (Gallus domesticus)	2	U	FD	21	d	1	d	JV	M	GRO	BDWT	WO	1.45		77
20	Steele and Rosebrough, 1979	13720	Turkey (Meleagris gallopavo)	4	U	FD	14	d	1	w	JV	B	GRO	BDWT	WO	6.42		77
21	Hill, 1974	92	Chicken (Gallus domesticus)	2	U	FD	2	w	1	d	JV	B	GRO	BDWT	WO	85.9		76
22	Hafez and Kratzer, 1976	8663	Chicken (Gallus domesticus)	3	U	FD	4	w	1	d	AD	M	GRO	BDWT	WO	359		76
23	Motozono et al., 1998	3067	Chicken (Gallus domesticus)	3	U	FD	35	d	7	d	JV	F	GRO	BDWT	WO		9.91	73
24	Nielsen et al, 1980	15690	Chicken (Gallus domesticus)	2	U	FD	4	w	1	d	JV	M	GRO	BDWT	WO		28.7	72
Survival																		
25	Hossain et al, 1998	11682	Chicken (Gallus domesticus)	2	U	FD	19	d	28	d	JV	B	MOR	MORT	WO	0.0248		79
26	Haseltine et al., unpublished	3739	Black duck (Anas rubripes)	3	U	FD	10	m	NR	NR	MA	M	MOR	MORT	WO	0.557	2.78	77
27	Hill, 1974	92	Chicken (Gallus domesticus)	2	U	FD	5	w	1	d	JV	B	MOR	MORT	WO	85.9		77
28	Hafez and Kratzer, 1976	8663	Chicken (Gallus domesticus)	3	U	FD	4	w	1	d	AD	M	MOR	MORT	WO	359		77

AD = adult; ALWT = albumin weight; B = both sexes; BDWT = body weight changes; BL = blood; CHM = chemical changes; d = days; EG = egg; EGG = effects on eggs; ENZ = enzyme changes; ESQU = eggshell quality; F= female; FCNS = food consumption; FD =food; FDB = feeding behavior; FDCV = feed conversion efficiency; GENZ = general enzyme changes; GLUC = glucose; GRO= growth; JV = juvenile; LB = laying bird; LI = liver; m = months; M = male; MA = mature; MOR = effects on survival; MORT = mortality; NR = not reported; ORW = organ weight changes; ORWT = Organ weight changes; PHY = physiology; REP = reproductive effects; RSUC = reproductive success; SL = spleen; SM = sexually mature; TPRD = total production; U = unmeasured; w = weeks; WO = whole organism.

Note: Study results excerpted from the Eco-SSL document for Chromium.

Geometric Mean NOAEL	Geometric Mean LOAEL
3.04	11.06

APPENDIX G-4

Summary of Mammalian Toxicity Data: Trivalent Chromium

Guidry Property
St. Martin Parish, Louisiana

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Data Evaluation Score
Reproduction																		
18	Zahid et al., 1990	3098	Mouse (Mus musculus)	4	U	FD	35	d	21	d	JV	M	REP	SPCL	TE		9.62	80
19	Bataineh et al., 1997	3009	Rat (Rattus norvegicus)	2	U	DR	12	w	NR	NR	AD	M	REP	TEWT	TE		36.2	74
20	Elbetieha and Al-Hamood, 1997	3025	Mouse (Mus musculus)	3	U	DR	12	w	50	d	JV	F	REP	PROG	WO		91.1	73
21	Elbetieha and Al-Hamood, 1997	3025	Mouse (Mus musculus)	2	U	DR	12	w	50	d	JV	M	REP	ORWT	OV		228	74
Growth																		
22	Van Heugten and Spears, 1997	25908	Pig (Sus scrofa)	2	U	FD	32	d	3	w	JV	NR	GRO	BDWT	WO	0.00663		69
23	Kegley and Spears, 1995	25914	Cattle (Bos taurus)	2	U	FD	56	d	NR	NR	JV	M	GRO	BDWT	WO	0.00933		69
24	Shroeder et al., 1963	14446	Rat (Rattus norvegicus)	2	U	DR	60	d	28	d	JV	M	GRO	BDWT	WO	0.537		66
25	Mooney and Cromwell, 1997	25905	Pig (Sus scrofa)	2	M	FD	103	d	NR	NR	JV	B	GRO	BDWT	WO	0.595		74
26	Mooney and Cromwell, 1997	25905	Pig (Sus scrofa)	3	M	FD	35	d	NR	NR	JV	B	GRO	BDWT	WO	0.927		74
27	Anderson et al., 1997	3004	Rat (Rattus norvegicus)	5	U	FD	20	w	4	w	JV	NR	GRO	BDWT	WO	8.09		68
28	Zahid et al., 1990	3098	Mouse (Mus musculus)	4	U	FD	35	d	21	d	JV	M	GRO	BDWT	WO	44.6		69
29	Elbetieha and Al-Hamood, 1997	3025	Mouse (Mus musculus)	2	U	DR	12	w	50	d	JV	M	GRO	BDWT	WO	228		72
30	Ivankovic and Preussmann, 1975	3729	Rat (Rattus norvegicus)	3	U	FD	90	d	100	d	SM	F	GRO	BDWT	WO	1770		72
31	Elbetieha and Al-Hamood, 1997	3025	Mouse (Mus musculus)	3	U	DR	12	w	50	d	JV	M	GRO	BDWT	WO		92.1	72
Survival																		
32	Meenakshi et al., 1989	3061	Rat (Rattus norvegicus)	2	U	GV	60	d	NR	NR	JV	M	MOR	MORT	WO	10		85
33	Mercado and Bibby 1973	757	Rat (Rattus norvegicus)	2	U	DR	50	d	23	d	JV	M	MOR	MORT	WO		2.82	72

AD = adult; AGGT = aggression; B = both; BEH = behavior; BDWT = body weight changes; BEH = behavior; BL = blood; BLPR = blood pressure; CHM = chemical changes; d = days; DR = drinking; F = female; FCNS= food consumption; FD = food; FDB = feeding behavior; FDCV = food conversion efficiency; GBIO = general biochemical; GLUC = glucose; GPHY = general physiology; GRO = growth; GRS = gross body weight changes; GSLN = gross lesions; GV = gavage; HMGL = hemoglobin; HIS = histology; JV = juvenile; KI = kidney; LI = liver; M = male; M = measured; mo = months; MOR = effects on survival; MORT = mortality; NCRO = necrosis; NR = not reported; ORWT = organ weight changes; OV = ovary; PHY = physiology; PL = plasma; PROG = progeny counts or numbers; PRTL = total protein; REP = reproduction; SM = sexually mature; SPCL = sperm cell counts; SR = serum; TE = testes; TEWT = testes weight; TH = teeth; U = unmeasured; w = weeks; WO = whole organism.

Note: Study results excerpted from the Eco-SSL document for Chromium.

Geometric Mean NOAEL	Geometric Mean LOAEL
2.77	**35.13**

APPENDIX G-5

Summary of Avian Toxicity Data: Lead

Guidry Property
St. Martin Parish, Louisiana

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Data Evaluation Score
Reproduction																		
50	Edens and Garlich, 1983	2608	Japanese quail (Coturnix japonica)	4	U	FD	5	w	6	w	LB	F	REP	PROG	WO	0.194	1.94	77
51	Edens and Garlich, 1983	2608	Chicken (Gallus domesticus)	3	U	FD	4	w	NR	NR	LB	F	REP	PROG	WO	1.63	3.26	79
52	Meluzzi et al., 1996	2771	Chicken (Gallus domesticus)	4	U	FD	30	d	22	w	LB	F	EGG	ALWT	EG	2.69	4.04	81
53	Haegele et al. 1974	2668	Mallard (Anas platyrhynchos)	2	U	FD	76	d	NR	NR	SM	F	EGG	ESTH	EG	5.63		71
54	Pattec 1984	2809	American kestrel (Falco sparverius)	3	M	FD	6	mo	1-6	yr	AD	F	REP	RSUC	WO	12		90
55	Morgan et al., 1975	2779	Japanese quail (Coturnix japonica)	5	U	FD	5	w	6	d	JV	M	REP	TEWT	TE	12.6	126	78
56	Morgan et al., 1975	2779	Japanese quail (Coturnix japonica)	5	U	FD	5	w	1	d	JV	M	REP	TEWT	TE	67.4	135	80
57	Stone and Soares, 1976	2898	Japanese quail (Coturnix japonica)	3	U	FD	32	d	NR	NR	AD	F	REP	PROG	WO	125		67
58	Edens et al., 1976	2606	Japanese quail (Coturnix japonica)	5	U	FD	12	w	0	d	LB	B	REP	EGPN	EG		0.11	77
59	Edens and Garlich, 1983	2608	Japanese quail (Coturnix japonica)	4	U	FD	12	w	NR	NR	LB	F	REP	PROG	WO		0.194	75
60	Edens and Garlich, 1983	2608	Chicken (Gallus domesticus)	5	U	FD	10	w	NR	NR	LB	F	REP	PROG	WO		3.26	75
61	Kendall and Scanlon, 1981	2734	Ringed Turtle Dove (Streptopelia risoria)	2	U	DR	11	w	NR	NR	AD	M	REP	TEWT	TE		11.8	68
62	Edens and Melvin, 1989	2609	Japanese quail (Coturnix japonica)	2	U	FD	1	w	14	w	JV	F	REP	TPRD	WO		93.1	75
63	Stone and Soares, 1976	2898	Japanese quail (Coturnix japonica)	2	U	FD	27	d	NR	NR	AD	F	REP	PROG	WO		377	74
Growth																		
64	Edens and Garlich, 1983	2608	Japanese quail (Coturnix japonica)	3	U	FD	5	w	1	d	JV	F	GRO	BDWT	WO	1.56	15.6	77
65	Stone and Fox, 1984	6291	Japanese quail (Coturnix japonica)	3	U	FD	2	w	1	d	JV	B	GRO	BDWT	WO	2.77		72
66	Stone et al., 1977	2897	Japanese quail (Coturnix japonica)	2	U	FD	2	w	1	d	JV	NR	GRO	BDWT	WO	4.64		70
67	Edens and Melvin, 1989	2609	Japanese quail (Coturnix japonica)	3	U	FD	4	w	0	d	JV	F	GRO	BDWT	WO	5.93	59.3	76
68	Damron et al, 1969	14768	Chicken (Gallus domesticus)	4	U	FD	4	w	4	w	JV	NR	GRO	BDWT	WO	6.14	61.4	76
69	Damron et al, 1969	14768	Chicken (Gallus domesticus)	4	U	FD	4	w	4	w	JV	NR	GRO	BDWT	WO	7.1	71	76
70	Edens et al., 1976	2606	Japanese quail (Coturnix japonica)	5	U	FD	12	w	0	d	JV	F	GRO	BDWT	WO	11.1	111	79
71	Edens, 1985	2605	Japanese quail (Coturnix japonica)	5	U	FD	12	w	1	w	JV	F	GRO	BDWT	WO	11.2	112	76
72	Morgan et al., 1975	2779	Japanese quail (Coturnix japonica)	5	U	FD	2	w	6	d	JV	NR	GRO	BDWT	WO	12.6	126	76
73	Morgan et al., 1975	2779	Japanese quail (Coturnix japonica)	5	U	FD	1	w	1	d	JV	NR	GRO	BDWT	WO	13.5	67.4	76
74	Howell and Hill, 1978	1387	Chicken (Gallus domesticus)	2	U	FD	21	d	1	d	JV	B	GRO	BDWT	WO	14.2		67
75	Jeng et. al, 1979	2718	Duck (Anas platyrhynchos)	3	U	GV	3	mo	24	w	MA	F	GRO	BDWT	WO	20		87
76	Hoffman et al., 1985	2696	American kestrel (Falco sparverius)	4	U	GV	10	d	1	d	JV	NR	GRO	BDWT	WO	25	125	88
77	Howell and Hill, 1978	1387	Chicken (Gallus domesticus)	2	U	FD	20	d	1	d	JV	B	GRO	BDWT	WO	28.4		67
78	Stone et al., 1981	6463	Japanese quail (Coturnix japonica)	5	U	FD	14	d	1	d	JV	B	GRO	BDWT	WO	34.5		77
79	Custer et al., 1984	2581	American kestrel (Falco sparverius)	4	M	FD	60	d	1-2	yr	AD	B	GRO	BDWT	WO	54.3		68
80	Berg et al., 1980	2534	Chicken (Gallus domesticus)	5	U	FD	2	w	1	d	JV	M	GRO	BDWT	WO	61.3	123	83
81	Frederick, 1976	2638	Mallard (Anas platyrhynchos)	4	U	FD	8	d	9	d	JV	NR	GRO	BDWT	WO	66.9		67
82	Donaldson and McGowan, 1989	1285	Chicken (Gallus domesticus)	5	U	FD	20	d	1	d	JV	M	GRO	BDWT	WO		38.2	72
83	Latta and Donaldson, 1986	2744	Chicken (Gallus domesticus)	2	U	FD	3	w	1	d	JV	M	GRO	BDWT	WO		53.1	71
84	Stone and Soares, 1976	2898	Japanese quail (Coturnix japonica)	3	U	FD	32	d	NR	NR	AD	F	GRO	BDWT	WO		64.3	72
85	Leeming and Donaldson, 1984	2748	Chicken (Gallus domesticus)	2	U	FD	19	d	1	d	JV	M	GRO	BDWT	WO		76.3	71
86	Berg et al., 1980	2534	Chicken (Gallus domesticus)	3	U	FD	2	w	1	d	JV	M	GRO	BDWT	WO		124	77
87	Bafundo et al. 1984	2517	Chicken (Gallus domesticus)	4	U	FD	14	d	8	d	JV	M	GRO	BDWT	WO		152	71
88	Donaldson, 1986	2600	Chicken (Gallus domesticus)	2	U	FD	20	d	1	d	JV	M	GRO	BDWT	WO		163	72
89	Khan, et al, 1993	5507	Chicken (Gallus domesticus)	2	U	OR	4	w	NR	NR	JV	B	GRO	BDWT	WO		200	74
90	Cupo and Donaldson, 1987	2579	Chicken (Gallus domesticus)	2	U	FD	7	d	1	d	JV	M	GRO	BDWT	WO		262	72
91	Berg et al., 1980	2534	Chicken (Gallus domesticus)	2	U	FD	2	w	1	d	JV	M	GRO	BDWT	WO		270	77
92	Franson and Custer, 1982	2635	Chicken (Gallus domesticus)	2	U	FD	7	d	1	d	IM	NR	GRO	BDWT	WO		273	72
93	Bafundo et al. 1984	2517	Chicken (Gallus domesticus)	2	U	FD	14	d	8	d	JV	M	GRO	BDWT	WO		282	71
Survival																		
94	Finley et al., 1976	2624	Mallard (Anas platyrhynchos)	4	M	FD	12	w	1	yr	AD	M	MOR	MORT	WO	2.47		80
95	Barthalmus et al., 1977	2526	Pigeon (Columba livia)	4	U	GV	40	d	NR	NR	AD	M	MOR	MORT	WO	12.5	25	82
96	Howell and Hill, 1978	1387	Chicken (Gallus domesticus)	2	U	FD	21	d	1	d	JV	B	MOR	MORT	WO	14.2		77
97	Howell and Hill, 1978	1387	Chicken (Gallus domesticus)	2	U	FD	20	d	1	d	JV	B	MOR	MORT	WO	28.4		77
98	Custer et al., 1984	2581	American kestrel (Falco sparverius)	4	M	FD	60	d	1-2	yr	AD	B	MOR	MORT	WO	54.3		78
99	Frederick, 1976	2638	Mallard (Anas platyrhynchos)	4	U	FD	8	d	9	d	JV	NR	MOR	MORT	WO	66.9		77
100	Hoffman et al., 1985	2696	American kestrel (Falco sparverius)	4	U	GV	10	d	1	d	JV	NR	MOR	SURV	WO	125	625	89
101	Vengris and Mare, 1974	14384	Chicken (Gallus domesticus)	7	U	GV	35	d	6	w	JV	B	MOR	MORT	WO	160	320	86

APPENDIX G-5

Summary of Avian Toxicity Data: Lead

Guidry Property
St. Martin Parish, Louisiana

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Data Evaluation Score
102	Donaldson and McGowan, 1989	1285	Chicken (Gallus domesticus)	5	U	FD	20	d	1	d	JV	M	MOR	MORT	WO	163		66
103	Johnsen and Damron 1982	2724	Goose (Anser cygnides)	5	U	FD	12	w	26	w	JV	NR	MOR	MORT	WO	196		73
104	Anders et al., 1982	2513	Pigeon (Columba livia)	2	U	GV	4	w	NR	NR	AD	M	MOR	MORT	WO		6.25	73
105	Cupo and Donaldson, 1987	2579	Chicken (Gallus domesticus)	2	U	FD	21	d	1	d	JV	M	MOR	MORT	WO		194	73
106	Khan et al, 1993	1415	Chicken (Gallus domesticus)	2	U	GV	7	d	43	d	JV	F	MOR	MORT	WO		400	80

AD = adult; ALAD = (delta) -aminolevulinic acid dehydrogenase; ALWT = albumin weight; ANR = anorexia; AR = adrenal; B = both; BEH = behavior; BDWT = body weight changes; BEH = behavior; BL = blood; BR = brain; CALC = calcium; CHM = chemical changes; d = days; DR = Drinking water; EG = egg; EGG = effects on eggs; EGPN = egg production; ENZ = enzyme changes; ESTH = eggshell thinning; F = female; FCNS = food consumption; FD = food; FDB = feeding behavior; FE = feathers; FEFF = feed effeciency; FM = femur; GE = gestation; GHIS = general histology; GITX = general intoxication; GLBM = glomerular basement membrane; GRO = growth; GRS = gross body weight changes (not growth); GV = gavage; HIS = histology; HMCT = hematocrit; HMGL = hemoglobin; IM = immature; INTX = intoxication; ITX = intoxication; JV = juvenile; KI = kidney; LB = laying bird; LI = liver; MA = mature; M = male; M = measured; mo = months; MOR = effects on survival; MORT = mortality; NMVM = number of movements; NR = Not reported; OR = other oral; ORW = organ weight changes; ORWT = organ weight; PHY = physiology; PL = plasma; PROG = progeny counts or numbers; REP = reproduction; RSUC = reproductive success; SKIR = skin irritation;
SM = sexually mature; SMIX = weight relative to body weight; SURV = survival; TB = tibia; TE = testes; TEDG = testes degeneration; TEWT = testes weight; TPRD = total production; U =unmeasured; w = weeks; WO = whole organism; yr = years.

Note: Study results excerpted from the Eco-SSL document for Lead.

Geometric Mean NOAEL	Geometric Mean LOAEL
16.13	51.68

APPENDIX G-6

Summary of Mammalian Toxicity Data: Lead

Guidry Parish
St. Martin Parish, Louisiana

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Data Evaluation Score
Reproduction																		
121	Grant et al., 1980	2658	Rat (Rattus norvegicus)	5	U	DR	62	d	21	d	GE	F	REP	PRWT	WO	0.71	7	77
122	Dilts and Ahokas, 1979	2593	Rat (Rattus norvegicus)	6	U	DR	21	d	NR	NR	GE	F	REP	PRWT	WO	1	5	74
123	Gandley et al., 1999	2642	Rat (Rattus norvegicus)	3	U	DR	35	d	NR	NR	AD	M	REP	RSUC	WO	2.6	26	72
124	Grant et al., 1980	2658	Rat (Rattus norvegicus)	4	U	DR	62	d	21	d	GE	B	REP	PRWT	WO	3	6	79
125	Carson et al., 1973	3830	Sheep (Ovis aries)	3	U	FD	27	w	NR	NR	GE	F	REP	RSUC	WO	4.5		68
126	Dilts and Ahokas, 1980	2592	Rat (Rattus norvegicus)	6	U	DR	21	d	NR	NR	GE	F	REP	PRWT	WO	5	10	76
127	Sierra and Tiffany-Castiglioni, 1992	2876	Guinea pig (Cavia porcellus)	3	U	DR	40	d	NR	NR	GE	F	REP	PRWT	WO	5.5		73
128	Jessup and Shott, 1969	11831	Rat (Rattus norvegicus)	5	U	FD	92	w	21	d	JV	M	REP	TEWT	TE	7.5	74.9	78
129	Kimmel et al., 1980	2737	Rat (Rattus norvegicus)	4	U	DR	23.8	d	21	d	LC	F	REP	Other	WO	8.9		76
130	Kimmel et al., 1980	2737	Rat (Rattus norvegicus)	5	U	DR	23.8	d	21	d	GE	F	REP	Other	WO	9.1	45	73
131	McMurry et al., 1995	2770	Cotton rat (Sigmodon hispidus)	3	U	DR	7	w	NR	NR	AD	M	REP	RHIS	RT	12.4	170	67
132	Barratt et al., 1989	2524	Rat (Rattus norvegicus)	4	U	GV	9	w	10	w	JV	M	REP	SPCV	TE	18	180	85
133	Zenick et al., 1979	2943	Rat (Rattus norvegicus)	3	U	DR	100	d	21	d	GE	F	REP	PRWT	WO	25.4		68
134	Cerklewski, 1980	10607	Rat (Rattus norvegicus)	2	U	FD	35	d	70	d	LC	F	REP	PRWT	WO	27.5		66
135	Chowdhury et al., 1984	3721	Rat (Rattus norvegicus)	4	U	DR	60	d	NR	NR	SM	M	REP	TEWT	TE	31.6	63.2	71
136	Bull, et.. al., 1978	14812	Rat (Rattus norvegicus)	4	U	DR	56	d	70	d	LC	F	REP	PROG	WO	32.5		69
137	Winder et al., 1984	2934	Rat (Rattus norvegicus)	3	U	DR	31	d	NR	d	LC	F	REP	PRWT	WO	33.3	111	72
138	Miller et al., 1982	2775	Rat (Rattus norvegicus)	4	U	GV	41	d	NR	NR	GE	F	REP	PRWT	WO	41	54.6	87
139	Wolfe et al, 1996	2502	Rat (Rattus norvegicus)	5	U	DR	1	w	94	d	JV	M	REP	SPCL	SM	47.3	82	84
140	Sourgens et al., 1987	2889	Rat (Rattus norvegicus)	4	U	DR	30	d	NR	NR	SM	M	REP	Other	SV	56	285	73
141	Carpenter, 1982	2565	Hamster (Mesocricetus auratus)	2	U	DR	51	d	15	w	GE	F	REP	PROG	WO	64.8		69
142	Carpenter, 1982	2565	Hamster (Mesocricetus auratus)	2	U	DR	14	d	11	w	GE	F	REP	PROG	WO	64.9		67
143	Ronis et al., 1998	2847	Rat (Rattus norvegicus)	4	U	DR	37	d	NR	NR	GE	F	REP	PRWT	WO	90.1	270	74
144	Wardell et al., 1982	748	Rat (Rattus norvegicus)	5	U	GV	12	d	NR	NR	GE	F	REP	RSEM	EM	100	150	87
145	Hamilton and O'Flaherty, 1994	2670	Rat (Rattus norvegicus)	3	U	DR	68	d	25	d	GE	F	REP	PRWT	WO	115		72
146	Hamilton et al., 1994	2671	Rat (Rattus norvegicus)	4	U	DR	77	d	25	d	GE	F	REP	PRWT	WO	116		68
147	Fox et al., 1977	2633	Rat (Rattus norvegicus)	2	U	DR	21	d	NR	NR	LC	F	REP	PRWT	WO	120		68
148	Eyden et al, 1978	2618	Mouse (Mus musculus)	3	U	FD	8	w	2	mo	GE	M	REP	SPCV	TE	144	1440	78
149	Maker et al., 1973	2758	Mouse (Mus musculus)	7	U	FD	30	d	NR	NR	LC	F	REP	PRWT	WO	202	506	79
150	Maker et al., 1973	2758	Mouse (Mus musculus)	7	U	FD	30	d	NR	NR	LC	F	REP	PRWT	WO	202	506	79
151	Cramer et al, 1980	14816	Rat (Rattus norvegicus)	4	U	DR	21	d	NR	NR	GE	F	REP	DEYO	WO	276	552	74
152	Nathan et al., 1992	2785	Rat (Rattus norvegicus)	5	U	DR	10	w	NR	NR	AD	M	REP	TEWT	MT	294	587	71
153	Brady, et al, 1975	14795	Rat (Rattus norvegicus)	2	U	GV	102	d	30	d	GE	F	REP	PRWT	WO	441		69
154	Wenda-Rozewicka et al., 1996	2928	Rat (Rattus norvegicus)	2	U	DR	9	mo	NR	NR	SM	M	REP	RHIS	TE	600		66
155	Barrett and Livesey, 1983	10239	Rat (Rattus norvegicus)	4	U	FD	4	d	NR	NR	LC	F	REP	PRWT	WO	601	1500	86
156	Piasekand Kostial, 1987	2817	Rat (Rattus norvegicus)	4	U	DR	13	w	NR	NR	JV	M	REP	FERT	WO	639		66
157	Junaid et al., 1997	2725	Mouse (Mus musculus)	4	U	GV	60	d	NR	NR	AD	F	REP	RPRD	OV		2	77
158	Morris et al, 1938	15125	Rat (Rattus norvegicus)	3	U	FD	339	d	26-27	d	JV	B	REP	PRWT	WO		2.49	74
159	Schroeder and Mitchener, 1971	66	Rat (Rattus norvegicus)	2	U	DR	9	mo	21	d	JV	F	REP	DEYO	WO		2.94	67
160	Schroeder and Mitchener, 1971	66	Mouse (Mus musculus)	2	U	DR	6	mo	21	d	JV	F	REP	DEYO	WO		3.62	67
161	Gupta et al., 1995	2666	Mouse (Mus musculus)	4	U	GV	52	d	2	mo	GE	F	REP	PROG	EM		5.5	81
162	Saxena et. al. 1989	2857	Rat (Rattus norvegicus)	2	U	DR	120	d	1	d	GE	M	REP	SPCL	TE		6.76	69
163	Cernochova and Kamarad, 1992	2568	Mouse (Mus musculus)	2	U	DR	5	w	NR	NR	AD	M	REP	TEDG	TE		16.6	66
164	Al-Omar et al, 2000	20974	Mouse (Mus musculus)	2	M	GV	2	w	NR	NR	JV	M	REP	SPCL	SM		46.4	86
165	Winneke et al., 1977	3935	Rat (Rattus norvegicus)	2	U	FD	102	d	NR	NR	GE	F	REP	PROG	WO		49.6	78
166	Batra et al., 1998	2528	Rat (Rattus norvegicus)	2	U	GV	3	mo	8	w	SM	M	REP	TEDG	TE		50	81
167	Hayashi, 1983	3864	Rat (Rattus norvegicus)	2	U	DR	18	d	NR	NR	GE	F	REP	PRWT	WO		55.5	68
168	Kempinas et. al 1988	2733	Rat (Rattus norvegicus)	3	U	DR	90	d	NR	NR	AD	M	REP	SPCL	SM		61.2	69
169	Donald et al., 1981	2598	Mouse (Mus musculus)	2	U	DR	23	d	NR	NR	GE	F	REP	PRWT	WO		78.6	69
170	Donald et al., 1986	2599	Mouse (Mus musculus)	2	U	DR	62	d	NR	NR	GE	F	REP	PRWT	WO		99.8	69
171	Talcott and Koller, 1983	2906	Mouse (Mus musculus)	2	U	DR	18	w	6-8	w	LC	F	REP	PRWT	WO		137	69
172	Johansson and Wide, 1986	2723	Mouse (Mus musculus)	2	U	DR	12	w	9	w	SM	M	REP	PRFM	WO		139	74
173	Jacquet et al., 1997	2713	Mouse (Mus musculus)	4	U	FD	18	d	NR	NR	GE	F	REP	PRWT	WO		154	72
174	Wolfe et al, 1996	2502	Rat (Rattus norvegicus)	2	M	DR	4	w	99	d	JV	M	REP	SPCL	SM		171	78
175	Blanusa, et al, 1989	14750	Rat (Rattus norvegicus)	5	U	DR	6	w	4	mo	GE	F	REP	RHIS	WO		175	69

APPENDIX G-6

Summary of Mammalian Toxicity Data: Lead

Guidry Parish
St. Martin Parish, Louisiana

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Data Evaluation Score
176	Cramer et al, 1980	14816	Rat (Rattus norvegicus)	2	U	DR	22	d	NR	NR	GE	F	REP	PRWT	WO		178	69
177	Sokol et al., 1985	2888	Rat (Rattus norvegicus)	3	U	DR	30	d	52	d	JV	M	REP	GREP	PG		198	71
178	Hallen et al., 1995	2669	Rat (Rattus norvegicus)	2	U	DR	13	w	NR	NR	GE	F	REP	PRWT	WO		200	73
179	Rabe et al., 1985	13216	Rat (Rattus norvegicus)	2	U	DR	21	d	80	d	JV	F	REP	PRWT	WO		218	70
180	Mykkanen et al., 1980	2783	Rat (Rattus norvegicus)	4	U	FD	3	w	NR	NR	LC	F	REP	PRWT	WO		221	73
181	Hsu, 1980	2704	Rat (Rattus norvegicus)	2	U	FD	1	w	19	w	LC	F	REP	PRWT	WO		222	73
182	Mykkanen et al., 1980	2783	Rat (Rattus norvegicus)	4	U	FD	3	w	NR	NR	LC	F	REP	PRWT	WO		230	73
183	Alfano and Petit, 1982	2511	Rat (Rattus norvegicus)	3	U	FD	25	d	NR	NR	LC	F	REP	PRWT	WO		258	78
184	Yu et al, 1996	3939	Rat (Rattus norvegicus)	2	U	DR	21	d	NR	NR	LC	F	REP	PRWT	WO		330	68
185	Sokol, 1989	2887	Rat (Rattus norvegicus)	2	U	DR	30	d	52	d	JV	M	REP	SPCL	SM		354	69
186	Ronis et al., 1998	2845	Rat (Rattus norvegicus)	2	U	DR	17	d	NR	NR	GE	F	REP	PRWT	WO		360	68
187	Ronis et al., 1998	2845	Rat (Rattus norvegicus)	2	U	DR	24	d	NR	NR	LC	F	REP	PRWT	WO		360	68
188	Ronis et al., 1996	2846	Rat (Rattus norvegicus)	2	U	DR	12	d	NR	NR	GE	F	REP	PRWT	WO		362	69
189	Sokol, 1989	2887	Rat (Rattus norvegicus)	2	U	DR	30	d	27	d	JV	M	REP	SPCL	SM		364	69
190	Pinon-Lataillade et al., 1995	2821	Mouse (Mus musculus)	2	U	DR	44	d	NR	NR	GE	F	REP	PRWT	WO		381	68
191	Draski et al., 1989	3719	Mouse (Mus musculus)	2	U	DR	14	d	NR	NR	LC	F	REP	PRWT	WO		381	68
192	Ronis et al., 1996	2846	Rat (Rattus norvegicus)	2	U	DR	50	d	24	d	JV	F	REP	RBEH	WO		381	69
193	Rasile et. al. 1995	2836	Mouse (Mus musculus)	2	U	DR	45	d	50-100	d	GE	F	REP	ODVP	WO		404	69
194	Thoreux-Manlay et al., 1995	2909	Rat (Rattus norvegicus)	2	U	DR	22	d	NR	NR	GE	F	REP	PRWT	WO		420	68
195	Donald et al., 1987	2597	Mouse (Mus musculus)	2	U	DR	48	d	NR	NR	GE	F	REP	PRWT	WO		437	70
196	Marchlewicz et al., 1993	2760	Rat (Rattus norvegicus)	2	U	DR	9	mo	3	mo	SM	M	REP	SPCL	TE		579	69
197	Piasecka et. al. 1995	2816	Rat (Rattus norvegicus)	2	U	DR	9	mo	NR	NR	SM	M	REP	TEDG	TE		600	69
198	Piasek et al, 1988	14751	Rat (Rattus norvegicus)	2	U	DR	3	w	14	w	LC	F	REP	PRWT	WO		635	69
199	Jacquet, 1977	2711	Mouse (Mus musculus)	2	U	FD	7	d	NR	NR	GE	F	REP	RSUC	EM		646	73
200	Selvin-Testa et. al. 1997	2869	Rat (Rattus norvegicus)	2	U	DR	126	d	1	d	GE	F	REP	PROG	WO		651	66
201	Piasek and Kostial 1991	2818	Rat (Rattus norvegicus)	2	U	DR	20	w	10	w	GE	F	REP	PRWT	WO		750	73
202	Epstein, et.al. 1991	2614	Mouse (Mus musculus)	2	U	DR	4	d	NR	NR	LC	F	REP	PRWT	WO		762	68
203	Holtzman et al., 1981	2698	Rat (Rattus norvegicus)	2	U	FD	2	w	NR	NR	LC	F	REP	PRWT	WO		828	78
204	Holtzman et al, 1978	2699	Rat (Rattus norvegicus)	2	U	FD	7	d	NR	NR	LC	F	REP	PRWT	WO		833	78
205	Barlow et al., 1977	2523	Rat (Rattus norvegicus)	2	U	FD	21	d	NR	NR	LC	F	REP	PRWT	WO		991	74
206	Gulati et al, 1985	2837	Mouse (Mus musculus)	4	M	DR	18	w	11	w	JV	F	REP	TEWT	WO		1370	75
207	McConnell and Berry, 1979	2767	Rat (Rattus norvegicus)	2	U	FD	30	d	NR	NR	LC	F	REP	PRWT	WO		1770	73
208	Sharma and Kanwar, 1985	2871	Mouse (Mus musculus)	2	U	DR	14	w	NR	NR	GE	B	REP	PROG	WO		1990	70
209	Goldstein et al, 1974	14824	Rat (Rattus norvegicus)	2	U	FD	16	d	NR	NR	LC	F	REP	PROG	WO		2570	78
210	Holtzman et al, 1980	14827	Rat (Rattus norvegicus)	2	U	FD	7	d	NR	NR	LC	F	REP	PRWT	WO		2570	78
211	Krigman et al., 1974	2741	Rat (Rattus norvegicus)	2	U	FD	25	d	NR	NR	LC	F	REP	PRWT	WO		2570	78
212	Pentschew and Garro 1966	2811	Rat (Rattus norvegicus)	M	FD	27	d	NR	NR	LC	F	C	REP	PROG	WO		2840	78
213	Sharma and Kanwar, 1985	2871	Mouse (Mus musculus)	2	U	DR	14	w	21	d	JV	B	REP	PROG	WO		3630	70
214	Michaelson and Sauerhoff, 1974	2774	Rat (Rattus norvegicus)	2	U	FD	17	d	NR	NR	LC	F	REP	PRWT	WO		6170	74
Growth																		
215	Willoughby et al., 1972	14386	Horse (Equus caballus)	2	U	FD	15	w	20 to 21	w	JV	M	GRO	BDWT	WO	0.15		68
216	Fox et.al., 1982	2634	Rat (Rattus norvegicus)	2	U	FD	21	d	0	d	JV	F	GRO	BDWT	WO	0.5		67
217	Dilts and Ahokas, 1979	2593	Rat (Rattus norvegicus)	6	U	DR	21	d	NR	NR	GE	F	GRO	BDWT	WO	1	5	72
218	Kimmel et al., 1980	2737	Rat (Rattus norvegicus)	5	U	DR	7	d	50	d	AD	F	GRO	BDWT	WO	1.27	13	73
219	Lynch et al, 1975	14380	Cattle (Bos taurus)	4	U	OR	7	w	1	w	JV	M	GRO	BDWT	WO	1.99		75
220	Wiebe and Barr, 1988	2930	Rat (Rattus norvegicus)	3	U	DR	14	d	21	d	JV	F	GRO	BDWT	WO	2.4		72
221	Schroeder et al, 1963	14446	Rat (Rattus norvegicus)	2	U	DR	332	d	28	d	JV	B	GRO	BDWT	WO	2.98		66
222	Kimmel et al., 1980	2737	Rat (Rattus norvegicus)	4	U	DR	7	w	21	d	GE	F	GRO	BDWT	WO	4.7	8.9	80
223	Horwitt and Cowgill, 1937	3873	Dog (Canis familiaris)	3	M	FD	7	mo	NR	NR	JV	NR	GRO	BDWT	WO	4.71		68
224	Zheng et al., 1996	2944	Rat (Rattus norvegicus)	3	U	DR	30	d	22-24	d	JV	M	GRO	BDWT	WO	5.64	28.2	71
225	Hammond et al., 1989	2675	Rat (Rattus norvegicus)	4	U	DR	23	d	22	d	JV	F	GRO	BDWT	WO	5.8	29	73
226	Lynch et al., 1976	3711	Cattle (Bos taurus)	3	U	OR	84	d	NR	NR	JV	M	GRO	BDWT	WO	7.79		80
227	Rader et al., 1981	2830	Rat (Rattus norvegicus)	2	U	OR	6	w	NR	NR	AD	M	GRO	BDWT	WO	9.1		67
228	Nehru et al., 1997	2788	Rat (Rattus norvegicus)	2	U	GV	8	w	NR	NR	JV	F	GRO	BDWT	WO	10		78
229	Gruber et al., 1997	2660	Rat (Rattus norvegicus)	3	U	DR	6	mo	NR	NR	AD	M	GRO	BDWT	WO	10.6	532	69
230	Lorenzo et al., 1978	2751	Rabbit (Oryctolagus cuniculus)	3	U	GV	10	d	1	d	JV	F	GRO	BDWT	WO	10.7	50.4	78
231	El-Gazzar et al, 1978	21143	Rat (Rattus norvegicus)	2	U	DR	140	d	21	d	JV	M	GRO	BDWT	WO	10.7		67

APPENDIX G-6

Summary of Mammalian Toxicity Data: Lead

Guidry Parish
St. Martin Parish, Louisiana

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Data Evaluation Score
232	Rader et al., 1981	2830	Rat (Rattus norvegicus)	2	U	DR	6	w	NR	NR	JV	M	GRO	BDWT	WO	15.1		71
233	Mahaffey et al., 1977	14580	Rat (Rattus norvegicus)	2	UX	FD	10	w	NR	NR	JV	M	GRO	BDWT	WO	15.4		79
234	Rader et al., 1981	2830	Rat (Rattus norvegicus)	2	U	OR	6	w	NR	NR	AD	M	GRO	BDWT	WO	15.5		74
235	Rader et. al. 1981	2829	Rat (Rattus norvegicus)	2	U	DR	7	w	NR	NR	JV	M	GRO	BDWT	WO	16.1		71
236	Gerber et al, 1978	14822	Mouse (Mus musculus)	3	U	DR	14	d	0	d	JV	NR	GRO	BDWT	WO	16.3	163	71
237	Barratt et al., 1989	2524	Rat (Rattus norvegicus)	4	U	GV	9	w	10	w	JV	M	GRO	BDWT	WO	18	180	83
238	Morris et al, 1938	15125	Rat (Rattus norvegicus)	3	U	FD	339	d	26-27	d	JV	B	GRO	BDWT	WO	18.3		72
239	Tafelski and Lamperti, 1975	2905	Rat (Rattus norvegicus)	4	U	GV	29	d	NR	NR	SM	F	GRO	BDWT	WO	18.9		71
240	Mahaffey et al., 1973	2756	Rat (Rattus norvegicus)	7	U	DR	10	w	NR	NR	JV	M	GRO	BDWT	WO	24.3		71
241	Bull, et.. al., 1978	14812	Rat (Rattus norvegicus)	4	U	DR	56	d	70	d	LC	F	GRO	BDWT	WO	32.5		67
242	Fick et al., 1976	3704	Sheep (Ovis aries)	5	U	FD	84	d	NR	NR	JV	M	GRO	BDWT	WO	32.7		66
243	Bankowska and Hine, 1985	14852	Rat (Rattus norvegicus)	2	U	DR	10	w	NR	NR	JV	M	GRO	BDWT	WO	38.5		67
244	Logner et al., 1984	3889	Cattle (Bos taurus)	4	U	FD	7	w	16	w	JV	M	GRO	BDWT	WO	43		72
245	Agodi et al., 1990	2507	Rat (Rattus norvegicus)	2	U	GV	28	d	2	d	JV	B	GRO	BDWT	WO	50		79
246	Wolfe et al, 1996	2502	Rat (Rattus norvegicus)	5	M	DR	4	w	94	d	JV	M	GRO	BDWT	WO	71.5	178	82
247	Gelman and Michaelson, 1979	14821	Rat (Rattus norvegicus)	4	U	GV	12	d	2	d	JV	B	GRO	BDWT	WO	75	225	85
248	Rudra Pal et al., 1975	2806	Rat (Rattus norvegicus)	2	U	FD	4	w	NR	NR	JV	M	GRO	BDWT	WO	100		67
249	Goyer et al., 1970	14799	Rat (Rattus norvegicus)	6	U	DR	10	w	NR	NR	JV	M	GRO	BDWT	WO	120	383	71
250	Eyden et al, 1978	2618	Mouse (Mus musculus)	3	U	FD	4	w	3	mo	JV	B	GRO	BDWT	WO	136	1360	76
251	Talcott and Koller, 1983	2906	Mouse (Mus musculus)	2	U	DR	18	w	6-8	w	LC	F	GRO	BDWT	WO	137		67
252	Johansson and Wide, 1986	2723	Mouse (Mus musculus)	2	U	DR	12	w	NR	NR	GE	M	GRO	BDWT	WO	139		72
253	Sokol et al., 1985	2888	Rat (Rattus norvegicus)	3	U	DR	30	d	52	d	JV	M	GRO	BDWT	WO	169	508	74
254	Wolfe et al, 1996	2502	Rat (Rattus norvegicus)	2	M	DR	4	w	99	d	JV	B	GRO	BDWT	WO	171		76
255	Kishi et al., 1983	12025	Rat (Rattus norvegicus)	4	U	GV	18	d	3	d	JV	M	GRO	BDWT	WO	180		79
256	Wadi and Ahmad, 1999	2924	Mouse (Mus musculus)	3	U	DR	6	w	7	w	SM	M	GRO	BDWT	WO	187	373	69
257	Petrusz et al., 1979	2815	Rat (Rattus norvegicus)	4	U	GV	18	d	2	d	JV	B	GRO	BDWT	WO	200		70
258	Yagminas et al., 1990	3937	Rat (Rattus norvegicus)	2	U	GV	91	d	NR	NR	JV	M	GRO	BDWT	WO	200		79
259	Rabe et al., 1985	13216	Rat (Rattus norvegicus)	2	U	DR	21	d	80	d	JV	F	GRO	BDWT	WO	218		68
260	Mykkanen et al., 1980	2783	Rat (Rattus norvegicus)	4	U	FD	1	w	NR	NR	LC	F	GRO	BDWT	WO	230	460	77
261	Sourgens et al., 1987	2889	Rat (Rattus norvegicus)	4	U	DR	30	d	NR	NR	JV	M	GRO	BDWT	WO	285		67
262	Exon et al., 1979	3847	Mouse (Mus musculus)	5	U	DR	10	w	NR	NR	JV	M	GRO	BDWT	WO	362		67
263	Sokol, 1989	2887	Rat (Rattus norvegicus)	2	U	DR	30	d	52	d	JV	M	GRO	BDWT	WO	364		67
264	Holtzman et al., 1982	2697	Rat (Rattus norvegicus)	4	U	GV	14	d	14	d	JV	NR	GRO	BDWT	WO	400	800	85
265	Holtzman et al., 1982	2697	Rat (Rattus norvegicus)	5	U	GV	14	d	20	d	JV	NR	GRO	BDWT	WO	400	800	85
266	Gerber et al, 1978	14822	Rat (Rattus norvegicus)	2	U	FD	14	mo	0	d	JV	NR	GRO	BDWT	WO	431		70
267	Brady, et al, 1975	14795	Rat (Rattus norvegicus)	2	U	GV	102	d	30	d	LC	F	GRO	BDWT	WO	441		67
268	Stewart et al., 1998	2896	Mouse (Mus musculus)	4	U	GV	12	d	6	d	JV	M	GRO	BDWT	WO	534		79
269	Maker et al., 1973	2758	Mouse (Mus musculus)	7	U	FD	30	d	NR	NR	LC	F	GRO	BDWT	WO	632	1264	77
270	Selvin-Testa et. al. 1997	2869	Rat (Rattus norvegicus)	2	U	DR	126	d	1	d	GE	F	GRO	BDWT	WO	651		66
271	Piasek and Kostial 1991	2818	Rat (Rattus norvegicus)	2	U	DR	20	w	10	w	GE	F	GRO	BDWT	WO	750		71
272	Maker et al., 1973	2758	Mouse (Mus musculus)	7	U	FD	28	d	NR	NR	LC	F	GRO	BDWT	WO	1260	2530	77
273	Barrett and Livesey, 1983	10239	Rat (Rattus norvegicus)	4	U	FD	18	d	NR	NR	LC	F	GRO	BDWT	WO	1500		71
274	Schroeder et al, 1970	252	Rat (Rattus norvegicus)	2	U	DR	9	d	21	d	JV	M	GRO	BDWT	WO		3.3	72
275	Kelliher, et al. 1973	14377	Cattle (Bos taurus)	2	U	FD	283	d	7	mo	JV	M	GRO	BDWT	WO		15	76
276	Hamilton and O'Flaherty, 1994	2670	Rat (Rattus norvegicus)	3	U	DR	92	d	25	d	GE	F	MPH	GMPH	TB		28.7	70
277	Hamilton et al., 1994	2671	Rat (Rattus norvegicus)	4	U	DR	7	d	25	d	GE	F	GRO	BDWT	WO		29	66
278	Hammond and Succop, 1995	2678	Rat (Rattus norvegicus)	2	U	DR	5	d	26	d	JV	F	GRO	BDWT	WO		29	66
279	Hammond et al., 1993	2677	Rat (Rattus norvegicus)	2	U	DR	26	d	22	d	JV	F	GRO	BDWT	WO		29.5	70
280	Hammond et al., 1993	2677	Rat (Rattus norvegicus)	2	U	DR	14	d	26	d	JV	F	MPH	Other	TA		29.9	69
281	Minnema and Hammond, 1994	2776	Rat (Rattus norvegicus)	2	U	DR	10	d	26	d	JV	F	GRO	BDWT	WO		30.4	67
282	Al-Omar et al, 2000	20974	Mouse (Mus musculus)	2	M	GV	3	w	NR	NR	JV	M	GRO	BDWT	WO		46.4	84
283	White, 1977	2929	Dog (Canis familiaris)	2	U	OR	5	w	<1	yr	JV	NR	GRO	BDWT	WO		50	84
284	Pankakoski et al., 1994	2807	Shrew (Sorex araneus)	4	M	FD	31	d	NR	NR	JV	B	GRO	BDWT	WO		61.5	76
285	Shailesh Kumar and Desiraju, 1990	2870	Rat (Rattus norvegicus)	3	U	GV	58	d	2	d	JV	B	GRO	BDWT	WO		100	79
286	Hsu et al, 1975	14376	Pig (Sus scrofa)	2	U	FD	13	w	4	w	JV	NR	GRO	BDWT	WO		173	73
287	Harry et al., 1985	2680	Rat (Rattus norvegicus)	2	U	GV	29	d	2	d	JV	F	GRO	BDWT	WO		200	79
288	Lessler and Wright, 1976	2750	Rat (Rattus norvegicus)	2	U	FD	5	w	NR	NR	MA	NR	GRO	BDWT	WO		272	72

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Summary of Mammalian Toxicity Data: Lead

Guidry Parish
St. Martin Parish, Louisiana

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Data Evaluation Score
289	Press 1975	2827	Rat (Rattus norvegicus)	2	U	GV	6	d	1	d	JV	B	GRO	BDWT	WO		328	79
290	Sokol, 1989	2887	Rat (Rattus norvegicus)	2	U	DR	30	d	27	d	JV	M	GRO	BDWT	WO		354	67
291	Ronis et al., 1996	2846	Rat (Rattus norvegicus)	2	U	DR	50	d	24	d	JV	M	GRO	BDWT	WO		371	67
292	Toews et al., 1983	2911	Rat (Rattus norvegicus)	2	U	GV	28	d	2	d	JV	M	GRO	BDWT	WO		400	79
293	Holtzman et al., 1982	2697	Rat (Rattus norvegicus)	4	U	GV	14	d	18	d	JV	NR	GRO	BDWT	WO		400	79
294	Rasile et. al. 1995	2836	Mouse (Mus musculus)	2	U	DR	45	d	50-100	d	GE	F	GRO	BDWT	WO		404	67
295	Mykkanen et al., 1980	2783	Rat (Rattus norvegicus)	4	U	FD	1	w	NR	NR	LC	F	GRO	BDWT	WO		442	71
296	Piasek et al, 1988	14751	Rat (Rattus norvegicus)	2	U	DR	6	w	14	w	LC	F	GRO	BDWT	WO		638	67
297	Gulati et al, 1985	2837	Mouse (Mus musculus)	4	M	DR	10	w	11	w	JV	F	GRO	BDWT	WO		748	73
298	Barlow et al., 1977	2523	Rat (Rattus norvegicus)	2	U	FD	21	d	NR	NR	LC	F	GRO	BDWT	WO		991	72
299	Brashear et al., 1978	2546	Rat (Rattus norvegicus)	2	U	GV	18	d	2	d	JV	B	GRO	BDWT	WO		1000	79
300	Gerber et al, 1978	14822	Rat (Rattus norvegicus)	2	U	FD	2	w	0	d	JV	NR	GRO	BDWT	WO		1430	72
301	Holtzman et al., 1982	2697	Rat (Rattus norvegicus)	4	U	GV	14	d	24	d	JV	NR	GRO	BDWT	WO		1600	79
302	Holtzman et al., 1981	2698	Rat (Rattus norvegicus)	2	U	FD	2	w	60-80	d	JV	M	GRO	BDWT	WO		2390	69
303	Holtzman et al., 1982	2697	Rat (Rattus norvegicus)	3	U	GV	14	d	16	d	JV	NR	GRO	BDWT	WO		2400	79
304	Holtzman et al, 1980	14827	Rat (Rattus norvegicus)	2	U	FD	14	d	60	d	JV	M	GRO	BDWT	WO		2650	77
Survival																		
305	Schroeder and Mitchener, 1975	1858	Mouse (Mus musculus)	2	U	DR	669	d	19-20	d	JV	B	MOR	LFSP	WO	3.5		68
306	Junaid et al., 1997	2725	Mouse (Mus musculus)	4	U	GV	60	d	NR	NR	AD	F	MOR	MORT	WO	4	8	82
307	Lynch et al., 1976	3711	Cattle (Bos taurus)	3	U	OR	84	d	NR	NR	JV	M	MOR	SURV	WO	7.79		85
308	Lorenzo et al., 1978	2751	Rabbit (Oryctolagus cuniculus)	5	U	GV	30	d	1	d	JV	F	MOR	MORT	WO	10.7	50.4	84
309	Azar et al., 1973	3747	Rat (Rattus norvegicus)	5	M	FD	2	yr	NR	NR	NR	M	MOR	MORT	WO	10.9	42.4	81
310	Logner et al., 1984	3889	Cattle (Bos taurus)	4	U	FD	10	d	74	d	JV	M	MOR	MORT	WO	16	43	88
311	Azar et al., 1973	3747	Dog (Canis familiaris)	5	M	FD	2	yr	NR	NR	NR	B	MOR	MORT	WO	24.7		68
312	Jessup, 1967	2720	Rabbit (Oryctolagus cuniculus)	3	U	FD	10	d	NR	NR	GE	F	MOR	MORT	WO	29.2		72
313	Lassen and Buck, 1979	3709	Pig (Sus scrofa)	5	U	DR	13	w	6	w	JV	NR	MOR	MORT	WO	30.2		68
314	Bankowska and Hine, 1985	14852	Rat (Rattus norvegicus)	2	U	DR	4	w	NR	NR	JV	M	MOR	MORT	WO	40.3		68
315	Al-Omar et al, 2000	20974	Mouse (Mus musculus)	2	M	GV	5	w	NR	NR	JV	M	MOR	MORT	WO	46.4		85
316	Carpenter, 1982	2565	Hamster (Mesocricetus auratus)	2	U	DR	51	d	15	w	GE	F	MOR	MORT	WO	64.8		68
317	Carpenter, 1982	2565	Hamster (Mesocricetus auratus)	2	U	DR	14	d	11	w	GE	F	MOR	MORT	WO	64.9		68
318	Jessup and Shott, 1969	11831	Rat (Rattus norvegicus)	5	U	FD	92	w	21	d	JV	M	MOR	SURV	WO	74.9		73
319	Jessup, 1969	2721	Rat (Rattus norvegicus)	4	U	FD	8	w	NR	NR	GE	B	MOR	SURV	WO	78.9		73
320	Azar et al., 1973	3747	Rat (Rattus norvegicus)	3	M	FD	2	yr	NR	NR	NR	M	MOR	MORT	WO	87.5	163	83
321	Wolfe et al, 1996	2502	Rat (Rattus norvegicus)	5	U	DR	24	w	94	d	JV	B	MOR	MORT	WO	104		77
322	Lessler and Wright, 1976	2750	Rat (Rattus norvegicus)	2	U	FD	24	w	NR	NR	YO	M	MOR	MORT	WO	170		73
323	Lessler and Wright, 1976	2750	Rat (Rattus norvegicus)	2	U	FD	8	w	NR	NR	MA	M	MOR	MORT	WO	170		66
324	Petrusz et al., 1979	2815	Rat (Rattus norvegicus)	4	U	GV	18	d	2	d	JV	B	MOR	MORT	WO	200		80
325	Ogilvie and Martin, 1981	2799	Mouse (Mus musculus)	2	U	DR	10	mo	NR	NR	AD	M	MOR	MORT	WO	379		68
326	Holtzman et al., 1982	2697	Rat (Rattus norvegicus)	5	U	GV	14	d	20	d	JV	NR	MOR	MORT	WO	400	800	86
327	Holtzman et al., 1982	2697	Rat (Rattus norvegicus)	4	U	GV	14	d	24	d	JV	NR	MOR	MORT	WO	400	800	86
328	Rasile et. al. 1995	2836	Mouse (Mus musculus)	2	U	DR	98	d	50-100	d	GE	F	MOR	MORT	WO	404		68
329	Piasekand Kostial, 1987	2817	Rat (Rattus norvegicus)	4	U	DR	18	w	NR	NR	JV	M	MOR	MORT	WO	639		72
330	Holtzman et al., 1982	2697	Rat (Rattus norvegicus)	4	U	GV	14	d	24	d	JV	NR	MOR	MORT	WO	2000	2400	86
331	Holtzman et al., 1982	2697	Rat (Rattus norvegicus)	3	U	GV	14	d	14	d	JV	NR	MOR	MORT	WO	3200		80
332	Kanisawa and Schroeder, 1969	3701	Rat (Rattus norvegicus)	2	U	DR	727	d	30	d	JV	F	MOR	LFSP	WO		0.569	67
333	Zmudski et al., 1983	3940	Cattle (Bos taurus)	4	U	DR	21	d	10	w	JV	M	MOR	MORT	WO		2.7	72
334	Schroeder et al, 1963	14446	Rat (Rattus norvegicus)	2	U	DR	6	mo	28	d	JV	B	MOR	SURV	WO		2.87	67
335	Schroeder et al, 1964	14447	Mouse (Mus musculus)	2	U	DR	21	mo	21	d	JV	M	MOR	SURV	WO		3.1	73
336	Wells, et.al, 1986	14803	Cattle (Bos taurus)	2	U	DR	8	d	3	mo	JV	M	MOR	MORT	WO		20	72
337	Pankakoski et al., 1994	2807	Shrew (Sorex araneus)	4	M	FD	31	d	NR	NR	JV	B	MOR	MORT	WO		61.5	77
338	Press 1975	2827	Rat (Rattus norvegicus)	2	U	GV	14	d	1	d	JV	B	MOR	MORT	WO		328	80
339	Shailesh Kumar and Desiraju, 1990	2870	Rat (Rattus norvegicus)	2	U	GV	58	d	2	d	JV	B	MOR	MORT	WO		400	84
340	Holtzman et al., 1982	2697	Rat (Rattus norvegicus)	4	U	GV	14	d	16	d	JV	NR	MOR	MORT	WO		400	80
341	Eyden et al, 1978	2618	Mouse (Mus musculus)	6	U	FD	115	d	NR	NR	AD	B	MOR	SURV	WO		635	72
342	Gulati et al, 1985	2837	Mouse (Mus musculus)	4	M	DR	18	w	11	w	JV	B	MOR	MORT	WO		670	74
343	Lamb et al., 1997	2505	Mouse (Mus musculus)	4	U	DR	105	d	6	w	JV	B	MOR	MORT	WO		670	72

APPENDIX G-6

Summary of Mammalian Toxicity Data: Lead

Guidry Parish
St. Martin Parish, Louisiana

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Data Evaluation Score
ACTP = accuracy of learned behavior; ACTV = activity level; AD = adult; ALAD =(delta) -aminolevulinic acid dehydrogenase; AVO = avoidance; B = both; B2MG = beta2-microglobulin; BL = blood; BLPR = blood pressure; BDWT = body weight changes; BEH = behavior; BR = brain; BTMP = body temperature; BUNT = blood urea nitrogen; CALC = calcium; CHM = chemical changes;d = days; DEYO = death of young; DHYD = dehdyration; DOPA = dopamine; DR = Drinking water; EDMA = edema; EM = embryo; ENCP = encephalopathy; ENZ = enyzme level changes; EXCR = excretion; EY = eye; F = female; FCNS = food consumption; FD = food; FDB = feeding behavior; FERT = fertility; FOOD = food avoidance; G6PD = glucose-6-phosphate dehydrogenase; GBCM = general biochemical; GE = gestation; GHIS = general histology; GLSN = gross lesions; GMPH = general morphology; GPHY = general physiology; GREP = general reproductive effect; GRO = growth; GRS = gross body weight changes; GV = gavage; HE = heart; HIS = histological changes; HMCT = hematocrit; HMGL = hemoglobin; HRM = hormone changes; IIBD = intranuclear inclusion bodies; ITX = intoxication; JV = juvenile; kg = kilograms; KI = kidney; L = liter; LC = lactation; LFSP = lifespan; LI = liver; LOAEL lowest observed adverse effect level; mo = months; M = male; M = measured; MA = mature; MOR = effects on mortality and survival; MORT = mortality; MT = multiple tissues/organs; NCRO = necrosis; NE = nervous tissue; NOAEL = No Observed Advese Effect Level; NORE = norephinephrine; NR = Not reported; ODVP = offspring development; OR = other oral; ORW = organ weight changes; ORWT = organ weight changes; OV = ovaries; PARL = paralysis; PCLV = packed cell volume; PG = prostate gland; PHY = physiology; PI = pituitary gland; POTA = potassium; PRFM = sexual performance; PROG = progeny numbers/counts; PRTL = total protein; PRWT = progeny weight; PTH = pathology; RBCE = red blood cell count; RBEH = reproductive behavior; REP = reproduction; RHIS = reproductive organ histology; RPRD = reproductive capacity; RRSP = righting response; RSEM = resorbed embryos; RSUC = reproductive success (general); RT = reproductive tissue; SCDH = succinate dehydrogenase; SM = sperm; SM = sexually mature; SMIX = weight relative to body weight; SOMC = somatomedin C; SPCL = sperm cell counts; SPCV = sperm cell viability; SR = serum; SURV = survival; SV = seminal vesicle; TA = tail; TB = tibia;TE = testes; TEDG = testes degeneration; TEWT = testes weight; U = unmeasured; UR = urine; USTR = ultrastructural changes; UX = measured but values not reported; w = weeks; WCON = water consumption; WO = whole organism; YO = young; y = year.																	

Note: Study results excerpted from the Eco-SSL document for Lead.

Geometric Mean NOAEL	Geometric Mean LOAEL
46.98	165.64

APPENDIX G-7

Summary of Avian Toxicity Data: Selenium

Guidry Property
St. Martin Parish, Louisiana

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Data Evaluation Score
Reproduction (REP)																		
85	Thapar et al 1969	1592	Chicken (Gallus domesticus)	3	U	FD	76	w	1	d	LB	F	EGG	EGWT	EG	0.092	0.368	83
86	Stanley et al, 1996	1569	Mallard (Anas platyrhynchos)	3	UX	FD	122	d	1	yr	AD	B	REP	HTCH	WO	0.212	0.425	89
87	Poley and Moxon, 1937	3788	Chicken (Gallus domesticus)	4	U	FD	1	w	NR	NR	LB	F	REP	RSUC	WO	0.214	0.429	85
88	Heinz et. al., 1989	1354	Duck (Anas platyrhynchos)	6	UX	FD	46	d	NR	NR	LB	B	REP	PROG	WO	0.219	0.438	90
89	Ort and Latshaw, 1978	1489	Chicken (Gallus domesticus)	4	U	FD	28	w	32	w	LB	F	REP	HTCH	WO	0.247	0.412	85
90	Hoffman and Heinz, 1988	1372	Mallard (Anas platyrhynchos)	5	UX	FD	6	w	NR	NR	LB	B	REP	RSUC	WO	0.273	0.546	89
91	Moksnes and Norheim, 1982	1465	Chicken (Gallus domesticus)	4	U	FD	31	w	20	w	LB	B	REP	PROG	WO	0.284		70
92	Moksnes, 1983	1464	Chicken (Gallus domesticus)	6	U	FD	18	w	20	w	LB	F	EGG	EGWT	EG	0.292		79
93	Thapar et al 1969	1592	Chicken (Gallus domesticus)	3	U	FD	105	w	1	d	LB	F	REP	PROG	WO	0.378		70
94	Albers et al 1996	1208	Duck (Anas platyrhynchos)	5	U	FD	16	w	1	yr	AD	M	REP	TEWT	TE	0.644	1.29	81
95	Heinz et. al., 1989	1354	Duck (Anas platyrhynchos)	2	UX	FD	49	d	NR	NR	LB	B	REP	PROG	WO	0.89		70
96	Stoewsand, etl al, 1977	1574	Japanese Quail (Coturnix japonica)	2	U	FD	10	w	2	w	LB	B	EGG	ESTH	WO	0.896		75
97	Heinz and Hoffman, 1987	1356	Mallard (Anas platyrhynchos)	6	UX	FD	57	w	2	yr	LB	F	REP	NDAY	WO	1.03	2.58	87
98	Santolo et al 1999	1535	American Kestrel (Falco sparverius)	3	M	FD	11	w	NR	mo	LB	F	EGG	EGWT	EM	1.37		83
99	Stoewsand, etl al, 1977	1574	Japanese Quail (Coturnix japonica)	2	M	FD	10	w	NR	NR	JV	B	EGG	ESTH	WO	3.64		80
100	Arnold et al, 1973	69	Chicken (Gallus domesticus)	3	U	FD	24	w	1	d	LB	F	EGG	EGWT	EG		0.0911	79
101	Kaantee and Kurkela, 1980	36819	Chicken (Gallus domesticus)	3	M	FD	2	w	18	mo	LB	F	REP	PROG	WO		0.0988	85
102	Stone and Soares, 1976	2898	Japanese Quail (Coturnix japonica)	2	U	FD	32	d	NR	NR	LB	F	REP	PROG	WO		0.12	79
103	Poley et al., 1937	3787	Chicken (Gallus domesticus)	2	M	FD	1	w	NR	NR	LB	F	REP	HTCH	WO		0.127	79
104	Stanley et al., 1994	1570	Mallard (Anas platyrhynchos)	2	M	FD	93	d	1	yr	LB	B	REP	TERA	EM		0.355	83
105	Heinz and Hoffman 1998	1353	Mallard (Anas platyrhynchos)	2	M	FD	75	d	18	mo	LB	F	REP	TERA	EM		0.456	84
106	Heinz and Hoffman 1996	1352	Mallard (Anas platyrhynchos)	2	M	FD	4	w	NR	mo	LB	F	REP	TERA	EM		0.524	83
107	Hoffman and Heinz, 1988	1372	Mallard (Anas platyrhynchos)	2	UX	FD	6	w	NR	NR	LB	B	REP	ABNM	WO		0.546	83
108	Heinz and Hoffman 1996	1352	Mallard (Anas platyrhynchos)	2	M	FD	4	w	NR	mo	LB	F	REP	TERA	EM		0.58	83
109	Heinz and Hoffman 1996	1352	Mallard (Anas platyrhynchos)	2	M	FD	4	w	NR	mo	LB	F	REP	TPRD	EM		0.614	77
110	Smith et al, 1988	1562	Black-crowned night-heron (Nycticorax nycti	2	UX	FD	92	d	NR	NR	LB	B	REP	ODVP	WO		0.675	76
111	El-Begerami et al, 1977	1291	Japanese Quail (Coturnix japonica)	3	U	FD	16	w	1	d	JV	B	REP	ABNM	WO		0.702	78
112	El-Begearmi et al, 1982	6433	Japanese Quail (Coturnix japonica)	2	U	FD	16	w	NR	NR	LB	F	REP	HTCH	WO		0.78	78
113	Stoewsand et al., 1978	1575	Japanese Quail (Coturnix japonica)	2	U	FD	5	w	15	d	JV	F	REP	EGPN	WO		0.826	78
114	Heinz and Hoffman, 1987	1356	Mallard (Anas platyrhynchos)	2	UX	FD	41	d	2	yr	LB	F	REP	PROG	WO		0.898	85
115	Heinz and Fitzgerald, 1993	36813	Mallard (Anas platyrhynchos)	2	M	FD	21	w	NR	NR	LB	F	REP	PROG	WO		1.19	84
116	Wiemeyer and Hoffman, 1996	1622	Owl (Otus asio)	3	M	FD	3	mo	3	yr	LB	B	REP	PLBR	WO		4.49	85
Growth (GRO)																		
117	Colnago et al, 1984	9356	Chicken (Gallus domesticus)	3	M	FD	24	d	1	d	JV	M	GRO	BDWT	WO	0.0632		73
118	Jensen, 1986	1402	Chicken (Gallus domesticus)	4	U	FD	3	w	1	d	JV	M	GRO	BDWT	WO	0.074	0.37	75
119	Hegazy and Adachi, 2000	7725	Chicken (Gallus domesticus)	2	U	FD	15	d	1	d	JV	NR	GRO	BDWT	WO	0.0859		70
120	Thapar et al 1969	1592	Chicken (Gallus domesticus)	3	U	FD	4	w	1	d	JV	B	GRO	BDWT	WO	0.18	0.721	81
121	Hill 1979	397	Chicken (Gallus domesticus)	4	U	FD	5	w	1	d	JV	F	GRO	BDWT	WO	0.204	0.408	77
122	Echevarria et al., 1988	1289	Chicken (Gallus domesticus)	4	U	FD	3	w	1	d	JV	M	GRO	BDWT	WO	0.213	0.426	82
123	Moksnes and Norheim, 1982	1465	Chicken (Gallus domesticus)	4	U	FD	31	w	20	w	JV	B	GRO	BDWT	WO	0.284		68
124	Moksnes, 1983	1464	Chicken (Gallus domesticus)	6	U	FD	18	w	20	w	SM	F	GRO	BDWT	WO	0.292		77
125	Moksnes and Norheim, 1982	1465	Chicken (Gallus domesticus)	4	U	FD	6	w	1	d	JV	B	GRO	BDWT	WO	0.319		68
126	Arnold et al, 1973	69	Chicken (Gallus domesticus)	3	U	FD	104	w	1	d	JV	B	GRO	BDWT	WO	0.371		68
127	Thapar et al 1969	1592	Chicken (Gallus domesticus)	3	U	FD	105	w	1	d	JV	F	GRO	BDWT	WO	0.379		68
128	Poley and Moxon, 1937	3788	Chicken (Gallus domesticus)	4	U	FD	6	w	NR	NR	SM	F	GRO	BDWT	WO	0.429		68
129	Hill, 1974	1369	Chicken (Gallus domesticus)	6	U	FD	2	w	1	d	JV	B	GRO	BDWT	WO	0.429	0.859	82
130	Jensen et al., 1977	1404	Chicken (Gallus domesticus)	5	U	FD	2	w	1	d	JV	B	GRO	BDWT	WO	0.617	1.23	77
131	O'Toole and Raisbeck 1997	1476	Mallard (Anas platyrhynchos)	4	U	FD	21	d	NR	NR	JV	M	GRO	BDWT	WO	0.69	1.73	79
132	Cantor et al., 1984	1245	Chicken (Gallus domesticus)	4	U	DR	7	d	6	d	JV	M	GRO	BDWT	WO	0.718	1.44	78
133	Sell and Horani, 1976	1550	Japanese Quail (Coturnix japonica)	2	U	FD	23	d	8	d	JV	B	GRO	BDWT	WO	0.909		69
134	Yamamoto et al, 1998	1636	American Kestrel (Falco sparverius)	3	M	FD	77	d	NR	NR	MA	M	GRO	BDWT	WO	1.06		68
135	Hoffman et al, 1991	1377	Mallard (Anas platyrhynchos)	3	UX	FD	4	w	1	d	JV	B	GRO	BDWT	WO	1.13	4.53	86
136	Hoffman et al, 1992	1378	Mallard (Anas platyrhynchos)	3	UX	FD	4	w	1	d	JV	B	GRO	BDWT	WO	1.23	4.94	86
137	Ansari and Britton, 1974	36789	Chicken (Gallus domesticus)	2	U	FD	10	d	1	d	JV	M	GRO	BDWT	WO	1.38		67

APPENDIX G-7

Summary of Avian Toxicity Data: Selenium

Guidry Property
St. Martin Parish, Louisiana

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Data Evaluation Score
138	Howell and Hill, 1978	1387	Chicken (Gallus domesticus)	2	U	FD	20	d	1	d	JV	B	GRO	BDWT	WO	1.42		67
139	Cantor et al., 1984	1245	Chicken (Gallus domesticus)	4	U	DR	7	d	9	d	JV	B	GRO	BDWT	WO	1.45	2.9	78
140	Heinz et al 1988	1355	Mallard (Anas platyrhynchos)	5	UX	FD	3	w	1	d	JV	NR	GRO	BDWT	WO	1.74	3.48	89
141	Heinz et al 1988	1355	Mallard (Anas platyrhynchos)	5	UX	FD	3	w	1	d	JV	NR	GRO	BDWT	WO	2.13	4.26	89
142	Heinz et al 1996	1357	Mallard (Anas platyrhynchos)	2	U	FD	2	w	1	d	JV	NR	GRO	BDWT	WO	3.04		72
143	Heinz et al 1996	1357	Mallard (Anas platyrhynchos)	3	U	FD	2	w	1	d	JV	NR	GRO	BDWT	WO	4.16	8.32	84
144	Heinz et al 1996	1357	Mallard (Anas platyrhynchos)	3	U	FD	1	w	1	d	JV	NR	GRO	BDWT	WO	5.75	11.5	84
145	Jensen et al., 1977	1404	Chicken (Gallus domesticus)	5	U	FD	2	w	1	d	JV	B	GRO	BDWT	WO	6.34	11.9	77
146	Heinz et al 1996	1357	Mallard (Anas platyrhynchos)	3	U	FD	2	w	1	d	JV	NR	GRO	BDWT	WO	7.31		72
147	El-Begearmi and Combs, 1982	1290	Chicken (Gallus domesticus)	4	U	FD	4	w	1	d	JV	B	GRO	BDWT	WO		0.0912	77
148	Poley et al., 1937	3787	Chicken (Gallus domesticus)	2	M	FD	1	w	NR	NR	SM	F	GRO	BDWT	WO		0.127	77
149	El-Begearmi and Combs, 1982	1290	Chicken (Gallus domesticus)	3	U	FD	4	w	1	d	JV	B	GRO	BDWT	WO		0.13	77
150	El-Begearmi and Combs, 1982	1290	Chicken (Gallus domesticus)	4	U	FD	4	w	1	d	JV	B	GRO	BDWT	WO		0.18	77
151	Fairbrother and Fowles, 1990	1297	Mallard (Anas platyrhynchos)	3	U	DR	9	d	9	mo	JV	M	GRO	BDWT	WO		0.275	72
152	Dafalla and Adam, 1986	1273	Chicken (Gallus domesticus)	3	U	FD	2	w	7	d	JV	B	GRO	BDWT	WO		0.306	77
153	Khan et al, 1993	1415	Chicken (Gallus domesticus)	2	U	GV	28	d	43	d	JV	B	GRO	BDWT	WO		0.5	84
154	Khan et al, 1993	5483	Chicken (Gallus domesticus)	2	U	OR	4	w	NR	NR	JV	B	GRO	BDWT	WO		0.5	79
155	Sell and Horani, 1976	1550	Chicken (Gallus domesticus)	2	U	FD	28	d	1	d	JV	M	GRO	BDWT	WO		0.629	78
156	Elzubeir and Davis, 1988	1294	Chicken (Gallus domesticus)	2	U	FD	24	d	14	d	JV	M	GRO	BDWT	WO		0.788	77
157	Davis, el. al. 1996	1278	Chicken (Gallus domesticus)	2	U	FD	21	d	14	d	JV	M	GRO	BDWT	WO		0.855	77
158	Hill, 1979	1370	Chicken (Gallus domesticus)	2	U	FD	2	w	1	d	JV	B	GRO	BDWT	WO		0.859	71
159	Stoewsand, etl al, 1977	1574	Japanese Quail (Coturnix japonica)	2	U	FD	10	w	2	w	JV	B	GRO	BDWT	WO		0.896	77
160	Heinz and Fitzgerald, 1993	36813	Mallard (Anas platyrhynchos)	2	M	FD	21	w	NR	NR	SM	B	GRO	BDWT	WO		1.08	75
161	Hoffman et al, 1992	1376	Duck (Anas platyrhynchos)	3	UX	FD	4	w	1	d	JV	B	GRO	BDWT	WO		1.2	82
162	Berg and Martinson, 1972	93	Chicken (Gallus domesticus)	3	U	FD	2	w	1	d	JV	NR	GRO	BDWT	WO		1.38	77
163	Lowry and Baker, 1989	1445	Chicken (Gallus domesticus)	2	U	FD	14	d	8	d	JV	M	GRO	BDWT	WO		1.55	77
164	Hill, 1979	1370	Chicken (Gallus domesticus)	2	U	FD	2	w	1	d	JV	B	GRO	BDWT	WO		1.72	71
165	Howell and Hill, 1978	1387	Chicken (Gallus domesticus)	2	U	FD	21	d	1	d	JV	B	GRO	BDWT	WO		1.78	76
166	Donaldson and McGowan, 1989	1285	Chicken (Gallus domesticus)	3	U	FD	20	d	1	d	JV	M	GRO	BDWT	WO		2.27	77
167	Hill, 1980	395	Chicken (Gallus domesticus)	2	U	FD	1	w	1	d	JV	F	GRO	BDWT	WO		2.76	71
168	Stoewsand, etl al, 1977	1574	Japanese Quail (Coturnix japonica)	2	M	FD	10	w	NR	NR	JV	B	GRO	BDWT	WO		3.64	82
Survival (MOR)																		
169	Arnold et al, 1973	69	Chicken (Gallus domesticus)	3	U	FD	24	w	1	d	JV	F	MOR	MORT	WO	0.093	0.371	82
170	Van Vleet et al, 1981	80	Duck (Anas platyrhynchos)	2	U	FD	15	d	1	d	JV	M	MOR	MORT	WO	0.153		77
171	El-Begearmi and Combs, 1982	1290	Chicken (Gallus domesticus)	4	U	FD	2	w	1	d	JV	B	MOR	MORT	WO	0.29	0.579	84
172	Moksnes, 1983	1464	Chicken (Gallus domesticus)	6	U	FD	18	w	20	w	SM	F	MOR	MORT	WO	0.292		78
173	Thapar et al 1969	1592	Chicken (Gallus domesticus)	3	U	FD	76	w	1	d	JV	F	MOR	MORT	WO	0.368		78
174	Thapar et al 1969	1592	Chicken (Gallus domesticus)	3	U	FD	105	w	1	d	JV	B	MOR	MORT	WO	0.378		77
175	El-Begearmi and Combs, 1982	1290	Chicken (Gallus domesticus)	3	U	FD	2	w	1	d	JV	B	MOR	MORT	WO	0.412	0.823	84
176	Heinz and Fitzgerald 1993	1350	Mallard (Anas platyrhynchos)	5	UX	FD	13	w	NR	mo	AD	M	MOR	MORT	WO	0.563	1.13	85
177	El-Begearmi and Combs, 1982	1290	Chicken (Gallus domesticus)	4	U	FD	2	w	1	d	JV	B	MOR	MORT	WO	0.572	1.14	84
178	Stoewsand et al., 1974	1577	Japanese Quail (Coturnix japonica)	2	U	FD	4	w	1	d	JV	B	MOR	MORT	WO	0.61		77
179	Sell and Horani, 1976	1550	Chicken (Gallus domesticus)	2	U	FD	28	d	1	d	JV	M	MOR	MORT	WO	0.629		79
180	Echevarria et al., 1988	1289	Chicken (Gallus domesticus)	4	U	FD	3	w	1	d	JV	M	MOR	MORT	WO	0.64		68
181	O'Toole and Raisbeck 1997	1476	Mallard (Anas platyrhynchos)	4	U	FD	50	d	NR	NR	AD	M	MOR	MORT	WO	0.699	4.19	82
182	El-Begerami et al, 1977	1291	Japanese Quail (Coturnix japonica)	3	U	FD	12	w	1	d	JV	B	MOR	SURV	WO	0.702	1.4	83
183	El-Begearmi et al, 1982	6433	Japanese Quail (Coturnix japonica)	2	U	FD	16	w	NR	NR	NR	B	MOR	SURV	WO	0.78		70
184	Heinz 1993	1347	Duck (Anas platyrhynchos)	2	U	FD	21	w	NR	NR	AD	M	MOR	MORT	WO	0.844		70
185	Hill, 1979	1370	Chicken (Gallus domesticus)	2	U	FD	2	w	1	d	JV	B	MOR	MORT	WO	0.859		72
186	Heinz et. al., 1989	1354	Duck (Anas platyrhynchos)	2	UX	FD	49	d	NR	NR	SM	B	MOR	MORT	WO	0.89		76
187	Stoewsand, etl al, 1977	1574	Japanese Quail (Coturnix japonica)	2	U	FD	10	w	2	w	JV	B	MOR	MORT	WO	0.896		78
188	Sell and Horani, 1976	1550	Japanese Quail (Coturnix japonica)	2	U	FD	23	d	8	d	JV	B	MOR	MORT	WO	0.909		78
189	Heinz et. al., 1989	1354	Duck (Anas platyrhynchos)	6	UX	FD	46	w	NR	NR	SM	B	MOR	MORT	WO	0.91		79
190	Yamamoto et al, 1998	1636	American Kestrel (Falco sparverius)	2	M	FD	77	d	NR	NR	MA	B	MOR	MORT	WO	0.944		75
191	Heinz and Hoffman, 1987	1356	Mallard (Anas platyrhynchos)	2	UX	FD	41	d	2	yr	SM	F	MOR	MORT	WO	1.01		84
192	Yamamoto et al, 1998	1636	American Kestrel (Falco sparverius)	3	M	FD	77	d	NR	NR	MA	B	MOR	MORT	WO	1.06		78

APPENDIX G-7

Summary of Avian Toxicity Data: Selenium

Guidry Property
St. Martin Parish, Louisiana

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Data Evaluation Score
193	Heinz and Fitzgerald, 1993	36813	Mallard (Anas platyrhynchos)	2	M	FD	21	w	NR	NR	SM	B	MOR	MORT	WO	1.08		76
194	Hoffman et al, 1991	1377	Mallard (Anas platyrhynchos)	3	UX	FD	4	w	1	d	JV	B	MOR	SURV	WO	1.13	4.53	87
195	Hoffman et al, 1992	1376	Duck (Anas platyrhynchos)	3	UX	FD	4	w	1	d	JV	B	MOR	SURV	WO	1.2	4.8	87
196	Green and Albers, 1997	1319	Mallard (Anas platyrhynchos)	5	U	FD	16	w	14	mo	AD	M	MOR	MORT	WO	1.22	2.44	83
197	Hoffman et al, 1992	1378	Mallard (Anas platyrhynchos)	3	UX	FD	4	w	1	d	JV	B	MOR	SURV	WO	1.23	4.94	87
198	Santolo et al 1999	1535	American Kestrel (Falco sparverius)	3	M	FD	11	w	NR	mo	AD	B	MOR	MORT	WO	1.37		78
199	Ansari and Britton, 1974	36789	Chicken (Gallus domesticus)	2	U	FD	10	d	1	d	JV	M	MOR	MORT	WO	1.38		77
200	Howell and Hill, 1978	1387	Chicken (Gallus domesticus)	2	U	FD	20	d	1	d	JV	B	MOR	MORT	WO	1.42		77
214	Hill, 1979	1370	Chicken (Gallus domesticus)	2	U	FD	2	w	1	d	JV	B	MOR	MORT	WO	1.72		72
201	Hoffman et al, 1991	1374	Mallard (Anas platyrhynchos)	7	U	FD	14	w	2	yr	AD	M	MOR	SURV	WO	1.87		78
202	Smith et al, 1988	1562	Black-crowned night-heron (Nycticorax nycti	3	UX	FD	92	d	NR	NR	AD	B	MOR	MORT	WO	2.03		78
203	Albers et al 1996	1208	Duck (Anas platyrhynchos)	5	U	FD	16	w	1	yr	AD	M	MOR	MORT	WO	2.38	4.75	80
204	Heinz et al 1996	1357	Mallard (Anas platyrhynchos)	2	U	FD	2	w	1	d	JV	NR	MOR	SURV	WO	3.04		73
205	Donaldson and McGowan, 1989	1285	Chicken (Gallus domesticus)	3	U	FD	18	d	1	d	JV	M	MOR	MORT	WO	3.04	6.08	84
206	Jensen et al., 1977	1404	Chicken (Gallus domesticus)	5	U	FD	2	w	1	d	JV	B	MOR	MORT	WO	3.07	6.14	78
207	Heinz and Hoffman, 1987	1356	Mallard (Anas platyrhynchos)	6	UX	FD	57	d	2	yr	SM	B	MOR	MORT	WO	3.08	12.3	84
208	Heinz et al 1996	1357	Mallard (Anas platyrhynchos)	3	U	FD	1	w	1	d	JV	NR	MOR	SURV	WO	3.49	6.99	85
209	Stoewsand, etl al, 1977	1574	Japanese Quail (Coturnix japonica)	2	M	FD	10	w	2	w	JV	B	MOR	MORT	WO	3.64		83
210	Heinz et al 1996	1357	Mallard (Anas platyrhynchos)	3	U	FD	2	w	1	d	JV	NR	MOR	SURV	WO	3.72		79
211	Heinz et al 1988	1355	Mallard (Anas platyrhynchos)	5	UX	FD	3	w	1	d	JV	NR	MOR	MORT	WO	3.99	7.98	90
212	Heinz et al 1988	1355	Mallard (Anas platyrhynchos)	5	UX	FD	2	w	1	d	JV	NR	MOR	MORT	WO	5.84	11.7	90
213	Heinz et al 1996	1357	Mallard (Anas platyrhynchos)	3	U	FD	2	w	1	d	JV	NR	MOR	SURV	WO	7.31		66
215	Jensen et al., 1977	1404	Chicken (Gallus domesticus)	5	U	FD	2	w	1	d	JV	B	MOR	MORT	WO	28.2	29	78
216	Khan et al, 1993	1415	Chicken (Gallus domesticus)	2	U	GV	28	d	43	d	JV	F	MOR	MORT	WO		0.5	78
217	Howell and Hill, 1978	1387	Chicken (Gallus domesticus)	2	U	FD	21	d	1	d	JV	B	MOR	MORT	WO		1.78	77
218	Hill, 1974	1369	Chicken (Gallus domesticus)	2	U	FD	2	w	1	d	JV	B	MOR	MORT	WO		3.44	77
219	Heinz 1993	1347	Duck (Anas platyrhynchos)	2	U	FD	5	w	NR	NR	AD	M	MOR	MORT	WO		5.75	71

ABNM = abnormal; B = both; BDWT = body weight changes; BEH = behavior; BIO = biochemical; BL = blood; bw = body weight; CHM = chemical changes; d = day; DR = drinking water; EG = egg; EGG = egg; EGPN = eggs per nest; EGWT = egg weight; EM = embryo; ENZ = enyzme level changes; ESTH = eggshell thickness; F = female; FCNS = food consumption; FD = food; FDB = feeding behavior; FDCV = food conversion efficiency; FO = foot; GCHM = general biochemical changes; GENZ = general enzyme changes; GHIS = general histology; GITX = general intoxication; GLAD = glutamic acid dehydrogenase; GLPX = glutathione peroxidase; GLSN = gross lesions; GLTH = glutathione; GPHY
= general pysiology changes; GRO = growth; GV = gavage; GZ = gizzard; HEME = heme content; HIS = histological changes; HMGL = hemoglobin; HTCH = hatch; IRRI = skin irritation; ITX = intoxication; JV = juvenile; kg = kilograms; KI = kidney; LB = egg-laying bird; LI = liver; LIPD = lipid; LOAEL = lowest observed adverse effect level; mg = milligrams; mo = months; M = male; M = measured; MOR = effects on mortality and survival; MORT = mortality; NCRO = necrosis; NDAY = number of days between eggs laid; NK = neck; NOAEL = No Observed Advese Effect Level; NR = Not reported; ODVP = offspring development; OR = other oral; ORW = organ weight changes; ORWT = organ weight changes; OV = ovaries; PHY = physiology; PL = plasma; PLBR = pairs with litter or brood; PR = proventriculus; PROG = progeny counts/numbers; PTH = pathology; REP = reproduction; RSUC = reproductive success (general); SK = skin; SM = sexually mature; SMIX = weight relative to body weight; SP = spleen; SR = serum; SURV = survival; TE = testes; TERA = teratogenic measurements; TEWT = testes weight; TPRD = total production; U = unmeasured; UX = measured but values not reported; w = weeks; WO = whole organism; yr = year.

Note: Study results excerpted from the Eco-SSL document for Selenium.

Geometric Mean NOAEL	Geometric Mean LOAEL
0.85	**1.17**

APPENDIX G-8

Summary of Mammalian Toxicity Data: Selenium

Guidry Property
St. Martin Parish, Louisiana

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Data Evaluation Score
Reproduction (REP)																		
231	Nobunaga et al., 1979	1473	Mouse (Mus musculus)	3	U	DR	56	d	60	d	GE	F	REP	PRWT	WO	0.072	0.145	81
232	Fredriksson et al., 1993	1304	Rat (Rattus norvegicus)	2	M	FD	14	w	NR	NR	GE	F	REP	ODVP	WO	0.108		74
233	Gunter et al, 2003	25959	Cattle (Bos taurus)	2	U	FD	42	w	NR	NR	GE	F	REP	PRWT	WO	0.173		70
234	Nebbia et al., 1987	1471	Rat (Rattus norvegicus)	4	U	DR	240	d	NR	NR	JV	M	REP	TEWT	TE	0.384	0.768	80
235	Kezhou et al., 1987	1413	Rat (Rattus norvegicus)	4	U	FD	5	w	NR	NR	JV	M	REP	SPCL	GO	0.388	0.776	86
236	Abdo, 1994	1475	Rat (Rattus norvegicus)	6	UX	DR	13	w	6	w	JV	F	REP	GREP	WO	0.393	0.763	95
237	Halverson, 1974	1329	Rat (Rattus norvegicus)	5	U	FD	42	d	90	d	GE	F	REP	PROG	WO	0.456		71
238	Abdo, 1994	1475	Mouse (Mus musculus)	6	UX	DR	13	w	6	w	JV	M	REP	GREP	WO	0.735	1.51	92
239	Panter et al., 1995	1498	Sheep (Ovis aries)	2	M	FD	88	d	NR	mo	GE	F	REP	PRWT	WO	0.78		77
240	Panter et al., 1995	1498	Sheep (Ovis aries)	2	M	FD	88	d	NR	NR	GE	F	REP	PRWT	WO	0.945		69
241	Hau et al., 1987	1344	Mouse (Mus musculus)	4	U	DR	29	d	8	w	GE	F	REP	PRWT	WO	1.21	6.03	78
242	Piccirillo et al 1983	1507	Mouse (Mus musculus)	2	U	GV	8	d	64	d	GE	F	REP	PRWT	WO	1.6		86
243	Abdo, 1994	1475	Mouse (Mus musculus)	6	UX	DR	13	w	6	w	JV	B	REP	SPCL	TE	2.28		85
244	Webster, 1979	823	Mouse (Mus musculus)	5	U	FD	19	d	4	mo	GE	F	REP	PRWT	WO	2.54	25.4	78
245	Hardin et al., 1987	1335	Mouse (Mus musculus)	5	U	GV	8	d	6-8	w	GE	F	REP	PRWT	WO	3.2	6.39	87
246	Plasterer et al., 1985	1509	Mouse (Mus musculus)	2	U	GV	8	d	61-71	d	GE	F	REP	PRWT	WO	3.2		86
247	Booth et al. 1983	1234	Mouse (Mus musculus)	2	U	GV	8	d	NR	NR	GE	F	REP	PROG	WO	7		90
248	Kaur and Parshad, 1994	1411	Rat (Rattus norvegicus)	3	U	FD	5	w	NR	NR	JV	M	REP	SPCV	TE		0.089	79
249	Abdo, 1994	1475	Rat (Rattus norvegicus)	6	UX	DR	13	w	6	w	JV	F	REP	GREP	WO		0.13	89
250	Wahlstrom and Olson, 1959	14497	Pig (Sus scrofa)	2	U	FD	239	d	8	w	GE	F	REP	PRWT	WO		0.296	79
251	Schroeder and Mitchener, 1971	66	Mouse (Mus musculus)	2	U	DR	6	mo	21	d	JV	F	REP	DEYO	WO		0.434	73
252	Thorlacius-Ussing, 1990	1595	Rat (Rattus norvegicus)	3	U	DR	21	d	NR	NR	LC	F	REP	PRWT	WO		0.504	73
253	Parshad and Sud, 1989	1500	Rat (Rattus norvegicus)	2	M	FD	4	w	NR	NR	JV	M	REP	TEWT	TE		0.55	79
254	Thorlacius-Ussing et al., 1987	1596	Rat (Rattus norvegicus)	2	U	DR	21	d	NR	mo	LC	F	REP	PRWT	WO		0.749	73
255	Chermoff and Kavlock, 1982	1259	Mouse (Mus musculus)	2	U	GV	5	d	60	d	GE	F	REP	PROG	WO		4.18	86
256	Gray and Kavlock, 1984	1316	Mouse (Mus musculus)	2	U	OR	5	d	90	d	GE	F	REP	PROG	WO		4.57	81
257	Seidenberg et al 1986	113	Mouse (Mus musculus)	2	U	GV	4	d	NR	NR	GE	F	REP	PROG	WO		5.01	86
Growth (GRO)																		
258	Shull and Checke, 1973	1557	Rat (Rattus norvegicus)	3	U	FD	8	w	NR	NR	JV	M	GRO	BDWT	WO	0.053	0.265	82
259	Meyer et al 1982	662	Rat (Rattus norvegicus)	2	U	FD	30	d	NR	NR	JV	M	GRO	BDWT	WO	0.0642		78
260	Palmer et al., 1982	1496	Rat (Rattus norvegicus)	3	M	FD	4	w	NR	NR	JV	NR	GRO	BDWT	WO	0.0838	0.763	86
261	Chen et al., 1990	1255	Rat (Rattus norvegicus)	2	U	FD	2	w	NR	NR	JV	M	GRO	BDWT	WO	0.0869		77
262	Glattre et al, 1995	11361	Rat (Rattus norvegicus)	2	U	DR	4	w	NR	NR	JV	M	GRO	BDWT	WO	0.09		67
263	Debski et al., 1992	1280	Rat (Rattus norvegicus)	2	U	FD	2	w	NR	NR	JV	M	GRO	BDWT	WO	0.11		81
264	Kim and Mahan, 2001	25957	Pig (Sus scrofa)	6	U	FD	12	w	NR	NR	JV	B	GRO	BDWT	WO	0.112	0.157	84
265	Kim and Mahan, 2001	25948	Pig (Sus scrofa)	4	U	FD	12	w	8	w	JV	B	GRO	BDWT	WO	0.137	0.273	84
266	Mahan and Moxon, 1984	1450	Pig (Sus scrofa)	7	U	FD	37	d	4	w	JV	B	GRO	BDWT	WO	0.143	0.215	84
267	Goehring et. al. 1983	1313	Pig (Sus scrofa)	6	M	FD	5	w	NR	NR	JV	B	GRO	BDWT	WO	0.146	0.273	89
268	Liu et al., 1994	1442	Rat (Rattus norvegicus)	4	M	FD	2	w	45	d	JV	F	GRO	BDWT	WO	0.151	0.304	89
269	Liu and Milner, 1992	12370	Rat (Rattus norvegicus)	2	M	FD	2	w	41	d	JV	F	GRO	BDWT	WO	0.153		76
270	Kim and Mahan, 2001	25958	Pig (Sus scrofa)	2	UX	FD	14	w	NR	NR	JV	F	GRO	BDWT	WO	0.155	0.221	89
271	Behne et al., 1992	1224	Rat (Rattus norvegicus)	2	U	FD	110	d	30	d	JV	M	GRO	BDWT	WO	0.163		77
272	Jenkins and Hidiroglou, 1986	1401	Cattle (Bos taurus)	5	U	FD	6	w	3	d	JV	M	GRO	BDWT	WO	0.165	0.33	83
273	Mahan and Magee, 1991	1448	Pig (Sus scrofa)	3	UX	FD	35	d	23	d	JV	B	GRO	BDWT	WO	0.17	0.51	89
274	Gunter et al, 2003	25959	Cattle (Bos taurus)	2	U	FD	42	w	NR	NR	GE	F	GRO	BDWT	WO	0.173		68
275	Nehru et al., 1997	2788	Rat (Rattus norvegicus)	2	U	GV	8	w	NR	NR	JV	F	GRO	BDWT	WO	0.175		79
276	Palmer and Olson, 1974	1497	Rat (Rattus norvegicus)	3	M	DR	42	d	21	d	JV	M	GRO	BDWT	WO	0.181		76
277	Mahan and Magee, 1991	1448	Pig (Sus scrofa)	3	UX	FD	35	d	23	d	JV	B	GRO	BDWT	WO	0.183	0.548	89
278	Mandisodza et al., 1979	1454	Pig (Sus scrofa)	3	M	FD	61	d	5-7	w	JV	B	GRO	BDWT	WO	0.189		74
279	Palmer and Olson, 1974	1497	Rat (Rattus norvegicus)	3	M	DR	42	d	21	d	JV	M	GRO	BDWT	WO	0.191		78
280	Coudray, et. al. 1996	1271	Rat (Rattus norvegicus)	2	U	FD	8	w	NR	NR	JV	M	GRO	BDWT	WO	0.198		77
281	Mandisodza et al., 1979	1454	Pig (Sus scrofa)	3	M	FD	61	d	5-7	w	JV		GRO	BDWT	WO	0.202		68
282	Salbe and Levander, 1990	1533	Rat (Rattus norvegicus)	3	UX	FD	6	w	NR	NR	JV	M	GRO	BDWT	WO	0.214		82
283	McAdam and Levander, 1987	1457	Rat (Rattus norvegicus)	4	U	FD	6	w	21	d	JV	M	GRO	BDWT	WO	0.217	0.435	82
284	Goehring et al., 1984	1312	Rat (Rattus norvegicus)	4	M	FD	4	w	NR	NR	JV	M	GRO	BDWT	WO	0.217	0.47	88

APPENDIX G-8

Summary of Mammalian Toxicity Data: Selenium

Guidry Property
St. Martin Parish, Louisiana

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Data Evaluation Score
285	Salbe and Levander, 1990	1533	Rat (Rattus norvegicus)	3	UX	FD	6	w	NR	NR	JV	M	GRO	BDWT	WO	0.217		82
286	Moxon and Mahan, 1982	1468	Pig (Sus scrofa)	8	UX	FD	37	d	NR	NR	JV	NR	GRO	BDWT	WO	0.227	0.34	89
287	Kim and Mahan, 2001	25958	Pig (Sus scrofa)	4	UX	FD	14	w	NR	NR	JV	F	GRO	BDWT	WO	0.236		74
288	Tsunoda et al, 2000	36834	Mouse (Mus musculus)	4	U	DR	14	d	7-8	w	JV	M	GRO	BDWT	WO	0.24	0.58	79
289	Lane et al., 1984	1429	Mouse (Mus musculus)	2	U	FD	26	w	4	w	JV	F	GRO	BDWT	WO	0.254		77
290	LeBoeuf et al., 1985	1433	Rat (Rattus norvegicus)	3	U	FD	6	w	NR	NR	JV	M	GRO	BDWT	WO	0.261	0.521	82
291	Goehring et al., 1984	1312	Pig (Sus scrofa)	4	M	FD	6	w	NR	NR	JV	B	GRO	BDWT	WO	0.265		74
292	Palmer and Olson, 1974	1497	Rat (Rattus norvegicus)	4	M	DR	7	d	21	d	JV	M	GRO	BDWT	WO	0.274	0.54	84
293	Turan et al., 1997	1602	Rabbit (Oryctolagus cuniculus)	2	U	FD	12	w	NR	NR	JV	B	GRO	BDWT	WO	0.277		73
294	Wahlstrom and Olson, 1959	14497	Pig (Sus scrofa)	2	U	FD	239	d	8	w	GE	F	GRO	BDWT	WO	0.296		68
295	Bioulac-Sage et al., 1992	1228	Rat (Rattus norvegicus)	3	U	FD	2	mo	NR	NR	JV	M	GRO	BDWT	WO	0.318		70
296	Julius et al, 1983	1408	Hamster (Mesocricetus auratus)	3	U	FD	21	d	4	w	JV	B	GRO	BDWT	WO	0.356	0.712	84
297	Kim and Mahan, 2001	25948	Pig (Sus scrofa)	4	U	FD	12	w	8	w	JV	B	GRO	BDWT	WO	0.367	0.489	79
298	Yeh et al, 1997	1640	Rat (Rattus norvegicus)	4	U	FD	8	w	NR	NR	JV	B	GRO	BDWT	WO	0.367		77
299	Abdo, 1994	1475	Rat (Rattus norvegicus)	6	U	DR	13	w	6	w	JV	F	GRO	BDWT	WO	0.368	0.564	93
300	Kiremidjian-Schumacher et al., 1	1422	Mouse (Mus musculus)	2	U	FD	8	w	6	w	JV	M	GRO	BDWT	WO	0.371		69
301	Julius et al, 1983	1408	Hamster (Mesocricetus auratus)	3	U	FD	21	d	4	w	JV	M	GRO	BDWT	WO	0.374	0.747	84
302	Dausch and Fullerton, 1993	1276	Rat (Rattus norvegicus)	2	U	FD	5	w	NR	NR	JV	M	GRO	BDWT	WO	0.375		76
303	Spallholz et al., 1973	1566	Mouse (Mus musculus)	10	U	FD	5	w	NR	NR	JV	B	GRO	BDWT	WO	0.384	0.523	83
304	Nebbia et al., 1987	1471	Rat (Rattus norvegicus)	4	U	DR	240	d	NR	NR	JV	M	GRO	BDWT	WO	0.384	0.768	78
305	Kezhou et al., 1987	1413	Rat (Rattus norvegicus)	4	U	FD	5	w	NR	NR	JV	M	GRO	BDWT	WO	0.388	0.776	84
306	Abdo, 1994	1475	Rat (Rattus norvegicus)	6	U	DR	13	w	6	w	JV	F	GRO	BDWT	WO	0.393	0.763	93
307	Schroeder and Mitchener, 1972	3725	Mouse (Mus musculus)	2	U	DR	360	d	NR	lf	JV	M	GRO	BDWT	WO	0.407		68
308	Halverson et al 1966	1332	Rat (Rattus norvegicus)	8	U	FD	6	w	NR	NR	JV	M	GRO	BDWT	WO	0.425	0.567	77
309	Dausch and Fullerton, 1993	1276	Rat (Rattus norvegicus)	2	U	FD	5	w	NR	NR	JV	M	GRO	BDWT	WO	0.426		74
310	Halverson et al 1966	1332	Rat (Rattus norvegicus)	7	U	FD	6	w	NR	NR	JV	M	GRO	BDWT	WO	0.432	0.577	83
311	McAdam and Levander, 1987	1457	Rat (Rattus norvegicus)	4	U	FD	6	w	21	d	JV	M	GRO	BDWT	WO	0.435	0.869	82
312	McAdam and Levander, 1987	1457	Rat (Rattus norvegicus)	4	U	FD	6	w	21	d	JV	M	GRO	BDWT	WO	0.435	0.869	82
313	McAdam and Levander, 1987	1457	Rat (Rattus norvegicus)	4	U	FD	6	w	21	d	JV	M	GRO	BDWT	WO	0.435	0.869	82
314	Johnson, et al., 2000	36818	Mouse (Mus musculus)	4	U	DR	14	d	6-7	w	JV	M	GRO	BDWT	WO	0.438	1.31	78
315	Jacobs and Forst 1981	1393	Rat (Rattus norvegicus)	6	U	DR	35	d	5, 12	w	JV	B	GRO	BDWT	WO	0.452	0.904	77
316	Goehring et al., 1984	1312	Pig (Sus scrofa)	4	M	FD	17	w	NR	NR	JV	B	GRO	BDWT	WO	0.464		74
317	Whanger and Butler, 1988	1618	Rat (Rattus norvegicus)	4	U	FD	9	w	NR	NR	JV	M	GRO	BDWT	WO	0.49		78
318	Whanger and Butler, 1988	1618	Rat (Rattus norvegicus)	4	U	FD	9	w	NR	NR	JV	M	GRO	BDWT	WO	0.5		78
319	Dausch and Fullerton, 1993	1276	Rat (Rattus norvegicus)	5	U	FD	5	w	NR	NR	JV	M	GRO	BDWT	WO	0.515	1.54	77
320	Beems and van Beek, 1985	1223	Hamster (Mesocricetus auratus)	5	M	FD	42	d	NR	NR	JV	M	GRO	BDWT	WO	0.61	1.21	92
321	Turan et al 1997	1603	Rabbit (Oryctolagus cuniculus)	2	U	FD	14	w	NR	NR	JV	B	GRO	BDWT	WO	0.652		68
322	Hadjimarkos, 1970	14488	Hamster (Mesocricetus auratus)	4	U	DR	4	w	NR	NR	JV	M	GRO	BDWT	WO	0.68	0.88	82
323	Abdo, 1994	1475	Mouse (Mus musculus)	6	U	DR	13	w	6	w	JV	M	GRO	BDWT	WO	0.735	1.51	90
324	Panter et al., 1995	1498	Sheep (Ovis aries)	2	M	FD	88	d	NR	NR	GE	F	GRO	BDWT	WO	0.78		73
325	Abdo, 1994	1475	Mouse (Mus musculus)	6	U	DR	13	w	6	w	JV	B	GRO	BDWT	WO	0.781	1.23	93
326	Jacobs and Forst, 1981	1394	Mouse (Mus musculus)	4	U	DR	47	w	6	w	JV	F	GRO	BDWT	WO	0.784	1.21	78
327	Julius et al, 1983	1408	Hamster (Mesocricetus auratus)	5	U	FD	21	d	4	w	JV	B	GRO	BDWT	WO	0.81	1.62	84
328	Panter et al., 1995	1498	Sheep (Ovis aries)	2	M	FD	88	d	NR	NR	GE	F	GRO	BDWT	WO	0.945		67
329	Hermann, et.al. 1991	1364	Rat (Rattus norvegicus)	3	U	FD	8	w	NR	NR	JV	F	GRO	BDWT	WO	0.996	1.59	82
330	Hermann, et.al. 1991	1364	Rat (Rattus norvegicus)	3	U	FD	8	w	NR	NR	JV	F	GRO	BDWT	WO	0.996	1.59	82
331	Ishikawa et al, 1992	1392	Mouse (Mus musculus)	5	U	DR	12	w	5	w	JV	M	GRO	BDWT	WO	1.09		72
332	Jacobs and Forst, 1981	1394	Mouse (Mus musculus)	7	U	DR	46	d	7	w	JV	M	GRO	BDWT	WO	1.14	2.27	77
333	Beems and van Beek, 1985	1223	Hamster (Mesocricetus auratus)	5	M	FD	42	d	NR	NR	JV	F	GRO	BDWT	WO	1.26		77
334	Piccirillo et al 1983	1507	Mouse (Mus musculus)	2	U	GV	8	d	64	d	GE	F	GRO	BDWT	WO	1.6		84
335	Tsunoda et al, 2000	36834	Mouse (Mus musculus)	4	U	DR	14	d	7-8	w	JV	M	GRO	BDWT	WO	1.96		71
336	Hardin et al., 1987	1335	Mouse (Mus musculus)	5	U	GV	8	d	6-8	w	JV	F	GRO	BDWT	WO	3.2	6.39	85
337	Plasterer et al., 1985	1509	Mouse (Mus musculus)	2	U	GV	8	d	61-71	d	GE	F	GRO	BDWT	WO	3.2		84
338	Piccirillo et al 1983	1507	Mouse (Mus musculus)	6	U	GV	8	d	64	d	JV	F	GRO	BDWT	WO	4.57		84
339	Plasterer et al., 1985	1509	Mouse (Mus musculus)	4	U	GV	8	d	61-71	d	JV	F	GRO	BDWT	WO	4.57		84
340	Booth et al. 1983	1234	Mouse (Mus musculus)	4	U	GV	8	d	68-81	d	JV	F	GRO	BDWT	WO	10		90
341	Sayato et al 1993	1538	Mouse (Mus musculus)	5	U	GV	30	d	5	w	JV	M	GRO	BDWT	WO	10	20	85

APPENDIX G-8

Summary of Mammalian Toxicity Data: Selenium

Guidry Property
St. Martin Parish, Louisiana

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Data Evaluation Score
342	Kaur and Parshad, 1994	1411	Rat (Rattus norvegicus)	3	U	FD	1	w	NR	NR	JV	M	GRO	BDWT	WO		0.0908	77
343	Spallholz et al., 1973	1566	Mouse (Mus musculus)	3	U	FD	5	w	NR	NR	JV	B	GRO	BDWT	WO		0.0968	77
344	Boylan et al, 1990	1239	Mouse (Mus musculus)	2	M	FD	6	mo	NR	NR	JV	F	GRO	BDWT	WO		0.156	82
345	Wahlstrom et al, 1956	14498	Pig (Sus scrofa)	2	U	FD	108	d	NR	NR	JV	NR	GRO	BDWT	WO		0.163	78
346	Behne et al., 1992	1224	Rat (Rattus norvegicus)	2	U	FD	110	d	30	d	JV	M	GRO	BDWT	WO		0.166	77
347	Baker et al., 1989	1219	Pig (Sus scrofa)	2	M	FD	9	w	8-14	w	JV	B	GRO	BDWT	WO		0.205	81
348	Rhian and Moxon, 1943	14494	Dog (Canis familiaris)	2	U	FD	8	w	150	d	JV	F	GRO	BDWT	WO		0.209	77
349	Goehring et al., 1984	1312	Rat (Rattus norvegicus)	4	M	FD	4	w	NR	NR	JV	M	GRO	BDWT	WO		0.215	82
350	Chen et al., 1985	1256	Rat (Rattus norvegicus)	4	U	DR	32	d	NR	NR	JV	M	GRO	BDWT	WO		0.232	72
351	Miller, 1938	14492	Pig (Sus scrofa)	5	U	FD	63	d	4	mo	JV	B	GRO	BDWT	WO		0.235	78
352	Wahlstrom et al, 1956	14498	Pig (Sus scrofa)	2	U	FD	3	mo	NR	NR	JV	NR	GRO	BDWT	WO		0.254	78
353	Schroeder, 1967	1540	Rat (Rattus norvegicus)	2	U	DR	30	d	21	d	JV	B	GRO	BDWT	WO		0.267	72
354	Schroeder, 1967	1540	Mouse (Mus musculus)	2	U	DR	99	d	21	d	JV	F	GRO	BDWT	WO		0.274	72
355	Schroeder, 1967	1540	Rat (Rattus norvegicus)	2	U	DR	30	d	21	d	JV	B	GRO	BDWT	WO		0.276	72
356	Mercado and Bibby 1973	757	Rat (Rattus norvegicus)	2	U	DR	50	d	23	d	JV	M	GRO	BDWT	WO		0.282	71
357	Wahlstrom et al., 1984	1612	Pig (Sus scrofa)	2	U	FD	6	w	5-6	w	JV	M	GRO	BDWT	WO		0.303	82
358	Baker et al., 1989	1219	Pig (Sus scrofa)	2	M	FD	9	w	8-14	w	JV	B	GRO	BDWT	WO		0.307	81
359	Wahlstrom et al, 1956	14498	Pig (Sus scrofa)	2	U	FD	98	d	NR	NR	JV	NR	GRO	BDWT	WO		0.323	78
360	Birt et al., 1983	1233	Hamster (Mesocricetus auratus)	3	U	FD	25	w	4	w	JV	F	GRO	BDWT	WO		0.345	82
361	Baker et al., 1989	1219	Pig (Sus scrofa)	2	M	FD	9	w	8-14	w	JV	B	GRO	BDWT	WO		0.352	81
362	Thorlacius-Ussing et al., 1988	1597	Rat (Rattus norvegicus)	2	U	DR	21	d	25	d	JV	F	GRO	BDWT	WO		0.378	72
363	Dausch and Fullerton, 1993	1276	Rat (Rattus norvegicus)	3	U	FD	3	w	NR	NR	JV	M	GRO	BDWT	WO		0.39	76
364	Thorlacius-Ussing et al., 1988	1598	Rat (Rattus norvegicus)	2	U	DR	21	d	21	d	JV	M	GRO	BDWT	WO		0.411	72
365	Liu and Boylan, 1994	1443	Rat (Rattus norvegicus)	2	M	FD	8	w	NR	NR	JV	M	GRO	BDWT	WO		0.42	82
366	Schroeder and Mitchener, 1972	3725	Mouse (Mus musculus)	2	U	DR	90	d	NR	lf	JV	M	GRO	BDWT	WO		0.425	72
367	Dausch and Fullerton, 1993	1276	Rat (Rattus norvegicus)	3	U	FD	5	w	NR	NR	JV	M	GRO	BDWT	WO		0.441	76
368	Carmichael and Fowler, 1980	1249	Rat (Rattus norvegicus)	2	U	DR	22	w	NR	NR	JV	M	GRO	BDWT	WO		0.454	73
369	Birt et al., 1986	1232	Hamster (Mesocricetus auratus)	2	U	FD	10	w	4	w	JV	M	GRO	BDWT	WO		0.49	77
370	Raisbeck et al., 1996	1521	Pronghorn (Antilocapra americana)	2	M	FD	164	d	6-96	mo	JV	M	GRO	BDWT	WO		0.493	81
371	Salbe et al., 1990	1532	Rat (Rattus norvegicus)	3	U	DR	21	d	21	d	JV	B	GRO	BDWT	WO		0.498	72
372	LeBoeuf and Hoekstra, 1983	1432	Rat (Rattus norvegicus)	2	U	FD	6	w	NR	NR	JV	M	GRO	BDWT	WO		0.521	76
373	Thorlacius-Ussing, 1990	1595	Rat (Rattus norvegicus)	2	U	DR	21	d	21	d	JV	B	GRO	BDWT	WO		0.543	71
374	Parshad and Sud, 1989	1500	Rat (Rattus norvegicus)	2	M	FD	4	w	NR	NR	JV	M	GRO	BDWT	WO		0.55	77
375	Gronbaek et al., 1995	1323	Rat (Rattus norvegicus)	2	U	DR	14	d	3-4	w	JV	M	GRO	BDWT	WO		0.57	73
376	Dausch and Fullerton, 1993	1276	Rat (Rattus norvegicus)	4	U	FD	3	w	NR	NR	JV	M	GRO	BDWT	WO		0.589	76
377	Kezhou et al., 1987	1413	Rat (Rattus norvegicus)	4	U	FD	5	w	NR	NR	JV	M	GRO	BDWT	WO		0.653	78
378	Hadjimarkos, 1967	1327	Rat (Rattus norvegicus)	2	U	DR	21	d	NR	NR	JV	M	GRO	BDWT	WO		0.667	73
379	Palmer et al 1983	15262	Rat (Rattus norvegicus)	2	M	FD	4	w	NR	NR	JV	M	GRO	BDWT	WO		0.704	76
380	Palmer et al 1983	15262	Rat (Rattus norvegicus)	2	U	FD	4	w	NR	NR	JV	M	GRO	BDWT	WO		0.754	77
381	Palmer and Olson, 1974	1497	Rat (Rattus norvegicus)	4	M	DR	7	d	21	d	JV	M	GRO	BDWT	WO		0.767	78
382	Cabe, et al., 1979	1244	Rat (Rattus norvegicus)	2	U	DR	13	w	50	d	JV	M	GRO	BDWT	WO		0.769	72
383	Panter et al., 1996	1499	Pig (Sus scrofa)	2	U	FD	6	w	8-10	w	JV	B	GRO	BDWT	WO		0.794	70
384	Panter et al., 1996	1499	Pig (Sus scrofa)	2	U	FD	6	w	8-10	w	JV	B	GRO	BDWT	WO		0.794	76
385	Palmer et al., 1982	1496	Rat (Rattus norvegicus)	2	M	FD	4	w	NR	NR	JV	NR	GRO	BDWT	WO		0.794	82
386	Panter et al., 1996	1499	Pig (Sus scrofa)	2	U	FD	6	w	8-10	w	JV	B	GRO	BDWT	WO		0.794	76
387	Palmer et al., 1982	1496	Rat (Rattus norvegicus)	2	M	FD	4	w	NR	NR	JV	NR	GRO	BDWT	WO		0.809	82
388	Palmer et al., 1982	1496	Rat (Rattus norvegicus)	2	M	FD	4	w	NR	NR	JV	NR	GRO	BDWT	WO		0.817	82
389	Palmer et al 1983	15262	Rat (Rattus norvegicus)	2	U	FD	8	w	NR	NR	JV	M	GRO	BDWT	WO		0.823	77
390	Obermeyer et al, 1971	12934	Rat (Rattus norvegicus)	2	U	FD	4	w	NR	NR	JV	NR	GRO	BDWT	WO		0.903	77
391	Halverson and Monty, 1960	36812	Rat (Rattus norvegicus)	2	U	FD	28	d	NR	NR	JV	M	GRO	BDWT	WO		0.968	77
392	Halverson et al., 1962	14489	Rat (Rattus norvegicus)	2	U	FD	18	d	NR	NR	NR	M	GRO	BDWT	WO		0.984	77
393	Halverson and Monty, 1960	36812	Rat (Rattus norvegicus)	2	U	FD	28	d	NR	NR	JV	M	GRO	BDWT	WO		0.988	77
394	Halverson et al., 1962	14489	Rat (Rattus norvegicus)	2	U	FD	18	d	NR	NR	NR	M	GRO	BDWT	WO		1.02	77
395	Cutler, 1974	21137	Rat (Rattus norvegicus)	2	U	DR	5	mo	NR	NR	JV	M	GRO	BDWT	WO		1.11	72
396	Hermann, et.al. 1991	1364	Rat (Rattus norvegicus)	2	U	FD	8	w	NR	NR	JV	F	GRO	BDWT	WO		1.59	76
397	Rastogi et al., 1976	1523	Rat (Rattus norvegicus)	2	U	DR	1	w	1	mo	JV	B	GRO	BDWT	WO		1.59	73
398	Franke and Moxon 1937	14508	Rat (Rattus norvegicus)	2	U	FD	65	d	28	d	JV	B	GRO	BDWT	WO		1.79	81

APPENDIX G-8

Summary of Mammalian Toxicity Data: Selenium

Guidry Property
St. Martin Parish, Louisiana

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Data Evaluation Score
399	Halverson et al., 1962	14489	Rat (Rattus norvegicus)	2	M	FD	18	d	NR	NR	NR	M	GRO	BDWT	WO		1.94	71
400	Franke and Moxon 1937	14508	Rat (Rattus norvegicus)	2	U	FD	5	d	28	d	JV	M	GRO	BDWT	WO		3.54	81
401	Franke and Moxon 1937	14508	Rat (Rattus norvegicus)	2	U	FD	5	d	28	d	JV	B	GRO	BDWT	WO		3.74	78
402	Chermoff and Kavlock, 1982	1259	Mouse (Mus musculus)	2	U	GV	5	d	60	d	GE	F	GRO	BDWT	WO		4.18	84
Survival (MOR)																		
403	Spallholz et al., 1973	1566	Mouse (Mus musculus)	3	U	FD	5	w	NR	NR	JV	B	MOR	SURV	WO	0.0961	0.385	82
404	Spallholz et al., 1973	1566	Mouse (Mus musculus)	10	U	FD	5	w	NR	NR	JV	B	MOR	SURV	WO	0.101	0.168	84
405	Palmer and Olson, 1974	1497	Rat (Rattus norvegicus)	3	M	DR	42	d	21	d	JV	M	MOR	MORT	WO	0.181		79
406	Palmer and Olson, 1974	1497	Rat (Rattus norvegicus)	3	M	DR	42	d	21	d	JV	M	MOR	MORT	WO	0.186		79
407	McAdam and Levander, 1987	1457	Rat (Rattus norvegicus)	4	U	FD	6	w	21	d	JV	M	MOR	MORT	WO	0.217	0.435	83
408	McAdam and Levander, 1987	1457	Rat (Rattus norvegicus)	4	U	FD	6	w	21	d	JV	M	MOR	MORT	WO	0.217	0.435	83
409	Schroeder, 1967	1540	Rat (Rattus norvegicus)	2	U	DR	180	d	21	d	JV	B	MOR	MORT	WO	0.221		73
410	Gronbaek and Thorlacius-Ussing	1324	Rat (Rattus norvegicus)	4	U	DR	2	w	NR	NR	NR	M	MOR	SURV	WO	0.239		68
411	Palmer and Olson, 1974	1497	Rat (Rattus norvegicus)	4	M	DR	21	d	21	d	JV	M	MOR	MORT	WO	0.274	0.54	85
412	Jenkins and Hidiroglou, 1986	1401	Cattle (Bos taurus)	5	U	FD	6	w	3	d	JV	M	MOR	MORT	WO	0.334		78
413	Birt et al., 1983	1233	Hamster (Mesocricetus auratus)	2	U	FD	25	w	4	w	JV	B	MOR	MORT	WO	0.35		79
414	Dausch and Fullerton, 1993	1276	Rat (Rattus norvegicus)	2	U	FD	3	w	NR	NR	JV	M	MOR	SURV	WO	0.375		77
415	Abdo, 1994	1475	Rat (Rattus norvegicus)	6	UX	DR	13	w	6	w	JV	F	MOR	MORT	WO	0.393	0.763	94
416	Dausch and Fullerton, 1993	1276	Rat (Rattus norvegicus)	4	U	FD	3	w	NR	NR	JV	M	MOR	MORT	WO	0.426	1.28	83
417	McAdam and Levander, 1987	1457	Rat (Rattus norvegicus)	4	U	FD	6	w	21	d	JV	M	MOR	MORT	WO	0.435	0.869	83
418	McAdam and Levander, 1987	1457	Rat (Rattus norvegicus)	4	U	FD	6	w	21	d	JV	M	MOR	MORT	WO	0.435	0.869	83
419	Moxon and Mahan, 1982	1468	Pig (Sus scrofa)	8	UX	FD	37	d	NR	NR	JV	NR	MOR	MORT	WO	0.474	0.632	90
420	Abdo, 1994	1475	Rat (Rattus norvegicus)	6	UX	DR	13	w	6	w	JV	F	MOR	MORT	WO	0.564	0.769	94
421	Halverson et al 1966	1332	Rat (Rattus norvegicus)	8	U	FD	4	w	NR	NR	JV	M	MOR	MORT	WO	0.576	0.72	78
422	Halverson et al 1966	1332	Rat (Rattus norvegicus)	7	U	FD	4	w	NR	NR	JV	M	MOR	MORT	WO	0.587	0.733	84
423	Palmer and Olson, 1974	1497	Rat (Rattus norvegicus)	4	M	DR	21	d	21	d	JV	M	MOR	MORT	WO	0.595	0.892	85
424	Wilson et al 1988	1629	Pig (Sus scrofa)	4	U	OR	9	d	6	w	JV	M	MOR	MORT	WO	0.639	1.19	91
425	Birt et al., 1983	1233	Hamster (Mesocricetus auratus)	3	U	FD	25	w	4	w	JV	B	MOR	MORT	WO	0.652		72
426	Turan et al 1997	1603	Rabbit (Oryctolagus cuniculus)	2	U	FD	14	w	NR	NR	JV	B	MOR	MORT	WO	0.652		78
427	Kezhou et al., 1987	1413	Rat (Rattus norvegicus)	4	U	FD	22	d	NR	NR	JV	M	MOR	MORT	WO	0.653	0.98	85
428	Chen et al., 1982	1254	Rat (Rattus norvegicus)	3	U	FD	4	w	NR	NR	JV	M	MOR	MORT	WO	0.68		78
429	Palmer et al 1983	15262	Rat (Rattus norvegicus)	2	M	FD	4	w	NR	NR	JV	M	MOR	MORT	WO	0.704		77
430	Palmer et al 1983	15262	Rat (Rattus norvegicus)	2	U	FD	4	w	NR	NR	JV	M	MOR	MORT	WO	0.754		78
431	Cabe, et al., 1979	1244	Rat (Rattus norvegicus)	2	U	DR	18	w	50	d	JV	M	MOR	MORT	WO	0.769		73
432	Palmer et al., 1982	1496	Rat (Rattus norvegicus)	2	M	FD	4	w	NR	NR	JV	NR	MOR	MORT	WO	0.794		83
433	Palmer et al., 1982	1496	Rat (Rattus norvegicus)	3	M	FD	4	w	NR	NR	JV	NR	MOR	MORT	WO	0.82		83
434	Kezhou et al., 1987	1413	Rat (Rattus norvegicus)	4	U	FD	22	d	NR	NR	JV	M	MOR	MORT	WO	0.857	1.71	85
435	Dausch and Fullerton, 1993	1276	Rat (Rattus norvegicus)	3	U	FD	3	w	NR	NR	JV	M	MOR	SURV	WO	0.881		77
436	Jacobs and Forst 1981	1393	Rat (Rattus norvegicus)	6	U	DR	35	d	5, 12	w	JV	B	MOR	SURV	WO	0.904	1.81	78
437	Rastogi et al., 1976	1523	Rat (Rattus norvegicus)	2	U	DR	8	w	1	mo	JV	B	MOR	MORT	WO	0.953		74
438	Piccirillo et al 1983	1507	Mouse (Mus musculus)	6	U	GV	8	d	64	d	JV	F	MOR	MORT	WO	1.14	2.28	91
439	Dausch and Fullerton, 1993	1276	Rat (Rattus norvegicus)	3	U	FD	3	w	NR	NR	JV	M	MOR	MORT	WO	1.17		77
440	Hadjimarkos, 1970	14488	Hamster (Mesocricetus auratus)	4	U	DR	4	w	NR	NR	JV	M	MOR	MORT	WO	1.17		77
441	Jacobs and Forst, 1981	1394	Mouse (Mus musculus)	4	U	DR	47	w	6	w	JV	F	MOR	MORT	WO	1.21		73
442	Beems and van Beek, 1985	1223	Hamster (Mesocricetus auratus)	5	M	FD	42	d	NR	NR	JV	M	MOR	MORT	WO	1.21		87
443	Beems and van Beek, 1985	1223	Hamster (Mesocricetus auratus)	5	M	FD	42	d	NR	NR	JV	F	MOR	MORT	WO	1.26		87
444	Miller, 1938	14492	Pig (Sus scrofa)	5	U	FD	63	d	4	mo	JV	B	MOR	MORT	WO	1.49	5.96	83
445	Abdo, 1994	1475	Mouse (Mus musculus)	6	UX	DR	13	w	6	w	JV	M	MOR	MORT	WO	1.51		85
446	Piccirillo et al 1983	1507	Mouse (Mus musculus)	2	U	GV	8	d	64	d	GE	F	MOR	MORT	WO	1.6		85
447	Jacobs and Forst, 1981	1394	Mouse (Mus musculus)	7	U	DR	46	d	7	w	JV	B	MOR	MORT	WO	2.27	4.55	78
448	Abdo, 1994	1475	Mouse (Mus musculus)	6	UX	DR	13	w	6	w	JV	B	MOR	MORT	WO	2.28		88
449	Plasterer et al., 1985	1509	Mouse (Mus musculus)	6	U	GV	8	d	61-71	d	JV	F	MOR	MORT	WO	2.28	4.57	91
450	Pathak and Datta 1984	1501	Goat (Capra hircus)	4	U	OR	17	d	6	mo	MA	NR	MOR	MORT	WO	3	6	87
451	Julius et al, 1983	1408	Hamster (Mesocricetus auratus)	5	U	FD	21	d	4	w	JV	B	MOR	MORT	WO	3.18	6.36	85
452	Hardin et al., 1987	1335	Mouse (Mus musculus)	5	U	GV	8	d	6-8	w	GE	F	MOR	MORT	WO	3.2	6.39	86
453	Plasterer et al., 1985	1509	Mouse (Mus musculus)	2	U	GV	8	d	61-71	d	GE	F	MOR	SURV	WO	3.2		85
454	Dausch and Fullerton, 1993	1276	Rat (Rattus norvegicus)	4	U	FD	3	w	NR	NR	JV	M	MOR	SURV	WO	3.53		77

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Summary of Mammalian Toxicity Data: Selenium

Guidry Property
St. Martin Parish, Louisiana

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Data Evaluation Score
455	Chermoff and Kavlock, 1982	1259	Mouse (Mus musculus)	2	U	GV	5	d	60	d	GE	F	MOR	MORT	WO	4.18		85
456	Booth et al. 1983	1234	Mouse (Mus musculus)	6	U	GV	8	d	68-81	d	JV	F	MOR	MORT	WO	10	20	97
457	Dausch and Fullerton, 1993	1276	Rat (Rattus norvegicus)	5	U	FD	3	w	NR	NR	JV	M	MOR	SURV	WO	15.4		78
458	Schroeder, 1967	1540	Rat (Rattus norvegicus)	2	U	DR	16	d	21	d	JV	B	MOR	MORT	WO		0.275	73
459	Jacobs and Forst 1981	1393	Rat (Rattus norvegicus)	2	U	DR	10	w	5	w	JV	M	MOR	SURV	WO		0.44	73
460	Palmer et al., 1982	1496	Rat (Rattus norvegicus)	2	M	FD	4	w	NR	NR	JV	NR	MOR	MORT	WO		0.809	83
461	Palmer et al., 1982	1496	Rat (Rattus norvegicus)	2	M	FD	4	w	NR	NR	JV	NR	MOR	MORT	WO		0.817	83
462	Palmer et al 1983	15262	Rat (Rattus norvegicus)	2	U	FD	8	w	NR	NR	JV	M	MOR	SURV	WO		0.823	72
463	Halverson et al., 1962	14489	Rat (Rattus norvegicus)	2	U	FD	18	d	NR	NR	NR	M	MOR	MORT	WO		0.975	78
464	Halverson et al., 1962	14489	Rat (Rattus norvegicus)	2	U	FD	18	d	NR	NR	NR	M	MOR	MORT	WO		0.984	78
465	Cutler, 1974	21137	Rat (Rattus norvegicus)	2	U	DR	5	mo	NR	NR	JV	M	MOR	MORT	WO		1.11	73
466	Franke and Moxon 1937	14508	Rat (Rattus norvegicus)	2	U	FD	100	d	28	d	JV	M	MOR	MORT	WO		1.79	82
467	Halverson et al., 1962	14489	Rat (Rattus norvegicus)	2	M	FD	18	d	NR	NR	NR	M	MOR	MORT	WO		1.94	72
468	Franke and Moxon 1937	14508	Rat (Rattus norvegicus)	2	U	FD	100	d	28	d	JV	B	MOR	MORT	WO		3.54	82
469	Franke and Moxon 1937	14508	Rat (Rattus norvegicus)	2	U	FD	100	d	28	d	JV	B	MOR	MORT	WO		3.74	79
470	Davidson-York et al, 1999	1277	Pig (Sus scrofa)	2	M	FD	19	d	NR	NR	NR	B	MOR	MORT	WO		4.17	76
471	Seidenberg et al 1986	113	Mouse (Mus musculus)	2	U	GV	4	d	NR	NR	GE	F	MOR	MORT	WO		5.01	85

AD = adult; ACTV = activity, general; ALAD = (delta) -aminolevulinic acid dehydrogenase; ALPH = alkaline phosphatase; ASAT = aspartate aminotransferase; ATAX = ataxia, B = both; BDWT = body weight changes; BEH = behavior; BI = bile; BIO = biochemical; BL = blood; BLPR = blood pressure; BO = bone; BR = brain; bw = body weight; CHM = chemical changes; CHOL = cholesterol; d = day; DEYO = development of young; DOPA = dopamine; DR = Drinking water; DT - digestive tract; ENZ = enyzme level changes; ER = erthryocyte; F = female; FCNS = food consumption; FD = food; FDB = feeding behavior; FDCV = food conversion efficiency; FEFF = feeding efficiency; FO = foot; G6PD = glucose-6-phosphate dehydrogenase; GBCM = general biochemical changes; GE = gestation; GENZ = general enzyme changes; GGTR = (gamma) Y-glutamyltransferase; GHIS = general histology; GITX = general intoxication; GLPX = glutathione peroxidase; GLSN = gross lesions; GLTH = glutathione; GLUC = glucose; GO = gonads; GOTR = glutamic-oxaloacetic transaminase; GPHY = general pysiology changes; GREP = general reproduction; GRO = growth; GRS = gross body weight changes; GSTR = glutathione S-transferase; GT = gastrointestinal tract; GV = gavage; HA = hair; HE = heart; HIS = histological changes; HMCT = hematocrit; HMGL = hemoglobin; HRM = hormone changes; HTRT = heart rate;
HYPL = hyperplasia; IN = intestinal tract; ITX = intoxication; JV = juvenile; kg = kilograms; KI = kidney; LC = lactation; LI = liver; LIPD = lipid; LMPH = lymphocyte; LOAEL
lowest observed adverse effect level; mg = milligrams; mo = months; M = male; M = measured; MK = milk, lactating females; MOR = effects on mortality and survival; MORT = mortality; MPH = morphology; MT = multiple; MU = muscle; NCCR = NADPH cytochrome C reductase; NCRO = necrosis; NOAEL = No Observed Advese Effect Level; NCRO = necrosis; NR = Not reported; NMVM = number of movements; ODVP = offspring development; OR = other oral; ORW = organ weight changes; ORWT = organ weight changes; P450
= cytochrome P450; PCLV = packed cell volume; PHY = physiology; PL = plasma; PRGS = progesterone; PROG = progeny numbers/counts; PRTL = protein, total; PRWT = progeny weight; PTH = pathology; RBCE = red blood cell count; REP = reproduction; RGSH = reduced gluthione; RPRT = respiratory rate; SM = sexually mature; SMIX = weight relative to body weight; SP = spleen; SPCL = sperm cell counts; SPCV = sperm cell volume; SURV = survival; TE = testes; TEWT = testes weight; TRII = tridothyronine; TS = thymus; U = unmeasured; USTR = ultrastructural changes; w = weeks; WCON = water consumption; WO = whole organism; yr = year.

Note: Study results excerpted from the Eco-SSL document for Selenium.

Geometric Mean NOAEL	Geometric Mean LOAEL
0.54	0.79

APPENDIX G-9

Summary of Avian Toxicity Data: Zinc

Guidry Property
St. Martin Parish, Louisiana

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Data Evaluation Score
Reproduction (REP)																		
75	Kaya et al, 2001	48543	Chicken (Gallus domesticus)	5	U	FD	12	w	NR	NR	LB	F	REP	PROG	WO	13.8		75
76	Schisler and Kienholz, 1967	8798	Chicken (Gallus domesticus)	2	U	FD	14	w	48	w	LB	F	REP	PROG	WO	14.4		70
77	Jensen and Maurice, 1980	9749	Chicken (Gallus domesticus)	3	U	FD	6	w	NR	NR	LB	F	REP	PROG	WO	24.7	98.8	82
78	Jackson et al, 1986	6133	Chicken (Gallus domesticus)	6	U	FD	140	d	40	w	LB	F	REP	PROG	WO	55	105	81
79	Gibson et al, 1986	6048	Chicken (Gallus domesticus)	6	U	FD	10	w	30	w	JV	F	REP	PROG	WO	57.3	66.5	81
80	Stevenson et al, 1987	8184	Chicken (Gallus domesticus)	9	U	FD	140	d	28	w	JV	F	REP	PROG	WO	63.9	76.7	81
81	Gibson et al, 1986	6048	Chicken (Gallus domesticus)	6	U	FD	10	w	30	w	LB	F	REP	PROG	WO	64.1	123	81
82	Stevenson et al, 1987	8184	Chicken (Gallus domesticus)	9	U	FD	140	d	28	w	LB	F	REP	PROG	WO	67.8	84.8	81
83	Stahl, et al, 1990	5764	Chicken (Gallus domesticus)	4	U	FD	12	w	56	w	LB	F	REP	PROG	WO	106		71
84	Gasaway and Buss, 1972	9261	Mallard duck (Anas platyrhynchos)	4	U	FD	60	d	7	w	JV	M	REP	TEWT	TE		31.2	79
85	Jackson et al, 1986	6133	Chicken (Gallus domesticus)	5	U	FD	1	w	40	w	SM	F	REP	PROG	WO		88	75
86	Jensen and Maurice, 1980	9749	Chicken (Gallus domesticus)	2	U	FD	6	w	NR	NR	LB	F	REP	PROG	WO		101	79
87	Stepinska et al, 1987	5770	Chicken (Gallus domesticus)	2	U	FD	5	d	71	w	LB	F	REP	PROG	WO		205	75
88	Jackson et al, 1986	6133	Chicken (Gallus domesticus)	5	U	FD	1	w	40	w	LB	F	REP	PROG	WO		367	75
89	Berry and Brake, 1985	6144	Chicken (Gallus domesticus)	2	U	FD	4	d	60	w	LB	F	REP	RHIS	OD		988	73
90	Berry and Brake, 1990	7089	Chicken (Gallus domesticus)	2	U	FD	49	d	66	w	LB	F	REP	RHIS	OD		988	73
Growth (GRO)																		
91	Schisler and Kienholz, 1967	8798	Chicken (Gallus domesticus)	2	U	FD	14	w	48	w	JV	F	GRO	BDWT	WO	14.4		68
92	Baker and Halpin, 1988	5917	Chicken (Gallus domesticus)	2	M	FD	14	d	8	d	JV	M	GRO	BDWT	WO	15		73
93	Mohanna and Nys, 1999	5090	Chicken (Gallus domesticus)	2	U	FD	16	d	5	d	JV	NR	GRO	BDWT	WO	16.1		68
94	Hamilton et al, 1979	6655	Japanese quail (Coturnix japonica)	2	U	FD	14	d	0	d	JV	B	GRO	BDWT	WO	21.5		80
95	Hill, 1974	1369	Chicken (Gallus domesticus)	2	U	FD	3	w	1	d	JV	B	GRO	BDWT	WO	28.7		76
96	Stahl et al, 1989	5820	Chicken (Gallus domesticus)	2	U	FD	20	d	1	d	JV	B	GRO	BDWT	WO	35.4		68
97	Hill, 1990	5734	Chicken (Gallus domesticus)	2	U	FD	19	d	1	d	JV	F	GRO	BDWT	WO	36.6		76
98	Hamilton et al, 1981	6403	Japanese quail (Coturnix japonica)	3	U	FD	14	d	1	d	JV	B	GRO	BDWT	WO	43.3	86.6	83
99	Jackson et al, 1986	6133	Chicken (Gallus domesticus)	6	U	FD	140	d	40	w	SM	F	GRO	BDWT	WO	55	105	79
100	Harland et al, 1975	6887	Japanese quail (Coturnix japonica)	2	U	FD	1	w	1	d	JV	B	GRO	BDWT	WO	55.1		77
101	Berg and Martinson, 1972	93	Chicken (Gallus domesticus)	7	U	FD	2	w	1	d	JV	NR	GRO	BDWT	WO	55.3	111	78
102	Lefevre et al, 1982	392	Chicken (Gallus domesticus)	2	U	FD	5	w	1	d	JV	NR	GRO	BDWT	WO	63.2		76
103	Sandoval et al, 1998	7245	Chicken (Gallus domesticus)	4	U	FD	3	w	1	d	JV	M	GRO	BDWT	WO	70.6	106	84
104	Roberson and Schaible, 1960	14538	Chicken (Gallus domesticus)	3	U	FD	4	w	1	d	JV	M	GRO	BDWT	WO	74.3	111	83
105	Roberson and Schaible, 1960	14538	Chicken (Gallus domesticus)	3	U	FD	4	w	1	d	JV	M	GRO	BDWT	WO	74.7	112	83
106	Roberson and Schaible, 1960	14538	Chicken (Gallus domesticus)	4	U	FD	4	w	1	d	JV	M	GRO	BDWT	WO	75	150	79
107	Roberson and Schaible, 1960	14538	Chicken (Gallus domesticus)	3	U	FD	4	w	1	d	JV	M	GRO	BDWT	WO	75.7	114	83
108	Hill, 1974	92	Chicken (Gallus domesticus)	5	U	FD	2	w	1	d	JV	B	GRO	BDWT	WO	85.9	172	82
109	Hamilton et al, 1979	6655	Japanese quail (Coturnix japonica)	6	U	FD	14	d	8	d	JV	B	GRO	BDWT	WO	86.8	174	86
110	Henry et al, 1987	6039	Chicken (Gallus domesticus)	4	U	FD	1	w	1	d	JV	M	GRO	BDWT	WO	92.3	185	83
111	Gibson et al, 1986	6048	Chicken (Gallus domesticus)	6	U	FD	10	w	30	w	JV	F	GRO	BDWT	WO	96.9	145	79
112	Stevenson et al, 1987	8184	Chicken (Gallus domesticus)	9	U	FD	140	d	28	w	JV	F	GRO	BDWT	WO	99.1	149	79
113	Sandoval et al, 1999	5067	Chicken (Gallus domesticus)	2	U	FD	7	d	14	d	JV	M	GRO	BDWT	WO	103		68
114	Sandoval et al, 1999	5067	Chicken (Gallus domesticus)	2	U	FD	7	d	14	d	JV	M	GRO	BDWT	WO	103		68
115	Stahl, et al, 1990	5764	Chicken (Gallus domesticus)	3	U	FD	44	w	24	w	LB	F	GRO	BDWT	WO	129		69
116	Stevenson et al, 1987	8184	Chicken (Gallus domesticus)	9	U	FD	140	d	28	w	LB	F	GRO	BDWT	WO	129	194	79
117	Bafundo et al, 1984	2517	Chicken (Gallus domesticus)	2	U	FD	14	d	8	d	JV	F	GRO	BDWT	WO	142		67
118	Dewar et al, 1983	37018	Chicken (Gallus domesticus)	4	U	FD	4	w	1	d	JV	B	GRO	BDWT	WO	143	286	79
119	Vohra and Kratzer, 1968	14404	Turkey (Meleagris gallopavo)	7	U	FD	21	d	NR	NR	JV	B	GRO	BDWT	WO	148	297	77
120	Roberson and Schaible, 1960	14538	Chicken (Gallus domesticus)	4	U	FD	4	w	1	d	JV	M	GRO	BDWT	WO	155	232	83
121	Roberson and Schaible, 1960	14538	Chicken (Gallus domesticus)	4	U	FD	4	w	1	d	JV	M	GRO	BDWT	WO	158	237	83
122	Southern and Baker, 1983	6368	Chicken (Gallus domesticus)	3	U	FD	14	d	8	d	JV	M	GRO	BDWT	WO	177	354	83
123	Oh et al, 1979	6627	Chicken (Gallus domesticus)	6	U	FD	4	w	1	d	JV	NR	GRO	BDWT	WO	252	503	79
124	Jackson et al, 1986	6133	Chicken (Gallus domesticus)	5	U	FD	1	w	40	w	SM	F	GRO	BDWT	WO	367	480	79
125	Lu and Combs, 1988	5903	Chicken (Gallus domesticus)	2	U	FD	15	d	1	d	JV	NR	GRO	BDWT	WO		21.6	72
126	Stahl et al, 1989	5820	Chicken (Gallus domesticus)	2	U	FD	20	d	1	d	JV	B	GRO	BDWT	WO		31	77
127	Lu and Combs, 1988	5866	Chicken (Gallus domesticus)	2	U	FD	6	d	20	d	JV	NR	GRO	BDWT	WO		39	73

APPENDIX G-9

Summary of Avian Toxicity Data: Zinc

Guidry Property
St. Martin Parish, Louisiana

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Data Evaluation Score
128	Lu et al, 1990	8008	Chicken (Gallus domesticus)	2	U	FD	7	d	14	d	JV	B	GRO	BDWT	WO		65.7	72
129	Jackson et al, 1986	6133	Chicken (Gallus domesticus)	5	U	FD	21	d	40	w	SM	F	GRO	BDWT	WO		88	73
130	Jensen and Maurice, 1980	9749	Chicken (Gallus domesticus)	2	U	FD	6	w	NR	NR	SM	F	GRO	BDWT	WO		101	77
131	Gasaway and Buss, 1972	9261	Mallard duck (Anas platyrhynchos)	4	U	FD	10	d	7	w	JV	B	GRO	BDWT	WO		126	77
132	Pimentel et al, 1992	5617	Chicken (Gallus domesticus)	2	M	FD	3	w	1	d	JV	B	GRO	BDWT	WO		132	77
133	Dewar et al, 1983	37018	Chicken (Gallus domesticus)	4	U	FD	4	w	2	w	JV	B	GRO	BDWT	WO		143	72
134	Berg and Martinson, 1972	93	Chicken (Gallus domesticus)	2	U	FD	2	w	1	d	JV	NR	GRO	BDWT	WO		252	72
135	Bafundo et al, 1984	6273	Chicken (Gallus domesticus)	2	U	FD	14	d	8	d	JV	M	GRO	BDWT	WO		190	76
136	Bafundo et al, 1984	2517	Chicken (Gallus domesticus)	2	U	FD	14	d	8	d	JV	M	GRO	BDWT	WO		284	76
137	Bartov, 1996	5373	Chicken (Gallus domesticus)	4	U	FD	2	w	1	w	JV	F	GRO	BDWT	WO		315	73
138	Rama and Planas, 1981	6435	Chicken (Gallus domesticus)	2	U	FD	9	w	1	d	JV	NR	GRO	BDWT	WO		433	70
139	Dean et al, 1991	5681	Chicken (Gallus domesticus)	2	M	FD	1	w	1	d	JV	M	GRO	BDWT	WO		757	78
140	Bartov et al, 1994	7956	Chicken (Gallus domesticus)	3	U	FD	2	w	1	w	JV	F	GRO	BDWT	WO		914	73
141	Palafox and Ho-A, 1980	6545	Chicken (Gallus domesticus)	2	U	FD	5	d	38	w	JV	F	GRO	BDWT	WO		988	71
142	Bartov, 1996	5373	Chicken (Gallus domesticus)	4	U	FD	2	w	1	w	JV	F	GRO	BDWT	WO		1370	73
Survival (MOR)																		
143	Hamilton et al, 1979	6655	Japanese quail (Coturnix japonica)	2	U	FD	14	d	0	d	JV	B	MOR	MORT	WO	21.5		81
144	Stahl et al, 1989	5820	Chicken (Gallus domesticus)	2	U	FD	20	d	1	d	JV	B	MOR	MORT	WO	31		78
145	Stahl et al, 1989	5820	Chicken (Gallus domesticus)	2	U	FD	20	d	1	d	JV	B	MOR	MORT	WO	35.4		78
146	Harland et al, 1975	6887	Japanese quail (Coturnix japonica)	2	U	FD	1	w	1	d	JV	B	MOR	MORT	WO	55.1		78
147	Lefevre et al, 1982	392	Chicken (Gallus domesticus)	2	U	FD	5	w	1	d	JV	NR	MOR	MORT	WO	63.2		79
148	Gibson et al, 1986	6048	Chicken (Gallus domesticus)	6	U	FD	10	w	30	w	JV	F	MOR	MORT	WO	68.8	87.1	80
149	Roberson and Schaible, 1960	14538	Chicken (Gallus domesticus)	10	U	FD	4	w	1	w	JV	M	MOR	SURV	WO	75.6		73
150	Hamilton et al, 1981	6403	Japanese quail (Coturnix japonica)	3	U	FD	14	d	1	d	JV	B	MOR	MORT	WO	89.5		78
151	Blalock and Hill, 1988	5868	Chicken (Gallus domesticus)	3	U	FD	12	d	1	d	JV	F	MOR	MORT	WO	109	219	79
152	Roberson and Schaible, 1960	14538	Chicken (Gallus domesticus)	3	U	FD	4	w	1	d	JV	M	MOR	SURV	WO	115		78
153	Roberson and Schaible, 1960	14538	Chicken (Gallus domesticus)	3	U	FD	4	w	1	d	JV	M	MOR	SURV	WO	120		77
154	Roberson and Schaible, 1960	14538	Chicken (Gallus domesticus)	3	U	FD	4	w	1	d	JV	M	MOR	SURV	WO	121		78
155	Dewar et al, 1983	37018	Chicken (Gallus domesticus)	4	U	FD	4	w	1	d	JV	B	MOR	MORT	WO	143	286	80
156	Roberson and Schaible, 1960	14538	Chicken (Gallus domesticus)	4	U	FD	4	w	1	d	JV	M	MOR	SURV	WO	159	239	84
157	Hill, 1974	92	Chicken (Gallus domesticus)	5	U	FD	5	w	1	d	JV	B	MOR	MORT	WO	172		68
158	Hamilton et al, 1979	6655	Japanese quail (Coturnix japonica)	6	U	FD	14	d	0	d	JV	B	MOR	MORT	WO	183	366	87
159	Oh et al, 1979	6627	Chicken (Gallus domesticus)	6	U	FD	4	w	1	d	JV	NR	MOR	MORT	WO	252	503	80
160	Roberson and Schaible, 1960	14538	Chicken (Gallus domesticus)	4	U	FD	4	w	1	d	JV	M	MOR	SURV	WO	255		78
161	Roberson and Schaible, 1960	14538	Chicken (Gallus domesticus)	4	U	FD	4	w	1	d	JV	M	MOR	SURV	WO	272		78
162	Dewar et al, 1983	37018	Chicken (Gallus domesticus)	3	U	FD	4	d	18	mo	AD	F	MOR	MORT	WO	319		69
163	Hill, 1974	1369	Chicken (Gallus domesticus)	2	U	FD	3	w	1	d	JV	B	MOR	MORT	WO	320		77
164	Dewar et al, 1983	37018	Chicken (Gallus domesticus)	4	U	FD	4	w	2	w	JV	B	MOR	MORT	WO	327	491	79
165	Vohra and Kratzer, 1968	14404	Turkey (Meleagris gallopavo)	7	U	FD	21	d	NR	NR	JV	B	MOR	MORT	WO	741		72
166	Gasaway and Buss, 1972	9261	Mallard duck (Anas platyrhynchos)	4	U	FD	30	d	7	w	JV	B	MOR	MORT	WO		126	78
167	Van Vleet et al, 1981	80	Duck (Anas platyrhynchos)	2	U	FD	15	d	1	d	JV	M	MOR	MORT	WO		401	77
168	Van Vleet et al, 1981	80	Duck (Anas platyrhynchos)	2	U	FD	15	d	1	d	JV	M	MOR	MORT	WO		803	77

AD = adult; AR = adrenal gland ; ASHC = ash content; AT = alimentary tract; B = both; BDWT = body weight changes; BEH = behavior; BIO = biochemical; BL = blood; BO = bone; w = body weight; CHM = chemical changes; d = day; DIFD = digestibility of food; DT = digestive tract; ENZ = enyzme level changes; F = female; FCNS = food consumption; FD = food; FDB = feeding behavior; FDCV = food conversion efficiency; FDNG = feeding behavior; GBCM = general biochemical ; GENZ = general enzyme changes; GHIS = general histology; GRO = growth; GZ = gizzard; HIS = histological changes; HMCT = hematocrit; HMGL = hemoglobin; ITX = intoxication; JV = juvenile; kg = kilograms; LB = egg-laying bird; LI = liver; LIPD = lipid; LOAEL = lowest observed adverse effect level; LU = lung; mg = milligrams; mo = months; M = male; M = measured; MCPR = microsomal proteins; MOR = effects on mortality and survival; MORT = mortality; NCRO = necrosis; NOAEL = No Observed Advese Effect Level; NR = Not reported; OD = oviduct; ORW = organ weight changes; ORWT = organ weight changes; PHY = physiology; PROG = progeny counts/numbers; PS = pancreas; PTH = pathology; REP = reproduction; RHIS = reproductive organ histology; SM = sexually mature; SMIX = weight relative to body weight; SP = spleen; SR = serum; SURV = survival; TE = testes; TEWT USTR = ultrastructural changes; w = weeks; WI = wings; WO = whole organism; yr = year.

Note: Study results excerpted from the Eco-SSL document for Zinc.

Geometric Mean NOAEL	Geometric Mean LOAEL
82.81	186.99

APPENDIX G-10

Summary of Mammalian Toxicity Data: Zinc

Guidry Property
St. Martin Parish, Louisiana

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Data Evaluation Score
Reproduction (REP)																		
87	Hill et. al., 1983	45143	Pig (Sus scrofa)	3	U	FD	12	mo	7-8	mo	GE	F	REP	ODVP	WO	8.23	82.3	79
88	Seidenberg et al 1986	113	Mouse (Mus musculus)	2	U	GV	4	d	NR	NR	GE	F	REP	PRWT	NR	8.89		82
89	Alaoui et al, 1985	36854	Rat (Rattus norvegicus)	2	U	FD	5	w	NR	NR	JV	M	REP	ORWT	TE	9.64		71
90	Cerklewski, 1979	37008	Rat (Rattus norvegicus)	2	U	FD	37	d	105	d	LC	F	REP	PRWT	WO	14.4		80
91	Food and Drug Res. Lab, 1973	42289	Mouse (Mus musculus)	3	U	GV	10	d	NR	NR	GE	F	REP	PRFM	WO	30		77
92	Khera and Shah, 1979	21134	Rat (Rattus norvegicus)	2	U	FD	4	d	NR	NR	GE	F	REP	PRWT	WO	34		69
93	Miller et al., 1989	14685	Cattle (Bos taurus)	3	U	FD	14	w	NR	NR	LC	F	REP	PRWT	WO	37.9	75.9	86
94	Amemiya et al, 1986	21069	Rat (Rattus norvegicus)	2	U	FD	21	d	NR	NR	GE	F	REP	PRWT	WO	41.2		74
95	Evenson et al, 1993	14660	Rat (Rattus norvegicus)	2	U	FD	8	w	3	w	JV	M	REP	TEWT	TE	42.1		70
96	Food and Drug Res. Lab, 1973	42289	Rat (Rattus norvegicus)	4	U	GV	10	d	NR	NR	GE	F	REP	PRFM	WO	42.5		77
97	Food and Drug Res. Lab, 1974	42292	Rabbit (Oryctolagus cuniculus)	5	U	GV	13	d	NR	NR	GE	F	REP	PRFM	WO	60		77
98	Food and Drug Res. Lab, 1973	42289	Hamster (Mesocricetus auratus)	3	U	GV	5	d	NR	NR	GE	F	REP	PRFM	WO	88		77
99	Shrader et al, 1978	21138	Rat (Rattus norvegicus)	2	U	FD	21	d	NR	NR	GE	F	REP	PRWT	WO	89.6		73
100	Hirsch and Hurley, 1978	21139	Rat (Rattus norvegicus)	2	U	FD	12	d	NR	NR	GE	F	REP	PRWT	WO	89.6		75
101	Hill et al, 1983	35659	Pig (Sus scrofa)	3	U	FD	20	w	NR	NR	LC	F	REP	RHIS	WO	97.8		70
102	Webster, 1979	823	Mouse (Mus musculus)	4	U	FD	19	d	4	mo	GE	F	REP	PRWT	WO	101		79
103	Anderson et al., 1993	139	Mouse (Mus musculus)	2	U	FD	13	w	12	w	JV	M	REP	PRWT	WO	110		74
104	Schlicker and Cox, 1968	25	Rat (Rattus norvegicus)	2	U	FD	36	d	NR	NR	GE	F	REP	PRWT	WO	167		73
105	Ketcheson et al, 1969	37837	Rat (Rattus norvegicus)	3	U	FD	14	d	NR	NR	LC	F	REP	PRWT	WO	181	452	81
106	Maita et al, 1981	43680	Rat (Rattus norvegicus)	4	U	FD	13	w	5	w	JV	M	REP	ORWT	TE	234	2514	82
107	Chu and Cox, 1970	42767	Rat (Rattus norvegicus)	2	U	FD	21	d	NR	NR	LC	F	REP	GREP	WO	347		74
108	Maita et al, 1981	43680	Mouse (Mus musculus)	4	U	FD	13	w	5	w	JV	M	REP	ORWT	TE	458	4927	82
109	Maita et al, 1981	43680	Mouse (Mus musculus)	4	U	FD	13	w	5	w	JV	F	REP	ORWT	OV	479	4878	82
110	Bui, et al, 1998	21045	Rat (Rattus norvegicus)	2	M	GV	7	d	NR	NR	GE	F	REP	PRWT	WO	975		80
111	Maita et al, 1981	43680	Rat (Rattus norvegicus)	4	U	FD	13	w	5	w	JV	F	REP	ORWT	OV	2486		71
112	Kumar, 1976	43587	Rat (Rattus norvegicus)	2	U	FD	17	d	100	d	GE	F	REP	RSEM	WO		12.2	78
113	Barone et al, 1998	21042	Rat (Rattus norvegicus)	2	U	FD	10	d	NR	NR	GE	F	REP	PROG	WO		81.1	73
114	Newman et al, 2002	48540	Rat (Rattus norvegicus)	2	U	FD	16	d	NR	NR	GE	F	REP	PROG	WO		232	81
115	Pal and Pal, 1987	14664	Rat (Rattus norvegicus)	2	U	FD	18	d	120-130	d	GE	F	REP	GREP	WO		326	78
116	Chu and Cox, 1972	42670	Rat (Rattus norvegicus)	2	U	FD	14	d	NR	NR	LC	F	REP	PRWT	WO		326	72
117	Cox et al, 1969	42838	Rat (Rattus norvegicus)	2	U	FD	22	d	NR	NR	GE	F	REP	PRWT	WO		353	74
118	Schlicker and Cox, 1968	25	Rat (Rattus norvegicus)	2	U	FD	18	d	NR	NR	GE	F	REP	PRWT	WO		424	74
Growth (GRO)																		
119	Attia, et al, 1987	36003	Water buffalo (Bubalus bubalis)	5	U	FD	90	d	7-9	mo	JV	M	GRO	BDWT	WO	4.33		69
120	Huerta et al, 2002	25973	Cattle (Bos taurus)	2	U	FD	50	d	18	mo	JV	F	GRO	BDWT	WO	4.78		68
121	Huerta et al, 2002	25973	Cattle (Bos taurus)	2	U	FD	50	d	18	mo	JV	F	GRO	BDWT	WO	4.78		68
122	Alaoui et al, 1985	36854	Rat (Rattus norvegicus)	2	U	FD	5	w	NR	NR	JV	M	GRO	BDWT	WO	9.64		69
123	Hill et. al., 1983	45143	Pig (Sus scrofa)	3	U	FD	8	mo	7-8	mo	GE	F	GRO	GGRO	WO	10.3	103	77
124	Weigarnd and Kirchgessner, 197	41855	Rat (Rattus norvegicus)	4	U	FD	12	d	NR	NR	JV	M	GRO	BDWT	WO	11.7		68
125	Eisemann et al, 1979	43242	Pig (Sus scrofa)	2	M	FD	16	w	6-8	w	JV	B	GRO	BDWT	WO	13.5		69
126	Cerklewski, 1979	37008	Rat (Rattus norvegicus)	2	U	FD	37	d	105	d	LC	F	GRO	BDWT	WO	14.4		78
127	Elliot and Walker, 1968	38623	Pig (Sus scrofa)	2	U	FD	4	w	NR	NR	JV	B	GRO	BDWT	WO	14.9		68
128	Cerklewski and Forbes, 1976	2627	Rat (Rattus norvegicus)	2	U	FD	7	w	NR	NR	JV	M	GRO	BDWT	WO	15.7		69
129	Wapnir and Lee, 1993	39821	Rat (Rattus norvegicus)	2	U	FD	3	w	NR	NR	JV	M	GRO	BDWT	WO	15.7		68
130	Agarwal et al, 1986	21084	Rat (Rattus norvegicus)	2	U	FD	14	d	9-10	w	SM	M	GRO	BDWT	WO	18		72
131	Brandt, 1983	2033	Mink (Mustela vison)	3	M	FD	4	mo	90	d	JV	M	GRO	BDWT	WO	20.2		82
132	Shankar et al, 1986	46830	Rat (Rattus norvegicus)	2	U	FD	120	d	40	d	JV	F	GRO	BDWT	WO	28.9		73
133	Food and Drug Res. Lab, 1973	42289	Mouse (Mus musculus)	3	U	GV	10	d	NR	NR	GE	F	GRO	BDWT	WO	30		75
134	Reeves and Newman, 1997	21067	Rat (Rattus norvegicus)	2	U	FD	7	w	3	w	JV	M	GRO	BDWT	WO	30.4		79
135	Gaynor et al, 1988	47892	Cattle (Bos taurus)	2	M	FD	4	w	NR	NR	LC	F	GRO	BDWT	WO	30.6		74
136	Gaynor et al, 1988	47892	Cattle (Bos taurus)	2	M	FD	5	w	NR	NR	LC	F	GRO	BDWT	WO	33.2		74
137	Khera and Shah, 1979	21134	Rat (Rattus norvegicus)	2	U	FD	4	d	NR	NR	GE	F	GRO	BDWT	WO	34		67
138	Evenson et al, 1993	14660	Rat (Rattus norvegicus)	2	U	FD	8	w	3	w	JV	F	GRO	BDWT	WO	42.1		68
139	Food and Drug Res. Lab, 1973	42289	Rat (Rattus norvegicus)	4	U	GV	10	d	NR	NR	GE	F	GRO	BDWT	WO	42.5		75
140	Brink et al, 1959	14525	Pig (Sus scrofa)	6	U	FD	42	d	NR	NR	JV	NR	GRO	BDWT	WO	43.5	87.1	84

APPENDIX G-10

Summary of Mammalian Toxicity Data: Zinc

Guidry Property
St. Martin Parish, Louisiana

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Data Evaluation Score
141	Miller et al., 1989	14685	Cattle (Bos taurus)	3	U	FD	14	w	NR	NR	LC	F	GRO	BDWT	WO	63.7		69
142	Reeves et al, 1994	37015	Rat (Rattus norvegicus)	2	U	FD	2	w	NR	NR	JV	M	GRO	BDWT	WO	56		75
143	Food and Drug Res. Lab, 1974	42292	Rabbit (Oryctolagus cuniculus)	5	U	GV	12	d	NR	NR	GE	F	GRO	BDWT	WO	60		75
144	Food and Drug Res. Lab, 1973	42289	Hamster (Mesocricetus auratus)	3	U	GV	5	d	NR	NR	GE	F	GRO	BDWT	WO	88		75
145	Bui, et al, 1998	21045	Rat (Rattus norvegicus)	2	M	GV	7	d	NR	NR	GE	F	GRO	BDWT	WO	97.5		69
146	Van Vleet et al, 1981	149	Pig (Sus scrofa)	2	U	FD	10	w	NR	NR	JV	M	GRO	BDWT	WO	99.1		73
147	Schell and Kornegay, 1996	42234	Pig (Sus scrofa)	4	M	FD	2	w	23	d	JV	B	GRO	BDWT	WO	103		69
148	Schell and Kornegay, 1996	42234	Pig (Sus scrofa)	4	M	FD	23	d	23	d	JV	B	GRO	BDWT	WO	106		74
149	Anderson et al., 1993	139	Mouse (Mus musculus)	2	U	FD	13	w	12	w	JV	M	GRO	BDWT	WO	110		81
150	Maita et al, 1981	43680	Rat (Rattus norvegicus)	4	U	FD	13	w	5	w	JV	M	GRO	BDWT	WO	234	2514	80
151	Bentley and Grubb, 1991	40436	Rabbit (Oryctolagus cuniculus)	3	U	FD	22	w	NR	NR	JV	B	GRO	BDWT	WO	282		68
152	Llewellyn et al, 1985	2203	Golden hamster (Mesocricetus auratus)	2	U	FD	18	w	NR	NR	JV	M	GRO	BDWT	WO	295		67
153	Maita et al, 1981	43680	Mouse (Mus musculus)	4	U	FD	13	w	5	w	JV	M	GRO	BDWT	WO	458	4927	80
154	Ketcheson et al, 1969	37837	Rat (Rattus norvegicus)	3	U	FD	14	d	NR	NR	LC	F	GRO	BDWT	WO	470		73
155	Maita et al, 1981	43680	Mouse (Mus musculus)	4	U	FD	13	w	5	w	JV	F	GRO	BDWT	WO	479	4878	80
156	O'Neil-Cutting et al, 1981	14656	Rat (Rattus norvegicus)	2	U	FD	18	w	NR	NR	JV	M	GRO	BDWT	WO	597		77
157	Zhang et al, 1995	39356	Mouse (Mus musculus)	2	M	FD	10	d	8	w	JV	F	GRO	BDWT	WO	825		68
158	Zhang et al, 1995	39356	Mouse (Mus musculus)	2	M	FD	10	d	8	w	JV	F	GRO	BDWT	WO	845		73
159	Zhang et al, 1995	39356	Mouse (Mus musculus)	2	M	FD	10	d	8	w	JV	F	GRO	BDWT	WO	846		68
160	Pettersen, et al, 2002	36374	Mouse (Mus musculus)	3	U	FD	3	w	4	w	JV	B	GRO	BDWT	WO	1419	2838	83
161	Urabe and Hayakawa, 1990	40997	Rat (Rattus norvegicus)	2	U	FD	42	d	NR	NR	JV	M	GRO	BDWT	WO	1684		78
162	Maita et al, 1981	43680	Rat (Rattus norvegicus)	4	U	FD	13	w	5	w	JV	F	GRO	BDWT	WO	2486		69
163	Nakamura et al., 1983	638	Rat (Rattus norvegicus)	2	U	FD	11	w	NR	NR	JV	F	GRO	BDWT	WO		8.71	73
164	Rosa et al, 1986	47007	Sheep (Ovis aries)	2	U	FD	56	d	NR	NR	SM	M	GRO	BDWT	WO		16.1	71
165	Subramanian et al, 2000	21011	Rat (Rattus norvegicus)	2	U	FD	6	w	NR	NR	JV	M	GRO	BDWT	WO		28.2	73
166	Davies, et al, 1977	14527	Sheep (Ovis aries)	2	M	FD	26	d	1	w	JV	M	GRO	BDWT	WO		75.7	81
167	Barone et al, 1998	21042	Rat (Rattus norvegicus)	2	U	FD	10	d	NR	NR	GE	F	GRO	BDWT	WO		81.1	71
168	Hsu et al, 1975	14376	Pig (Sus scrofa)	2	U	FD	13	w	4	w	JV	NR	GRO	BDWT	WO		89.1	73
169	Schlicker and Cox, 1968	25	Rat (Rattus norvegicus)	2	U	FD	18	d	NR	NR	GE	F	GRO	BDWT	WO		424	68
170	Settlemire and Matrone, 1967	38015	Rat (Rattus norvegicus)	2	U	FD	5	w	4-6	w	JV	M	GRO	BDWT	WO		667	76
171	Ogiso, et. al., 1974	42961	Rat (Rattus norvegicus)	2	U	FD	15	d	NR	NR	JV	M	GRO	BDWT	WO		956	77
172	Scott and Magee, 1979	43264	Rat (Rattus norvegicus)	2	U	FD	1	w	NR	NR	JV	M	GRO	BDWT	WO		968	77
Survival (MOR)																		
173	Seidenberg et al 1986	113	Mouse (Mus musculus)	2	U	GV	4	d	NR	NR	GE	F	MOR	MORT	WO	8.89		85
174	Van der Schee et al, 1980	21171	Sheep (Ovis aries)	3	M	FD	98	d	NR	NR	JV	M	MOR	MORT	WO	12		83
175	Food and Drug Res. Lab, 1973	42289	Mouse (Mus musculus)	3	U	GV	10	d	NR	NR	GE	F	MOR	SURV	WO	30		76
176	Food and Drug Res. Lab, 1973	42289	Rat (Rattus norvegicus)	4	U	GV	10	d	NR	NR	GE	F	MOR	SURV	WO	42.5		76
177	Brink et al, 1959	14525	Pig (Sus scrofa)	6	U	FD	42	d	NR	NR	JV	NR	MOR	MORT	WO	43.5	87.1	85
178	Food and Drug Res. Lab, 1974	42292	Rabbit (Oryctolagus cuniculus)	5	U	GV	13	d	NR	NR	GE	F	MOR	MORT	WO	60		76
179	Ott et al, 1966	14535	Sheep (Ovis aries)	8	U	FD	6	w	NR	NR	JV	NR	MOR	MORT	WO	82.9	99.5	80
180	Willoughby et al, 1972	14385	Horse (Equus caballus)	2	M	FD	9	w	3-4	w	JV	F	MOR	MORT	WO	83.7		78
181	Food and Drug Res. Lab, 1973	42289	Hamster (Mesocricetus auratus)	3	U	GV	5	d	NR	NR	GE	F	MOR	SURV	WO	88		76
182	Aulerich et al, 1991	46274	Mink (Mustela vison)	4	M	FD	144	d	>1	yr	AD	M	MOR	MORT	WO	165		80
183	Aulerich et al, 1991	46274	Mink (Mustela vison)	4	M	FD	144	d	10-12	w	JV	M	MOR	MORT	WO	297		84
184	Aulerich et al, 1991	46274	Mink (Mustela vison)	4	M	FD	144	d	10-12	w	JV	F	MOR	MORT	WO	324		84
185	Aulerich et al, 1991	46274	Mink (Mustela vison)	4	M	FD	114	d	>1	yr	AD	F	MOR	MORT	WO	327		80
186	Maita et al, 1981	43680	Mouse (Mus musculus)	4	U	FD	13	w	5	w	JV	M	MOR	MORT	WO	458	4927	81
187	Maita et al, 1981	43680	Rat (Rattus norvegicus)	4	U	FD	13	w	5	w	JV	F	MOR	MORT	WO	2486		70
188	Maita et al, 1981	43680	Rat (Rattus norvegicus)	4	U	FD	13	w	5	w	JV	M	MOR	MORT	WO	2514		79
189	Maita et al, 1981	43680	Mouse (Mus musculus)	4	U	FD	13	w	5	w	JV	F	MOR	MORT	WO	4878		79
190	Van Vleet et al, 1981	149	Pig (Sus scrofa)	2	U	FD	10	w	NR	NR	JV	M	MOR	MORT	WO		99.1	78

APPENDIX G-10

Summary of Mammalian Toxicity Data: Zinc

Guidry Property
St. Martin Parish, Louisiana

Result #	Reference	Ref No.	Test Organism	# of Conc/ Doses	Method of Analyses	Route of Exposure	Exposure Duration	Duration Units	Age	Age Units	Lifestage	Sex	Effect Type	Effect Measure	Response Site	NOAEL Dose (mg/kg bw/day)	LOAEL Dose (mg/kg bw/day)	Data Evaluation Score

AD = adult; AHDX = aniline hydroxylase; ALPH = alkaline phosphatase; B = both; BDWT = body weight changes; BEH = behavior; BI = bile; BIO = biochemical; BL = blood; BR = brain; bw = body weight; CALC = calcium; CCOX = cytochrome C-oxidase; CHM = chemical changes; CHOL = cholesterol; d = day; DIFD = digestibility of food; DR = Drinking water; DT - digestive tract; ENZ = enyzme level changes; F = female; FCNS = food consumption; FD = food; FDB = feeding behavior; FDCV = food conversion efficiency; FDNG = feeding behavior; FM = femur; FO = foot; GBCM = general biochemical changes; GE = gestation; GGRO = general growth changes; GLPX = glutathione peroxidase; GLSN = gross lesions; GLUC = glucose; GLYC = glycogen; GPHY = general pysiology changes; GRO = growth; GREP = general reproduction; GRS = gross body weight changes; GT = gastrointestinal tract; GV = gavage; HA = hair; HE = heart; HEMT = hematocrit; HIS = histological changes; HM = humerus; HMCT = hematocrit; HMGL
= hemoglobin; HRM = hormone changes; IN = intestinal tract; ITX = intoxication; JV = juvenile; kg = kilograms; KI = kidney; LC = lactation; LD = lipid; LI = liver; LOAEL = lowest observed adverse effect level; mg = milligrams; mo = months; M = male; M = measured; MCHC = mean corpuscular hemoglobin; MCPR = microsomal proteins; MK = milk, lactating females; MOR = effects on mortality and survival; MORT = mortality; MPH = morphology; MT = multiple; MU = muscle; NACO = sodium; NOAEL = No Observed Advese Effect Level; NCRO = necrosis; NR = Not reported; NMVM = number of movements; ODVP = offspring development; OR = other oral; ORW
= organ weight changes; ORWT = organ weight changes; OV = ovary; P450 = cytochrome P450; PCLV = packed cell volume; PHY = physiology; PL = plasma; PRFM =
pregnant females in a population; PROG = progeny numbers/counts; PRTL = protein, total; PRWT = progeny weight; PS = pancreas; PTH = pathology; RBCE = red blood cell count; REP = reproduction; RHIS = reproductive organ histology; RSEM = resorbed embryos; SH = stomach; SK = skin; SM = sexually mature; SMIX = weight relative to body weight; SP = spleen; SPCL = sperm cell counts; SR = serum; SURV = survival; TB = tibia; TE = testes; TEWT = testes weight; TS = thymus; TWBC = white blood cell count, total; U = unmeasured; UR = urine; USTR = ultrastructural changes; VD = Vas deferens; VTMA = vitamin A; w = weeks; WCON = water consumption; WO = whole organism.

Note: Study results excerpted from the Eco-SSL document for Zinc.

Geometric Mean NOAEL	Geometric Mean LOAEL
86.83	292.07

APPENDIX G-11

Derivation of Cadmium Toxicity Reference Values

Guidry Property
St. Martin Parish, Louisiana

Avian Receptor

NOAEL	LOAEL
Reproduction	
0.593	2.37
0.593	2.37
0.799	2.4
1.53	21.1
1.53	21.1
4.2	-
-	2.4
-	3.71
-	7.65
-	10.4
Growth	
0.125	-
0.26	-
0.78	7.08
0.826	3.3
0.858	-
1.25	-
1.55	4.66
1.72	3.44
1.72	3.44
4.2	-
4.24	-
5.76	-
6.44	-
12.5	37.5
-	1.05
-	4.26
-	4.8
-	4.9
-	5.63
-	9.57
-	9.75
-	12.2
-	12.8
-	13
-	13.8
-	14.7
Survival	
0.125	-
4.24	-
5.78	-
8.59	-
9.57	14.3
10.5	-
13.4	-
14.2	-
15.3	30.6
16.9	-
21.1	-
22.3	44.6
-	4.9
-	66.9

Geometric Mean NOAEL: 2.77
Geometric Mean LOAEL: 7.76

Mammalian Receptor

NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Reproduction		Growth		Survival	
0.0069	-	0.0069	-	0.0069	-
0.0939	15.6	0.00792	-	1.36	-
0.651	4.88	0.00884	-	1.87	4.99
0.89	-	0.0187	-	2.22	-
1	10	0.0584	-	2.53	-
1	10	0.0793	-	2.61	-
1.14	2.28	0.1	1	4	40
1.57	4.5	0.1	1	4	-
2.53	-	0.179	-	6.61	-
4	40	0.207	1.57	10	-
4	-	0.268	1.34	10	-
5.4	54	0.323	-	12.5	-
6	10	0.4	4	21.3	-
6.13	18.4	0.448	0.909	41.1	-
6.44	-	0.478	-	67.3	-
7.41	-	0.579	-	103	-
11.4	-	0.581	1.16	571	2160
12.5	-	0.593	-	-	0.551
13.9	-	0.645	1.61	-	0.62
25	-	0.77	7.7	-	5.74
41.1	-	0.89	-		
50	75	0.89	-		
50	-	1	10		
-	0.661	1.04	5.18		
-	1.42	1.08	10.8		
-	1.45	1.36	-		
-	1.87	1.78	-		
-	2.14	1.84	6.13		
-	3.93	1.85	-		
-	4.61	2.22	-		
-	5.59	2.53	-		
-	5.82	2.65	10.6		
-	6.3	2.78	-		
-	7.28	3	10		
-	236	3.08	15.4		
		3.73	-		
		4.05	12.1		
		4.36	8.71		
		4.44	44.4		
		4.97	-		
		4.99	-		
		5.4	54		
		5.54	-		
		6.06	15.2		
		7.23	-		
		7.38	-		
		8.53	-		
		8.54	17.1		
		8.61	-		
		10.5	-		
		11.8	-		
		12.5	-		
		12.5	-		
		12.6	-		
		16.9	-		
		21.3	-		
		31.3	-		
		43	85.9		
		50	100		
		-	0.0744		
		-	0.143		
		-	1		
		-	1.97		
		-	3.01		
		-	3.21		
		-	3.43		
		-	3.88		
		-	4.06		
		-	4.58		
		-	5.08		
		-	5.18		
		-	5.44		
		-	5.74		
		-	5.82		
		-	6.13		
		-	6.89		
		-	9.54		
		-	9.7		
		-	10		
		-	10.4		
		-	13.2		
		-	14.7		
		-	16.8		
		-	20.7		
		-	75.8		
		-	103		
		-	571		

Geometric Mean NOAEL: 2.32
Geometric Mean LOAEL: 7.08

NOTE:

Toxicity reference values are taken from the USEPA (2005) Ecological Soil Screening Levels for Cadmium.

APPENDIX G-12

Summary of Avian and Mammalian Toxicity Data for Metals without USEPA Eco-SSL Documents

Guidry Property
St. Martin Parish, Louisiana

COPEC	Chemical Form	Test Species	Study Duration	Test Endpoint	Exposure Route	NOAEL [(a)] (mg/kg/d)	LOAEL [(b)] (mg/kg/d)	Study Reference	Source Reference
Mammals									
Mercury	mercuric chloride	mink	6 months	reproduction	oral in diet	1.0E+00	1.0E+01 (a)	Aulerich et al., 1974	Sample et al. 1996
Strontium	strontium chloride	rat	3 years	body weight and bone changes	oral in water	2.6E+02	2.6E+03 (a)	Skoryna, 1981	Sample et al. 1996
Avian									
Mercury	mercuric chloride	Japanese quail	1 year during reproduction	reproduction	oral in diet	4.5E-01	9.0E-01	Hill and Schaffner, 1976	Sample et al. 1996

NOTES:

Toxicity data for COPECs without Ecological Soil Screening Level documents.
COPEC - Constituents of Potential Ecological Concern
Eco-SSL - Ecological Soil Screening Level
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Adverse Effects Level
Hierarchy of source references:

1. Sample et al. 1996 - Sample BE, DM Opresko, and GW Suter II. *Toxicological Benchmarks for Wildlife: 1996 Revisior*. U.S. Department of Energy. June 1996. ES/ER/TM-86/R3.