

APPENDIX G

STACK EMISSIONS RISK ASSESSMENT: CHRONIC MULTIPLE PATHWAY RISK RESULTS BY PATHWAY AND RECEPTOR

Appendix G

Stack Emissions Risk Assessment: Chronic Multipathway Risk Results by Pathway and Receptor

Group 1: All Detected Compounds

Stack Emissions Risk Assessment
Chronic Multipathway Risk Results by Pathway and Receptor
Group 1: All Detected Compounds (a)
(IRAP Software Output Information)

Receptor	Scenario	Pathway (b)	Total Excess Lifetime Cancer Risk	Total Non- Cancer Hazard Index
R 1 resident	resident adult	air crisk inhale	1.7E-08	1.1E-02
R 1 resident	resident adult	intake crisk ag	4.4E-09	1.4E-04
R 1 resident	resident adult	intake crisk soil	1.8E-11	1.4E-06
		Total	2E-08	1E-02
R 1 resident	resident child	air crisk inhale	3.3E-09	1.1E-02
R 1 resident	resident child	intake crisk ag	2.1E-09	3.3E-04
R 1 resident	resident child	intake crisk soil	3.4E-11	1.3E-05
		Total	5E-09	1E-02
R 2 resident	resident adult	air crisk inhale	5.4E-08	4.8E-02
R 2 resident	resident adult	intake crisk ag	9.2E-09	3.1E-04
R 2 resident	resident adult	intake crisk soil	5.0E-11	4.9E-06
		Total	6E-08	5E-02
R 2 resident	resident child	air crisk inhale	1.1E-08	4.8E-02
R 2 resident	resident child	intake crisk ag	4.4E-09	7.4E-04
R 2 resident	resident child	intake crisk soil	9.3E-11	4.6E-05
		Total	2E-08	5E-02
R 3 resident farmer	farmer adult	air crisk inhale	2.1E-08	1.5E-02
R 3 resident farmer	farmer adult	intake crisk ag	1.9E-09	4.2E-05
R 3 resident farmer	farmer adult	intake crisk beef	5.7E-09	3.3E-06
R 3 resident farmer	farmer adult	intake crisk chick	6.2E-13	6.2E-09
R 3 resident farmer	farmer adult	intake crisk eggs	3.5E-13	5.4E-09
R 3 resident farmer	farmer adult	intake crisk pork	1.2E-11	1.9E-09
R 3 resident farmer	farmer adult	intake crisk soil	1.3E-11	2.9E-07
		Total	3E-08	1E-02
R 3 resident farmer	farmer child	air crisk inhale	3.2E-09	1.5E-02
R 3 resident farmer	farmer child	intake crisk ag	7.0E-10	1.0E-04
R 3 resident farmer	farmer child	intake crisk beef	5.2E-10	2.1E-06
R 3 resident farmer	farmer child	intake crisk chick	6.1E-14	4.2E-09
R 3 resident farmer	farmer child	intake crisk eggs	3.4E-14	3.9E-09
R 3 resident farmer	farmer child	intake crisk pork	1.2E-12	1.4E-09
R 3 resident farmer	farmer child	intake crisk soil	1.6E-11	2.7E-06
		Total	4E-09	1E-02
R 4 resident farmer	farmer adult	air crisk inhale	1.9E-08	1.2E-02
R 4 resident farmer	farmer adult	intake crisk ag	2.3E-09	5.0E-05
R 4 resident farmer	farmer adult	intake crisk beef	5.0E-09	3.9E-06
R 4 resident farmer	farmer adult	intake crisk chick	6.0E-13	5.7E-09
R 4 resident farmer	farmer adult	intake crisk eggs	3.2E-13	4.6E-09
R 4 resident farmer	farmer adult	intake crisk pork	1.1E-11	1.6E-09
R 4 resident farmer	farmer adult	intake crisk soil	1.2E-11	2.8E-07
		Total	3E-08	1E-02
R 4 resident farmer	farmer child	air crisk inhale	2.8E-09	1.2E-02
R 4 resident farmer	farmer child	intake crisk ag	8.2E-10	1.2E-04
R 4 resident farmer	farmer child	intake crisk beef	4.6E-10	2.4E-06
R 4 resident farmer	farmer child	intake crisk chick	6.0E-14	3.9E-09
R 4 resident farmer	farmer child	intake crisk eggs	3.1E-14	3.3E-09
R 4 resident farmer	farmer child	intake crisk pork	1.2E-12	1.2E-09
R 4 resident farmer	farmer child	intake crisk soil	1.5E-11	2.6E-06
		Total	4E-09	1E-02
R only fish drain	fisher adult	intake crisk fish	9.8E-09	1.4E-02
		Total	1E-08	1E-02

Stack Emissions Risk Assessment
Chronic Multipathway Risk Results by Pathway and Receptor
Group 1: All Detected Compounds (a)
(IRAP Software Output Information)

Receptor	Scenario	Pathway (b)	Total Excess Lifetime Cancer Risk	Total Non- Cancer Hazard Index
R_only fish_drain	fisher_child	intake_crisk_fish	1.4E-09	1.0E-02
		Total	1E-09	1E-02
R_only fish_river	fisher_adult	intake_crisk_fish	6.9E-09	3.8E-03
		Total	7E-09	4E-03
R_only fish_river	fisher_child	intake_crisk_fish	9.7E-10	2.7E-03
		Total	1E-09	3E-03
Farmer area	farmer_adult	air_crisk_inhale	8.5E-09	5.8E-03
Farmer area	farmer_adult	intake_crisk_ag	4.6E-10	1.0E-05
Farmer area	farmer_adult	intake_crisk_beef	2.2E-09	8.0E-07
Farmer area	farmer_adult	intake_crisk_chick	2.1E-13	2.2E-09
Farmer area	farmer_adult	intake_crisk_eggs	1.3E-13	2.1E-09
Farmer area	farmer_adult	intake_crisk_pork	4.4E-12	7.4E-10
Farmer area	farmer_adult	intake_crisk_soil	4.5E-12	9.9E-08
		Total	1E-08	6E-03
Farmer area	farmer_child	air_crisk_inhale	1.3E-09	5.8E-03
Farmer area	farmer_child	intake_crisk_ag	1.7E-10	2.4E-05
Farmer area	farmer_child	intake_crisk_beef	2.0E-10	4.9E-07
Farmer area	farmer_child	intake_crisk_chick	2.0E-14	1.5E-09
Farmer area	farmer_child	intake_crisk_eggs	1.2E-14	1.5E-09
Farmer area	farmer_child	intake_crisk_pork	4.5E-13	5.6E-10
Farmer area	farmer_child	intake_crisk_soil	5.7E-12	9.2E-07
		Total	2E-09	6E-03
Town area	resident_adult	air_crisk_inhale	1.1E-08	1.1E-02
Town area	resident_adult	intake_crisk_ag	5.8E-10	2.7E-05
Town area	resident_adult	intake_crisk_soil	7.3E-12	9.7E-07
		Total	1E-08	1E-02
Town area	resident_child	air_crisk_inhale	2.1E-09	1.1E-02
Town area	resident_child	intake_crisk_ag	2.8E-10	6.6E-05
Town area	resident_child	intake_crisk_soil	1.4E-11	9.1E-06
		Total	2E-09	1E-02

(a) Group 1 includes 95 compounds that were detected in the Performance Demonstration Test (PDT) in addition to several compounds that were not measured during the PDT but which were evaluated based on emission rates derived from feed rates.

(b) Exposure pathway definitions:

IRAP Term	Exposure pathway
air_crisk_inhale	= inhalation of air
intake_crisk_ag	= ingestion of produce
intake_crisk_beef	= ingestion of beef
intake_crisk_chick	= ingestion of chicken
intake_crisk_eggs	= ingestion of eggs
intake_crisk_pork	= ingestion of pork
intake_crisk_soil	= incidental ingestion of soil
intake_crisk_fish	= ingestion of fish

Appendix G

Stack Emissions Risk Assessment: Chronic Multipathway Risk Results by Pathway and Receptor Group 2: All Compounds (except benzidine)

Stack Emissions Risk Assessment
Chronic Multipathway Risk Results by Pathway and Receptor
Group 2: All Compounds (except benzidine) (a)
(IRAP Software Output Information)

Receptor	Scenario	Pathway (b)	Total Excess Lifetime Cancer Risk	Total Non-Cancer Hazard Index
R 1 resident	resident_adult	air_crisk_inhale	4.1E-08	1.2E-02
R 1 resident	resident_adult	intake_crisk_ag	1.3E-08	1.8E-04
R 1 resident	resident_adult	intake_crisk_soil	1.9E-11	1.5E-06
		Total	5E-08	1E-02
R 1 resident	resident_child	air_crisk_inhale	8.3E-09	1.2E-02
R 1 resident	resident_child	intake_crisk_ag	6.0E-09	4.3E-04
R 1 resident	resident_child	intake_crisk_soil	3.6E-11	1.4E-05
		Total	1E-08	1E-02
R 2 resident	resident_adult	air_crisk_inhale	1.3E-07	5.1E-02
R 2 resident	resident_adult	intake_crisk_ag	3.0E-08	4.1E-04
R 2 resident	resident_adult	intake_crisk_soil	5.4E-11	5.0E-06
		Total	2E-07	5E-02
R 2 resident	resident_child	air_crisk_inhale	2.7E-08	5.1E-02
R 2 resident	resident_child	intake_crisk_ag	1.4E-08	9.8E-04
R 2 resident	resident_child	intake_crisk_soil	1.0E-10	4.7E-05
		Total	4E-08	5E-02
R 3 resident farmer	farmer_adult	air_crisk_inhale	5.2E-08	1.5E-02
R 3 resident farmer	farmer_adult	intake_crisk_ag	5.5E-09	6.1E-05
R 3 resident farmer	farmer_adult	intake_crisk_beef	7.4E-09	9.8E-06
R 3 resident farmer	farmer_adult	intake_crisk_chick	6.4E-13	6.3E-09
R 3 resident farmer	farmer_adult	intake_crisk_eggs	3.6E-13	5.5E-09
R 3 resident farmer	farmer_adult	intake_crisk_pork	1.3E-11	4.3E-09
R 3 resident farmer	farmer_adult	intake_crisk_soil	1.3E-11	3.1E-07
		Total	6E-08	2E-02
R 3 resident farmer	farmer_child	air_crisk_inhale	7.8E-09	1.5E-02
R 3 resident farmer	farmer_child	intake_crisk_ag	2.0E-09	1.4E-04
R 3 resident farmer	farmer_child	intake_crisk_beef	6.8E-10	6.0E-06
R 3 resident farmer	farmer_child	intake_crisk_chick	6.3E-14	4.3E-09
R 3 resident farmer	farmer_child	intake_crisk_eggs	3.5E-14	3.9E-09
R 3 resident farmer	farmer_child	intake_crisk_pork	1.3E-12	3.3E-09
R 3 resident farmer	farmer_child	intake_crisk_soil	1.7E-11	2.9E-06
		Total	1E-08	2E-02
R 4 resident farmer	farmer_adult	air_crisk_inhale	4.7E-08	1.3E-02
R 4 resident farmer	farmer_adult	intake_crisk_ag	6.3E-09	7.0E-05
R 4 resident farmer	farmer_adult	intake_crisk_beef	6.9E-09	1.2E-05
R 4 resident farmer	farmer_adult	intake_crisk_chick	6.1E-13	5.8E-09
R 4 resident farmer	farmer_adult	intake_crisk_eggs	3.3E-13	4.7E-09
R 4 resident farmer	farmer_adult	intake_crisk_pork	1.2E-11	3.7E-09
R 4 resident farmer	farmer_adult	intake_crisk_soil	1.2E-11	3.0E-07
		Total	6E-08	1E-02
R 4 resident farmer	farmer_child	air_crisk_inhale	7.0E-09	1.3E-02
R 4 resident farmer	farmer_child	intake_crisk_ag	2.3E-09	1.6E-04
R 4 resident farmer	farmer_child	intake_crisk_beef	6.4E-10	7.2E-06
R 4 resident farmer	farmer_child	intake_crisk_chick	6.1E-14	4.0E-09
R 4 resident farmer	farmer_child	intake_crisk_eggs	3.2E-14	3.4E-09
R 4 resident farmer	farmer_child	intake_crisk_pork	1.2E-12	2.8E-09
R 4 resident farmer	farmer_child	intake_crisk_soil	1.6E-11	2.8E-06
		Total	1E-08	1E-02
R only fish_drain	fisher_adult	intake_crisk_fish	1.2E-08	1.4E-02
		Total	1E-08	1E-02

Stack Emissions Risk Assessment
Chronic Multipathway Risk Results by Pathway and Receptor
Group 2: All Compounds (except benzidine) (a)
(IRAP Software Output Information)

Receptor	Scenario	Pathway (b)	Total Excess Lifetime Cancer Risk	Total Non-Cancer Hazard Index
R only fish drain	fisher child	intake crisk fish	1.7E-09	1.0E-02
		Total	2E-09	1E-02
R only fish river	fisher adult	intake crisk fish	8.0E-09	3.8E-03
		Total	8E-09	4E-03
R only fish river	fisher child	intake crisk fish	1.1E-09	2.7E-03
		Total	1E-09	3E-03
Farmer area	farmer adult	air crisk inhale	2.1E-08	6.1E-03
Farmer area	farmer adult	intake crisk ag	1.4E-09	1.6E-05
Farmer area	farmer adult	intake crisk beef	2.6E-09	2.3E-06
Farmer area	farmer adult	intake crisk chick	2.2E-13	2.2E-09
Farmer area	farmer adult	intake crisk eggs	1.3E-13	2.2E-09
Farmer area	farmer adult	intake crisk pork	4.6E-12	1.7E-09
Farmer area	farmer adult	intake crisk soil	4.7E-12	1.0E-07
		Total	2E-08	6E-03
Farmer area	farmer child	air crisk inhale	3.2E-09	6.1E-03
Farmer area	farmer child	intake crisk ag	5.1E-10	3.6E-05
Farmer area	farmer child	intake crisk beef	2.4E-10	1.4E-06
Farmer area	farmer child	intake crisk chick	2.1E-14	1.5E-09
Farmer area	farmer child	intake crisk eggs	1.3E-14	1.5E-09
Farmer area	farmer child	intake crisk pork	4.7E-13	1.3E-09
Farmer area	farmer child	intake crisk soil	6.0E-12	9.6E-07
		Total	4E-09	6E-03
Town area	resident adult	air crisk inhale	2.7E-08	1.2E-02
Town area	resident adult	intake crisk ag	3.1E-09	3.8E-05
Town area	resident adult	intake crisk soil	8.4E-12	9.8E-07
		Total	3E-08	1E-02
Town area	resident child	air crisk inhale	5.3E-09	1.2E-02
Town area	resident child	intake crisk ag	1.4E-09	8.7E-05
Town area	resident child	intake crisk soil	1.6E-11	9.2E-06
		Total	7E-09	1E-02

(a) Group 2 includes over 170 compounds, of which 82 were not detected in the Performance Demonstration Test (PDT). This group does not include benzidine which was not detected in the PDT.

(b) Exposure pathway definitions:

IRAP Term	Exposure pathway
air_crisk_inhale	= inhalation of air
intake_crisk_ag	= ingestion of produce
intake_crisk_beef	= ingestion of beef
intake_crisk_chick	= ingestion of chicken
intake_crisk_eggs	= ingestion of eggs
intake_crisk_pork	= ingestion of pork
intake_crisk_soil	= incidental ingestion of soil
intake_crisk_fish	= ingestion of fish

Appendix G

Stack Emissions Risk Assessment: Chronic Multipathway Risk Results by Pathway and Receptor

Group 3: All Compounds

Stack Emissions Risk Assessment
Chronic Multipathway Risk Results by Pathway and Receptor
Group 3: All Compounds (a)
(IRAP Software Output Information)

Receptor	Scenario	Pathway (b)	Total Excess Lifetime Cancer Risk	Total Non- Cancer Hazard Index
R 1 resident	resident_adult	air_crisk inhale	1.2E-07	1.2E-02
R 1 resident	resident_adult	intake_crisk_ag	5.9E-07	1.8E-04
R 1 resident	resident_adult	intake_crisk_soil	9.1E-10	1.5E-06
		Total	7E-07	1E-02
R 1 resident	resident_child	air_crisk inhale	2.5E-08	1.2E-02
R 1 resident	resident_child	intake_crisk_ag	2.8E-07	4.4E-04
R 1 resident	resident_child	intake_crisk_soil	1.7E-09	1.4E-05
		Total	3E-07	1E-02
R 2 resident	resident_adult	air_crisk inhale	4.9E-07	5.1E-02
R 2 resident	resident_adult	intake_crisk_ag	1.6E-06	4.2E-04
R 2 resident	resident_adult	intake_crisk_soil	2.4E-09	5.1E-06
		Total	2E-06	5E-02
R 2 resident	resident_child	air_crisk inhale	9.8E-08	5.1E-02
R 2 resident	resident_child	intake_crisk_ag	7.9E-07	1.0E-03
R 2 resident	resident_child	intake_crisk_soil	4.5E-09	4.7E-05
		Total	9E-07	5E-02
R 3 resident farmer	farmer_adult	air_crisk inhale	2.0E-07	1.5E-02
R 3 resident farmer	farmer_adult	intake_crisk_ag	2.8E-07	6.2E-05
R 3 resident farmer	farmer_adult	intake_crisk_beef	2.2E-08	9.8E-06
R 3 resident farmer	farmer_adult	intake_crisk_chick	1.1E-12	6.3E-09
R 3 resident farmer	farmer_adult	intake_crisk_eggs	6.4E-13	5.5E-09
R 3 resident farmer	farmer_adult	intake_crisk_pork	2.3E-11	4.4E-09
R 3 resident farmer	farmer_adult	intake_crisk_soil	1.8E-10	3.1E-07
		Total	5E-07	2E-02
R 3 resident farmer	farmer_child	air_crisk inhale	3.1E-08	1.5E-02
R 3 resident farmer	farmer_child	intake_crisk_ag	1.1E-07	1.4E-04
R 3 resident farmer	farmer_child	intake_crisk_beef	2.1E-09	6.0E-06
R 3 resident farmer	farmer_child	intake_crisk_chick	1.2E-13	4.3E-09
R 3 resident farmer	farmer_child	intake_crisk_eggs	7.2E-14	3.9E-09
R 3 resident farmer	farmer_child	intake_crisk_pork	2.7E-12	3.3E-09
R 3 resident farmer	farmer_child	intake_crisk_soil	3.0E-10	2.9E-06
		Total	1E-07	2E-02
R 4 resident farmer	farmer_adult	air_crisk inhale	1.8E-07	1.3E-02
R 4 resident farmer	farmer_adult	intake_crisk_ag	2.5E-07	7.1E-05
R 4 resident farmer	farmer_adult	intake_crisk_beef	2.0E-08	1.2E-05
R 4 resident farmer	farmer_adult	intake_crisk_chick	1.0E-12	5.8E-09
R 4 resident farmer	farmer_adult	intake_crisk_eggs	6.0E-13	4.7E-09
R 4 resident farmer	farmer_adult	intake_crisk_pork	2.1E-11	3.7E-09
R 4 resident farmer	farmer_adult	intake_crisk_soil	1.7E-10	3.0E-07
		Total	4E-07	1E-02
R 4 resident farmer	farmer_child	air_crisk inhale	2.6E-08	1.3E-02
R 4 resident farmer	farmer_child	intake_crisk_ag	9.9E-08	1.7E-04
R 4 resident farmer	farmer_child	intake_crisk_beef	1.9E-09	7.2E-06
R 4 resident farmer	farmer_child	intake_crisk_chick	1.1E-13	4.0E-09
R 4 resident farmer	farmer_child	intake_crisk_eggs	6.8E-14	3.4E-09
R 4 resident farmer	farmer_child	intake_crisk_pork	2.5E-12	2.9E-09
R 4 resident farmer	farmer_child	intake_crisk_soil	2.8E-10	2.8E-06
		Total	1E-07	1E-02
R_only fish_drain	fisher_adult	intake_crisk_fish	1.6E-08	1.4E-02
		Total	2E-08	1E-02

Stack Emissions Risk Assessment
Chronic Multipathway Risk Results by Pathway and Receptor
Group 3: All Compounds (a)
(IRAP Software Output Information)

Receptor	Scenario	Pathway (b)	Total Excess Lifetime Cancer Risk	Total Non-Cancer Hazard Index
R only fish drain	fisher child	intake crisk fish	2.3E-09	1.0E-02
		Total	2E-09	1E-02
R only fish river	fisher adult	intake crisk fish	1.6E-08	3.8E-03
		Total	2E-08	4E-03
R only fish river	fisher child	intake crisk fish	2.3E-09	2.7E-03
		Total	2E-09	3E-03
Farmer area	farmer adult	air crisk inhale	8.8E-08	6.1E-03
Farmer area	farmer adult	intake crisk ag	1.0E-07	1.6E-05
Farmer area	farmer adult	intake crisk beef	7.8E-09	2.3E-06
Farmer area	farmer adult	intake crisk chick	3.7E-13	2.2E-09
Farmer area	farmer adult	intake crisk eggs	2.3E-13	2.2E-09
Farmer area	farmer adult	intake crisk pork	8.0E-12	1.7E-09
Farmer area	farmer adult	intake crisk soil	6.0E-11	1.0E-07
		Total	2E-07	6E-03
Farmer area	farmer child	air crisk inhale	1.3E-08	6.1E-03
Farmer area	farmer child	intake crisk ag	4.0E-08	3.6E-05
Farmer area	farmer child	intake crisk beef	7.4E-10	1.4E-06
Farmer area	farmer child	intake crisk chick	4.0E-14	1.5E-09
Farmer area	farmer child	intake crisk eggs	2.6E-14	1.5E-09
Farmer area	farmer child	intake crisk pork	9.6E-13	1.3E-09
Farmer area	farmer child	intake crisk soil	1.0E-10	9.6E-07
		Total	5E-08	6E-03
Town area	resident adult	air crisk inhale	1.1E-07	1.2E-02
Town area	resident adult	intake crisk ag	2.5E-07	3.9E-05
Town area	resident adult	intake crisk soil	3.4E-10	9.9E-07
		Total	4E-07	1E-02
Town area	resident child	air crisk inhale	2.3E-08	1.2E-02
Town area	resident child	intake crisk ag	1.2E-07	9.0E-05
Town area	resident child	intake crisk soil	6.3E-10	9.2E-06
		Total	1E-07	1E-02

(a) Group 3 includes over 170 compounds, of which 83 were not detected in the Performance Demonstration Test, including benzidine.

(b) Exposure pathway definitions:

IRAP Term	Exposure pathway
air_crisk_inhale	= inhalation of air
intake_crisk_ag	= ingestion of produce
intake_crisk_beef	= ingestion of beef
intake_crisk_chick	= ingestion of chicken
intake_crisk_eggs	= ingestion of eggs
intake_crisk_pork	= ingestion of pork
intake_crisk_soil	= incidental ingestion of soil
intake_crisk_fish	= ingestion of fish