HAZCO
A CCS Company

22 August 2008

Proj. No.: C62720114
File Loc.: Calgary

Alberta Environment
1st Floor, Twin Atria Building
4999 – 98 Avenue
Edmonton, Alberta
T6B 2X3

Attention: Michelle Camilleri

Dear Michelle:

RE: ADDITIONAL SUPPLEMENTARY INFORMATION REQUESTS

This letter is written in response to additional Supplemental Information Requests (SIRs) dated June 2008 that reflect the additional information needs that were recently communicated in draft form to Alberta Sulphur Terminals by Alberta Environment. For ease of reference, each additional SIR is repeated in full, in italics, and with the same numerical designation as in the original draft communication.

AIR

1) Supplemental Information Request Response 53, Page 51

a) Provide a figure to show the location of the windscreen as requested by Supplemental Information Request 53(a).

b) AST states that the windscreen would be constructed…surrounding the south, southwest and west edges of the sulphur stockpile. Discuss how the placement of the windscreen can be used effectively for dust control against all wind directions.

c) In terms of minimizing wind-blown dust emissions only, which of the technologies presented were considered the most effective by AST?

A. See Figure 1.

B. As the wind approaches the windscreen from outside of the sulphur stockpile (i.e., from the southeast, south, southwest, west, and northwest), the wind is deflected up and over the sulphur stockpile which rests in the lee of the windscreen. Partial upwind protection from winds emanating from the north and east is also provided by the windscreen. As the wind approaches the windscreen from inside of the sulphur stockpile (i.e., from the northeast), the wind is again deflected upwards, from the forming structure, windscreen and stockpile, which forms partial protection against dust migration. Any dust that may be entrained in the wind would settle on the lee side of the windscreen.

C. In terms of mitigating wind-blown dust emissions, (fugitive dust) full enclosure of the stockpile is considered the most effective. However, this option was not selected due to the potential explosion hazard associated with storage of sulphur dust in an enclosed space. The windscreen was selected as the preferred option because it provides nearly equal protection to nearby stakeholders as an enclosed storage facility and the potential explosion hazard is eliminated.

2) *Supplemental Information Request Response 55, Page 51*
AST indicates in the original application that natural gas consumption will be approximately 20,000 GJ/month and two 150 HP boilers were considered. In response to Supplemental Information Request Response 55, AST indicates that one boiler is proposed and that natural gas usage will be 100 tonnes/month. In Attachment 1 Page 8, AST states Natural gas requirements are approximately 5,300 SCFH, which is about 4,000 GJ/month.

a) *Clarify if HP refers to horsepower.*

b) *Clarify how many boilers are proposed at the facility.*

c) *In Attachment 1 Page 8, it is indicated that a 150 Hp Boiler has a fired duty of 5 mm BTU/hr. Discuss why these power ratings are inconsistent.*

d) *What is the actual input duty or power rating of the boiler or boilers?*

e) *Clarify the natural gas usage for the facility and provide a calculation showing that the proposed natural gas usage is consistent with the power rating of the boiler or boilers.*

A. Yes, HP refers to horsepower.

B. One boiler will be installed in phase 1 for the 3,000 tonne production capacity. A second boiler will be added for phase 2 expansion to the 6,000 tonne capacity.

C. The power rating of the boiler is specified in boiler horsepower rather than metric or international horsepower. The conversion factor from BTU/h to boiler horsepower is

$$33{,}471.4\frac{BTU/h}{BoilerHp}$$ [a]

Using this conversion, the boiler's duty of 150 boiler hp corresponds to 5,020,711 BTU/h or, approximately, 5 mmBTU/h. Hence, there is no inconsistency.

D. The actual input duty or power rating of the boiler is 150 hp (boiler) or 5 mmBTU/h.

E. Assuming an average net calorific value of 35,391 kJ/m^3 (equivalent to 950 BTU/scf)[b], the natural gas requirement for a boiler with a fired duty of 5 mmBTU/h is calculated as shown below:

$$NG(SCFH) = FiredDuty\left(\frac{BTU}{h}\right) \times \frac{1}{NCV}\left(\frac{m^3}{kJ}\right) \times conversion\left(\frac{kJ}{BTU}\right) \times conversion\left(\frac{ft^3}{m^3}\right)$$

$$= 5{,}020{,}711\left(\frac{BTU}{h}\right) \times \frac{1}{35{,}391}\left(\frac{m^3}{kJ}\right) \times 1.06\left(\frac{kJ}{BTU}\right) \times 35.31\left(\frac{ft^3}{m^3}\right) = 5{,}309\ SCFH$$

[a] ConvertWorld, http://www.convertworld.com/en/power/

[b] Engineering Toolbox, http://www.engineeringtoolbox.com/heating-values-fuel-gases-d_823.html

3) *Supplemental Information Request Response 60(a), Page 54*
AST states Air quality monitoring at the receiving point (H_2S concentration and odours) will detect excess H_2S should it be present. Explain how air quality monitoring, which monitors H_2S concentrations of the ambient air, can be used to detect H_2S concentrations of the liquid sulphur.

The liquid sulphur producers will be required to verify that liquid sulphur delivered to the Site contains no greater than 10 ppm H_2S. Testing will be completed by the producers before initial shipment to the facility and at regular intervals thereafter. We propose that the nature and frequency of the testing will be submitted by AST for formal authorization by Alberta Environment as a condition of the Approval.

Air quality monitoring is not used to detect H_2S concentrations in the liquid sulphur that exceed 10 ppm. However, the presence of continuous H_2S air monitors at all liquid sulphur transfer points will detect H_2S that may be liberated while the sulphur is being transferred. Thus, the air monitors provide an indirect indication of sulphur that may contain elevated H_2S concentrations. Hence, the air monitoring provides an additional measure of safety.

It is noted that petroleum operators in the Province generate in excess of 8 million tonnes of liquid, degassed sulphur annually, and that the existing systems for sulphur degassing have been proven reliable through this production experience.

4) *Supplemental Information Request Response 66, Page 58*
AST states The monitoring program was designed to ensure that ambient on site concentrations of H_2S would not exceed the occupational health standard of 10 ppm. Ambient measurements of H_2S at a continuous monitoring station located at the plant boundary will be used to ensure that off-site concentrations do not exceed the Alberta Ambient Air Quality Objectives (AAAQO) of 10 ppb.

a) *Confirm if AST expects no off-lease odours during the normal operation of the facility.*

b) *If an off-site odour is attributable to the operation of the proposed facility, what will AST do to find the source of the odour and rectify the problem?*

A. AST does not expect off-Site odours during normal operation of the facility. However, a certain combination of meteorological conditions, operating emissions, background conditions and the sensitivity of a potential receptor could result in noticeable odours over the short term. Based on the results of the H_2S modelling such an event is expected to be rare and short in duration.

B. AST will maintain a 24-hour phone-in line that will allow area residents to report issues such as odours to the facility management team. All odour complaints will be fully investigated in accordance with the following procedure:

- the location of the odour complaint will be established;
- the climate conditions (wind direction, temperature, etc.) at the time of the odour complaint will be established;
- the operations at the time of odour complaint will be established;
- potential sources of odours will be fully investigated with sensitive H_2S and SO_2 detectors;
- sources of vapours will be addressed by either modifying operational practices or the facilities; and
- the details of the odour complaint as summarized above will be fully documented and submitted to Alberta Environment. Follow up monitoring will be implemented to ensure that the mitigations employed are effective in reducing airborne H_2S concentrations during normal operations to levels that are not expected to cause odours.

5) *Supplemental Information Request Response 66(e), Page 63 AST indicates that the efficiency of the SulfaTreat unit is maintained by replenishing the absorbent media after increasing* H_2S *ambient concentrations are noticed. Discuss how the SulfaTreat unit can be maintained in such a manner that adsorbent media is replenished before increasing ambient* H_2S *concentrations are noticed.*

The treatment efficiency of the SulfaTreat units will be monitored on a regular basis by measuring airborne H_2S concentrations in the vapour effluent from the SulfaTreat units. An increasing trend in airborne H_2S concentrations in the vapour effluent is an indication that the iron sponge used to adsorb H_2S is being consumed and that it is time to be replenished. Initially, H_2S concentrations in the vented air will be measured daily. It is anticipated that AST will soon recognize reliable trends in SulfaTreat performance over time and that the monitoring program can be adjusted accordingly. Testing will be completed on a frequent enough basis to provide reliable verification of the performance of the treatment system. Testing results will be recorded and kept on file with the plant.

WATER

6) *Supplemental Information Request Response 24, Page 19 AST states AST has approached area residents regarding field sampling pertaining to this EIA and typically has not been granted access.*

a) *Provide a table summarizing when AST attempted to contact the groundwater users within the 1.6 km radius about the field survey and any responses received from the groundwater users with respect to the survey.*

A. As outlined in the public consultation report, the initial announcement of Hazco's plans to proceed with the Bruderheim Sulphur Forming and Shipping Facility project, at the proposed location, generated significant concern and opposition from a number of landowners in proximity to the proposed site. A number of these landowners chose to express their opposition by denying access to their properties for any technical work associated with completing the EIA (e.g., soil testing, groundwater testing, etc.). In respect for their decisions and directions that access would not be allowed, it was determined by consultation staff that follow-up requests for access by Worley Parsons or by field staff may be perceived as harassing or disrespectful. Consequently, no additional requests for access by project representatives were initiated. The generic nature of these interactions are outlined in the public consultation component of the EIA. Specific requests for access were not documented at this time.

AST and WorleyParsons approached the adjacent landowner immediately to the north in the context of the upper bedrock pumping test described in the EIA supplemental submission (October 30, 2007). This resident had expressed some concern regarding groundwater usage by the Project and had requested that their well be monitored during the pumping test. While WorleyParsons was granted access in this instance, it was ultimately not possible to monitor the resident's well during the pumping test because the pumping assembly prevented access to the well.

As stated in the SIR response letter dated 22 April 2008, AST would be pleased to include neighbouring domestic supply wells into the facility monitoring program, subject to residents agreeing to allow access. The Lamont County Water Utility has now been established as a make-up water supply; therefore, such monitoring would be limited to establishing pre-development groundwater chemistry. Landowners will be notified of monitoring events to arrange access from landowners who are interested in participating in the monitoring program for sampling these groundwater supplies prior to construction and operation of the Project.

No summary table regarding attempts to contact groundwater users is provided. As noted earlier, individual communications with area residents regarding access for environmental monitoring studies were completed as described but individual contacts were not specifically catalogued for documentation purposes.

7) *Supplemental Information Request Response 32, Page 33 AST states that the clay and till deposits vary in thickness from 1.5 m (MW05-06A/B) to 2.0 m (PW06-01) underneath the proposed facility.*

   a) *Comment on the effectiveness of the clay and till aquitard for preventing downward movement of potential contaminants in cases where it is less that 2 m thick beneath the plant site.*

A. The surface clay till aquitard is expected to provide a reasonable and adequate level of protection to the underlying groundwater bearing unit, partly as a result of its low permeability and partly as a result of the low vertical hydraulic gradient across the surface till unit. Baseline monitoring has indicated that the vertical hydraulic gradient at the Site varies from very low downward (nested monitoring well 05-06; June 2005) to near neutral (November 2005 and June 2006). As such, there appears to be minimal potential for the downward movement of potential contaminants, despite the fact that the clay and till aquitard is relatively thin in the area of the Site. If downward movement of potential contaminants were to occur, then groundwater travel times through the 2 m thick clay till layer are expected to vary between approximately 10 and 40 years. This estimate is based on typical groundwater recharge rates of 1–5% of the annual precipitation of 460 mm over fine-grained till areas (i.e., on the order of 5–25 mm/y; Section 2.5.4 of the EIA) and an assumed porosity for the till of 10%.

Groundwater flow velocities in the underlying groundwater bearing unit are also low, which would allow for effective monitoring and response should an unacceptable impact to groundwater quality be observed in this unit. Further, grading of the PDA will be designed in such a way as to maintain or increase the thickness of the till in the main processing and storage area rather than cutting into this layer. Hence, the site preparation work will increase the effectiveness of this unit rather than diminish it.

8) *Supplemental Information Request Response 51(b), Page 49*
AST states that the answer to this question is discussed in the response to SIR 42. In the response to Supplemental Information Request 42, AST discusses the water quality of the storm water pond releases.

a) Chemically characterize the expected water quality of the discharged wastewater from the cooling tower blow down; include a list of the active chemical compounds to be used as bio-fouling and corrosion inhibitors, as well as, estimates of the concentrations of these active chemicals in the discharged wastewater.

A. A list of the typical chemicals and their active chemical compounds required in an internal cooling loop to condition the water and to prevent scaling in a cooling tower is provided in Table 8-1.

Table 8-1: Typical Chemicals and Active Chemical Compounds Required in a Cooling Tower

Function	Chemical	Active Chemical Compound
pH Control – decreases pH which rises when bicarbonate breaks down to hydroxyl ions	Sulphuric acid	Sulphuric acid
Biocide – control microbial growth	Bleach	Chlorine
Biodispersant – detergent aids biocide to control microbial growth	Detergent	Sodium metaborate octahydrate (metaborate)
Corrosion Inhibitor – inhibits corrosion on steel	Phosphorous based alkaline treatment	Phosphonooxy acetic acid (phosphate)
Scale Dispersant – inhibits scaling	Phosphorous based alkaline treatment	Phosphonooxy acetic acid (phosphate)

Estimates of the concentrations of active chemical compounds in discharged wastewater were determined based on the water chemistry resulting from the addition of the chemicals listed in Table 8-1. It is estimated the following dose rates of chemical will be required:

- pH control – 132 mg/L;
- biocide – 8 mg/L;
- biodispersant – 20 mg/L; and
- corrosion inhibitor and scale dispersant – 25mg/L.

Upon start-up of the cooling tower, testing will be completed to determine the exact dose rates.

The expected concentrations of compounds in the discharged wastewater partially generated from the addition of chemicals are:

- pH control – 776 mg/L;
- biocide – 12 mg/L;
- biodispersant – 36 mg/L; and
- corrosion inhibitor and scale dispersant – 5 mg/L.

For a six (6) cycle water process, the expected water quality in the blow down stream that will enter the storm water pond based on the water chemistry and chemical additions indicated above is described in Table 8-2.

Table 8-2: Estimated Blow down Water Chemistry

Water Quality Parameters	Estimated Blow down Water Chemistry
Blow down temperature	85 ºF
Sodium	45.0 mg/L
Potassium	6.6 mg/L
Magnesium	79.2 mg/L
Calcium	268.8 mg/L
Hardness (as calcium carbonate)	996.6 mg/L
Chloride	20.4 mg/L
Sulphate	908.9 mg/L
Bicarbonate	60.9 mg/L
Carbonate	1.8 mg/L
Phosphate	8.5 mg/L
Silica dioxide	24 mg/L
pH	8
Alkalinity	132.35 mg/L
Total dissolved solids	1500.0 mg/L

9) *Supplemental Information Request Responses 42, 43 and 49, Pages 43, 44 and 48 AST states that the water collection pond will have capacity for a 1 in 25 year, 24 hour precipitation event plus 300 mm freeboard (10,980 m^3) and that the pond will also be used for cooling water supply and fire fighting purposes. AST also states that pond water will be sampled and treated prior to any release as a result of extreme runoff/precipitation events.*

   a) *Provide calculations and assumptions that show the collection pond will have the available volume required to handle a 1 in 25 year, 24 hour precipitation event while maintaining available volume requirements for other purposes (i.e., minimum of 6,000m^3 for firefighting purposes – see Supplemental Information Request Response 5).*

   b) *AST states Discharge of water to the northwest wetland would only occur under extreme conditions when water runoff exceeds the capacity of the pond. How does AST propose to ensure the released water has been sampled, tested and treated prior to release to the northwest wetland, especially considering the episodic nature of rain events?*

   c) *Comment on the environmental risk to the northwest wetland in the event of an emergency release of untreated water from the surface water pond.*

   d) *The proposed collection pond will have a total volume of 10,980 m^3, the total annual average precipitation amount on the process plant area is approximately 42,390 m^3 and total anticipated initial water use by the plant is approximately 12,000 m^3 per year. Given that some evaporation will occur from the collection pond, what accounts for additional* *water removal from the collection pond without plans of intentionally releasing water to the wetland area? Provide a water balance.*

e) *Clarify if AST has any plans to install a neutralizing treatment unit adjacent to the collection pond for timely pH adjustments and suspended solid removal (to meet effluent discharge regulations or if overflows are to meet surface water quality guidelines) or clarifiers to remove small sulphur particles prior to reaching the collection pond. If not, explain why.*

A. Given the relatively small size of the principal development area, the runoff associated with the 1 in 25 years, 24 hour runoff event can be reliably predicted using the rational method whereby the total predicted runoff is equal to the rainfall (99.2 mm) multiplied by the collection area (66,000 m^2), multiplied by a runoff coefficient (0.7 is reasonable given that gravel and vegetation will cover most of the collection area). The resultant runoff volume is estimated to be 4,600 m^3. This is lower than the 5,000 m^3 of available volume in the pond, assuming that the minimum 6,000 m^3 volume of water is contained in the pond prior to experiencing the storm. The Lamont County Water Utility will be used as a make-up water supply. This has been verified by AST and this water supply will be available to maintain the minimum volume of 6,000 m^3 in the pond for use in fire fighting. During the period of high potential rainfall (May to August), AST will manage the pond levels to provide additional assurance that release of collected water is not required. The size of the pond is adequate to maintain the 6,000 m^3 of water for fire fighting and runoff associated with a 1 in 25 years, 24 hour runoff event.

B. Should a release be required, AST would first treat the impounded water to ensure that release criteria are achieved. Then, the treated water would be tested to ensure that it complies with release criteria. The treated and verified water would then be discharged to the wetland using pumps and hoses to prevent surface erosion. The methodology for this process would be in accordance with the Manual and Guidelines referred to in SIR 12 and would be subject to review and authorization by AENV as a condition of the Approval. Given the size of the pond, adequate time will be available to undertake these tasks prior to release.

C. The risk to the northwest wetland is considered to be low even if an uncontrolled release of untreated water were to occur. Firstly, the volume of the uncontrolled release will be very small relative to the volume of water running into the pond at that moment. Based on the environmental assessment, the proportion of released water would comprise less than 4% of the total flow to the wetland. Even this estimate is likely high given that a high proportion of the runoff will be safely contained in the pond even during an uncontrolled release scenario. Secondly, the chemistry of the water in the pond will be diluted by the high proportion of runoff surge that is present. Thirdly, the wetland itself will be overtopping and freely flowing into a tributary to Beaverhill Creek during such an extreme runoff event. Finally, the primary impact of concern is pH and the wetland is known to have significant buffering capability. The combination of these factors ensures that the risk to the wetland is low even during a scenario that results in uncontrolled release of untreated water from the collection pond.

D. The average annual precipitation in the collection area of the pond (66,000 m^2) was estimated in the EIA to be 43,400 m^3. The collection area comprises both areas that will be developed for processing sulphur (approximately 1/3) and areas that will remain undisturbed (approximately 2/3). Annual runoff from these areas can be estimated using published average annual runoff coefficients. The appropriate annual runoff coefficient for undisturbed areas is 0.06 (see Volume IIB, Section 3: Table 3-5-8, p.3-20 of the Surface Water Quantity assessment). An appropriate annual runoff coefficient for light industrial areas (i.e., facilities and gravel areas) is 0.5 (City of Calgary Storm water Management and Design Manual, 2000). Accordingly, the estimated annual runoff volume collected in the pond is 15,400 m^3.

Use of water in the pond is estimated to be 14,000 m^3/year during initial operation of the facility.

Evaporative losses from the pond can be estimated using evaporation rates presented in Table 3.5-4 (see Volume IIB, Section 3: Surface Water Quantity). Winter evaporation rates from the pond need to be corrected in this case to account for the introduction of warm cooling water blow down, which is expected to keep the water in the pond unfrozen. An appropriate equation is found in Adams et al. (1990). The estimated evaporative loss from the pond during winter is 2.1 mm/day or 63 mm/month. This estimate assumes an average air temperature of -10°C and an average pond temperature of 10°C, although the estimated evaporation rates are not overly sensitive to these assumed temperatures. They also assumed an average wind speed of 2.7 m/s and a relative humidity of 50% based on Edmonton airport meteorological data. Where monthly evaporation reported in the EIA is less than this rate (i.e., during the winter) this rate of evaporation was assumed. This will increase total annual evaporation by approximately 200 mm.

The total evaporation from the pond is estimated to be 3,800 m^3 using an average pond surface area of 3,500 m^2 and the average annual area evaporation of 1,090 mm (as reported in Volume IIB, Section 3: Table 3.5-4 in the Surface Water Quantity assessment and as corrected above).

Average annual precipitation in the collection area	43,400 m^3
Average annual runoff from the collection area	15,400 m^3
Average annual initial water use	14,000 m^3
Average annual water evaporation from pond	3,800 m^3
Average net water balance	-2,400 m^3

Compliant discharge from the pond or legal disposal of excess impounded water can be used to remove excess water during periods of unusually high runoff, should this occur.

E. AST does not plan to install an automated neutralization system for this facility. AST's experience on similar facilities demonstrates that pH can be effectively neutralized on a one-time basis by circulating the water in the pond and adding neutralizing lime on a batch basis. Given that this scenario is very unlikely to occur, it is most reasonable to neutralize on a batch basis as described above. Using this method, lime is added to the pond as the water in the pond is circulated until a neutral pH is confirmed. The sediments are allowed to settle and the decanted water is tested prior to release. Given that the volume of the pond is sufficient to contain at least one large storm adequate time will be available to mobilize and implement this neutralization method.

10) *Supplemental Information Request Response 44, Page 44.*
AST states that sampling activities were conducted from mid-August to October 2006 to evaluate seasonal surface water quality conditions within, and beyond, the Local Study Area and Regional Study Area.

a) *Provide evidence or justification to confirm that these samples are representative of the seasonal conditions at the site and the actual average daily conditions.*

b) *Clarify if any continuous temperature, pH, dissolved oxygen, turbidity, etc. measurements were taken by AST.*

A. In the response to SIR 44 it is stated that pressure transducer measurements of water levels were taken from August to October. Sampling was completed in June 2006, October 2006 and February 2007. It is AST's opinion that these sampling events fairly represent the seasonal fluctuations in water quality in the wetland and specifically address late spring, fall and winter characteristics. As such, the measured water chemistry represents the range of water chemistry in the wetland and surface water bodies surrounding the Site, rather than the overall average, or average daily water chemistry. Based on professional judgement, these samples are expected to fairly represent the normal water chemistry associated with each respective season noted.

B. No continuous measurements of temperature, pH, dissolved oxygen, turbidity etc. were taken by AST. These parameters were determined during the three specific events as noted above and the results of these measurements are considered representative of the seasonal variance of these parameters at each sampling point.

11) *Supplemental Information Request Responses 46 and 48, Pages 46 and 48*
With respect to Beaverhill Creek:

a) *Sulphate concentrations were elevated in October samples from the creek as compared to February samples. Provide possible reasons for these elevated numbers.*

b) *High sulphur/sulphate values and reducing conditions may promote the formation of* H_2S*. Clarify if AST has considered taking dissolved gas measurements.*

A. The quality of water in Beaverhill Creek is influenced by natural water cycles, climate conditions (rainfall, temperature, etc.), agricultural and livestock management practices in the drainage basin, and the discharge of treated sewage from the Town of Lamont sewage lagoon. The Town of Lamont lagoon discharge reports for 2006 and 2007 are provided in Attachment 1. The variability of sulphate concentrations in the water of Beaverhill Creek is likely a reflection of all of these factors. The natural variability of surface water chemistry largely results from the changing proportion of water that originates from surface runoff versus that which originates from groundwater discharge. In this case, a higher proportion of the flow observed in February is expected to originate from groundwater discharge. Higher dissolved sulphate concentrations are typically present in groundwater than they are in surface runoff. Accordingly, in our opinion, the higher sulphate concentrations observed in October are more likely the result of either agricultural or anthropogenic activities (the release of sewage) than they are with the natural, seasonal variability in surface water quality.

B. The existing concentrations of dissolved oxygen in Beaverhill Creek are typically depressed and anoxic, varying from 0.03 to 0.73 mg/L. However, it is not evident that conditions are appropriate for the generation of H_2S. First, while the dissolved oxygen concentrations are low, they still may be high enough to preclude the biological reduction of sulphate to sulphide. Further, any biological reduction that were to occur would more likely result in the generation of iron sulphide (pyrite) than hydrogen sulphide (H_2S) given the relatively high dissolved iron concentrations (up to 23 mg/L) that are observed in the water of Beaverhill Creek.

12) *Supplemental Information Request Response 47, Page 46*
AST states that although two different regulatory documents are referred to, it is appropriate to apply the effluents standards to plant discharge, whereas, in the unlikely event of a flood situation, it is more appropriate to apply direct water quality guidance used in generic surface water situations. Using two different guidance documents does not imply that two different procedures will be followed, but ensures the most appropriate and stringent standards will be applied.

a) Confirm that AST will follow the Water Quality Based Effluent Limits Procedures Manual (AEP, 1995) when/if discharge from the collection pond was to occur during non-storm periods and would follow Alberta Surface Water Quality Guidelines when/if discharge from the collection pond was to occur during extreme runoff conditions.

b) Who or what determines what an extreme runoff event is?

A. AST confirms that it will follow the Water Quality Based Effluent Limits Procedures Manual to determine safe discharge levels for specific chemicals of concerns associated with its contained water. AST will follow Alberta Surface Water Quality Guidelines when a discharge from the collection pond is required. As stated in the Application, it is proposed that AENV apply its standard release criteria for sulphur management facilities and that the specified Manual and Guidelines be used to establish release criteria introduced into the collected water through the facilities operations and cooling water recycle processes.

B. An extreme runoff event is one that threatens to result in an uncontrolled release of impounded water. This situation would occur when there is insufficient available capacity in the pond to contain the runoff anticipated for the anticipated weather. In accordance with the procedures described in SIR 12(a), the facility manager will determine when it is necessary to treat and release water to mitigate the risk of experiencing an uncontrolled discharge of water. This would typically occur when there is significant rain predicted in the forecast and when the available storage capacity in the pond is less than 10% (the approximate volume of runoff generated by a one in one-year rainfall event).

TERRESTRIAL

13) *Supplemental Information Request Responses 9 and 12(c), Pages 8 to 10*
AST states that the site-specific soil monitoring plan to assess the possible impacts of fugitive S° deposition will be guided by the suggestions and recommendations set out in Alberta Environment's Air Monitoring Directive, Appendix A-7 (Soil Monitoring Guidelines), 1989. The Soil Monitoring Guidelines state the guide is not designed to provide operators with a rigid set of step-by-step instructions. Individual operators are to develop programs that meet the needs of the regulating agencies.

For AST's monitoring plan discuss the following:

a) *Proposed soil sampling strategy (i.e., how will it differ from the baseline soil survey conducted?).*

b) *Soil sampling design (i.e., how will the radial soil sampling design include areas subject to S° both within and outside the Project Development Area?).*

c) *How will AST establish when soil amelioration is required (i.e., for the suggested soil monitoring parameters, what are the nominated threshold values that will trigger a need to remediate?) If the latter has not been determined, how will the threshold values be established? Alberta Environment's Air Monitoring Directive – Appendix A-7 does not include recommendations as to the interpretation of soil monitoring data.*

A. Initially, the proposed soil sampling strategy will be developed based mainly on the predicted aerial dispersion of elemental sulphur from the Project during operation. This differs from the baseline soil survey in that the objective of the baseline study was to identify major soil types in the Project area, while the soil-monitoring plan will be based on evaluating soil quality in response to ongoing Project operations.

B. The Alberta Environment Air Monitoring Directive, Appendix A-7 (Soil Monitoring Guidelines), 1989, recommends adopting a radial transect sampling design with eight transects originating at the centre of the main source of sulphur dust and extending outward at 45 degree intervals for distances up to 2 km. The proposed sampling strategy will adopt this approach. The Air Monitoring Directive further recommends sampling along each radial at 50 m from the Project boundary and then at 500 m intervals thereafter. Based on the relatively low annual sulphur deposition rate predicted in the air modelling study, the initial soil monitoring design will be to sample both within and outside the PDA at distances of 50 m or less from any source of elemental sulphur dust deposition and then along each radial at a number of shorter-spaced (100-250 m compared to the recommended 500 m) sampling locations along each radial. Initial soil monitoring locations are expected to be confined to the Site (Section 35-55-20 W4M) but may be extended beyond these boundaries if soil analytical data or sulphur dust deposition data indicate it is warranted.

C. Threshold values have not yet been established. The threshold values for each parameter selected are expected to be based on:

- Statistically determined changes from measured baseline conditions; and/or
- Regulatory criteria, such as the Alberta Tier 1 Soil and Groundwater Remediation Guidelines (AENV 2007a).

The Alberta Tier 1 Soil and Groundwater Remediation Guidelines (Alberta Environment, 2007a) provide guidelines for pH and elemental sulphur concentrations in soil. Threshold values selected will need to be less than the Tier 1 guideline values so that soil amelioration takes place prior to the guideline value being exceeded.

Threshold values for soil remediation may also be selected based on modified regulatory guidelines (Tier 2) or using an exposure control approach as appropriate and as outlined in Alberta Tier 2 Soil and Groundwater Remediation Guidelines (Alberta Environment, 2007b).

SOCIO-ECONOMIC

14) Supplemental Information Request Response 121, Page 103
AST states that the future of property values in Bruderheim and Lamont are highly variable and not predictable for the following reasons: Property values can be assessed several different ways (i.e. option value versus hedonic pricing. and Land use zoning boundaries may be modified. While the reasons stated by AST are relevant to land situated within and near the boundaries of the Alberta Industrial Heartland they have little relevance to the value of individual homes situated within the towns of Bruderheim and Lamont.

a) What would be the impact of the project on home values in Bruderheim and Lamont be, using generally accepted property appraisal practices endorsed by a professional appraisal society as a guideline?

A. Current home values in Bruderheim and Lamont may be predicted by a licensed appraiser following the ‘Handbook of Disclosure Guidelines for the Valuation of Real Estate Assets’ (Handbook; Dybvig et. al 1996) recognized by the Appraisal Institute of Canada (Charleboise July 2008 pers. comm.). This appraisal method includes proposed construction and developments as assessment criteria. Because many other attributes are incorporated into the appraisal process and several projects are proposed in the region surrounding Bruderheim and Lamont, it is difficult to determine precisely how much impact this Project, specifically, may have on home values in Bruderheim and Lamont. To provide some insight into recent trends regarding home values in the Industrial Heartland (IH), an analysis of the current house-pricing trend for the IH and the relative size of the Project in relation to other projects in the region were performed.

The conclusion that can be safely and reliably made from the assessment of recent house price history is that industrial developments in the Industrial Heartland have resulted in increases in home values within towns located within the Industrial Heartland. Hence, development of the Project can reasonably be expected to influence house prices in

Bruderheim and Lamont upwards. As stated in the original EIA, given the size of the Project, its influence on house prices is expected to be small relative to other factors that influence house prices.

Summary of Recent Trends in Home Values in the Industrial Heartland

Residential housing prices within the IH between 2003 to 2007 for small to mid-sized urban centres within the four counties that constitute the IH (Strathcona, Sturgeon, Fort Saskatchewan and Lamont), show increases in prices ranging from 128% to 252%. The average selling price for single detached houses in six urban centres (Fort Saskatchewan, Morinville, Bruderheim, Redwater, Gibbons and Bon Accord), ranging in size, are displayed in Table 14-1. No data were available for the Town of Lamont.

Table 14-1: Average-Selling Prices for Single Detached Houses

Location	2003 ($)	2004 ($)	2005 ($)	2006 ($)	2007 ($)	% of Change in 5 years
Fort Saskatchewan[1]	$160,312	$208,331	$218,576	$256,491	$407,381	+154%
Morinville (Sturgeon County)[1]	$147,350	$162,525	$186,453	$211,083	$350,340	+138%
Bruderheim (Lamont County)[2]	$92,625	$110,780	$124,330	$133,998	$326,620	+252%
Redwater (Sturgeon County)[2]	$94,051	$98,012	$103,088	$190,227	$259,352	+176%
Gibbons (Sturgeon County)[2]	$116,719	$131,404	$138,662	$216,024	$295,302	+153%
Bon Accord (Sturgeon County)[2]	$130,118	$130,474	$142,269	$188,944	$296,792	+128%

Notes:

[1] – EREB 2008.

[2] – REALTORS Association of Edmonton.

To estimate what impact the Project may have on home values in Bruderheim and Lamont, the Project was compared to a list of projects planned for this region in the upcoming years. Of those projects related to oil sands, pipelines, chemicals & petrochemicals, oil & gas and mining, this Project ranked 17 out of 18 projects in size ($), with some projects more than 140 times larger (see table 14-2; Dumaresq 2006 pers. comm.). Given the level of industrial development in the area, it is difficult to isolate the impacts created specifically by the Project. It is possible that property values in Bruderheim and Lamont may continue to follow the trends observed between 2003 and

2007 in the IH. However, how much the Project could specifically contribute to future increases in home values is uncertain.

Table 14-2: Major Projects Prescribed for the Industrial Heartland

Project Sector	Company Name	Project Description	Project Location	Cost in $ Millions
Oil sands	Fort Hills Energy Corp.	Bitumen Upgrader Phase 1	Sturgeon County (near Redwater)	$5,000.0
Oil sands	Shell Canada / Chevron Canada / Western Oil Sands	Scotford Upgrader Expansion (De-bottleneck and Addition of Third Bitumen Processing Train) for Alberta Oil Sands Project (AOSP)	Strathcona County (Scotford)	$5,000.0
Oil sands	North West Upgrading Inc.	Bitumen Upgrader Phases 2 and 3	Sturgeon County (near Redwater)	$3,200.0
Oil sands	SynEnCo Energy Inc. / SinoCanada Petroleum Corp.	'Northern Lights' Bitumen Upgrader	Sturgeon County	$2,800.0
Oil sands	BA Energy Inc.	'Alberta Heartland' Bitumen Upgrader Phases 2 and 3	Strathcona County	$2,000.0
Oil sands	North West Upgrading Inc.	Bitumen Upgrader Phase 1	Sturgeon County	$1,600.0
Oil sands	Petro-Canada Oil and Gas	Strathcona Refinery Conversion to Upgrade Bitumen	Strathcona County	$1,600.0
Oil sands	BA Energy Inc.	'Alberta Heartland' Bitumen Upgrader Phase 1	Strathcona County (NW of Bruderheim)	$900.0
Mining	Sherritt International	Facility Expansion	Fort Saskatchewan	$200.0
Oil & Gas	Kinder Morgan Canada	Crude Oil Storage Terminals	Strathcona County	$133.0
Pipelines	Enbridge Athabasca	'Stonefell' Tankage and Pipelines	Strathcona County (near Bruderheim)	$100.0
Pipelines	Enbridge Inc.	Oil Pipelines and Storage Tanks	Strathcona County	$80.0

Project Sector	Company Name	Project Description	Project Location	Cost in $ Millions
Chemicals & Petrochemicals	Agrium Products Inc.	Gypsum Stack Extension phases 1 and 2	Sturgeon County	$65.0
Chemicals & Petrochemicals	Aux Sable Canada / BA Energy	HEARTLAND OFF GAS PLANT (HOP) PHASE 1	Strathcona County	$45.0
Oil & Gas	Canadian Bioenergy	Biodiesel Manufacturing Facility	Sturgeon County (near Fort Saskatchewan)	$45.0
Chemicals & Petrochemicals	Alberta Sulphur Terminals (a division of Hazco Environmental Services)	Sulphur Forming and Shipping Facility	Lamont County (E of Bruderheim)	$35.0
Pipelines	Strathcona County	Waterline from CU Pipeline to Northern Bear Golf Course	Strathcona County	$2.0

Note:

The data presented in this table was originally reported in Volume IID, Section 2: Land Use and Reclamation of the EIA. Projects listed and $millions were current as of January 2007.

15) *Supplemental Information Request Response 122(a), Page 104*
The question posed relates to 'How closely does the multiplier that was applied (provincial) estimate economic relationship in the community or region?' not the risk of 'double counting' which reflects AST's interpretation. When applying multipliers, it is important to identify the direct effects as accurately as possible. A region's economy depends mainly on what its businesses sell to other regions (direct effect) and how the income from sales flows through the regional economy (the multipliers). It is important to distinguish changes in sales to other regions from economic activity in general. It is appreciated that provincial multipliers based on secondary data provide insight to economic impacts however, the size of the economy influences the size of the multiplier (larger areas have more business thus a greater dollar because of its ability to circulate more). Calculating regional multipliers based on primary data collection can also be expensive and time-consuming.

a) Provide an updated calculation using a more 'conservative' estimate of the multiplier based on community and regional conditions.

A. According to the developer of the Alberta multiplier, a 'conservative estimate' of the provincial multiplier is not a viable method to incorporate community and regional conditions. The provincial multiplier is a tool to determine impact to the province as a whole and cannot be manipulated to determine regional conditions (Howe July 2008, pers. comm.). The results borne from a reduction in the multiplier would be interpreted as a reduction to the provincial impact as a whole and not a representation of the economic contribution in a smaller region, or the density of business in a region, and thus should not be used as such (Howe July 2008, pers. comm.). Thus, a new multiplier, rather than a conservative estimate of the existing provincial multiplier, should be developed.

As the provincial multiplier is based on the size of the Alberta economy (based on data gathered from 150 industries and 700 commodities), it is deemed appropriate to recognize impacts to the province. It is not possible to fully disaggregate the impact between the LSA, RSA and Alberta.

As stated a ‘conservative estimate’ is not an approved method to accommodate ‘community and regional conditions’ however a model was run using the Alberta Multipliers minus 20%. The new multiplier numbers are:

Construction Multipliers

Table 15-1: Non-residential Construction Multipliers

GDP at Basic Prices	Labour Income	Employment 2002	Employment 2005	Gross Output
0.722	0.513	0.097	0.089	1.618

Table 15-2: Machinery and Equipment Multipliers

GDP at Basic Prices	Labour Income	Employment 2002	Employment 2005	Gross Output
0.629	0.314	0.061	0.056	1.300

Operations

Table 15-3: Support Activities for Mining and Oil and Gas Extraction

GDP at Basic Prices	Labour Income	Employment 2002	Employment 2005	Gross Output
0.840	0.579	0.098	0.084	1.527

Employment multiplier for *Support Activities for Mining and Oil and Gas Extraction* (Operations)

1.642

Results

The reduction in multipliers resulted in the following impacts:

Table 15-4: Economic Impact of Construction Phase to the Province of Alberta

Component	Economic Impact
Non-residential construction	$18.3 million
Non-residential labour	$13 million
Machinery and equipment	$7.6 million
Machinery and equipment labour	$3.8 million
Total Economic Impact	**$42.7 million**

The reduction in the Employment multiplier results in a total employment impact of 36 people rather than 45. Of these 36 people, the Project is expected to directly employ 22 and the indirect and induced spin-off effects will employ an estimated 14 people.

Table 15-5: Total Economic Impact from Operations Phase

Impact	3,000 t/d	6,000 t/d
Yearly contribution to Provincial GDP	$16.5 million/y ($20)	$ 33.1 million/y ($41.4)
Labour income impact	$11.4 million/y ($14.3)	$22.8 million/y ($28.5)
Tax impact	$460,007/y	$460,007/y
Total Economic Impact	**$28.4 million/y**	**$56.4 million/y**

16) Supplemental Information Request Response 130(a), Page 108
AST has responded to the request for rationale related to transportation benefit being attributed to the project based on the application of the provincial multiplier.

a) Because the annual sales are exclusive of transportation costs, clarify if transportation is a direct expenditure of AST or if it is borne by a different party.

A. Transportation costs for delivering liquid sulphur to the facility and for transporting formed sulphur to market are borne by the sulphur producer.

ENVIRONMENTAL RISK

17) Supplemental Information Request Response Attachment 7, Risk assessment

a) It is concluded in the risk assessment that sulphur fires could be a concern at the facility and that the resulting SO_2 could likely impact residents. It is noted that the risk assessment was completed in 2005. Discuss if that conclusion is still valid considering the fact that the air quality assessment that was completed for the current application concluded that the AAAQO will be met during a sulphur fire.

b) What is the historic probability of the spontaneous combustion of sulphur piles or sulphur dust at similar facilities?

c) *What has AST implemented in the design of the proposed facility to reduce the risks from a sulphur dust explosion to as low as reasonably possible?*

d) *What are the conclusions of the risk assessment regarding the risks to the public from exposure to H_2S during a worst case scenario?*

e) *On page 33, AST states Pooling of the heavy vapour cloud (which depicts all the clouds formed by the chemicals noted here including flammable materials) in very low to no wind conditions can happen. How are heavy vapour clouds applicable to this facility considering that sulphur fires have been identified as the main hazard and would create very buoyant releases?*

A. The conclusion that adjacent residents could be affected by airborne SO_2 remains valid. The maximum predicted hourly ground level SO_2 concentration that would accompany a sulphur fire on top of the pastille storage burning at 4 kg/10 min is 433 µg/m^3 on the south boundary of the Site. This is below the AAAQO for SO_2 of 450 µg/m^3 (see Volume IIA, Section 2.5.4). If the worst case scenario was experienced this would involve evacuation of area residents over a radius of approximately 2 km. The AAAQO for SO_2 is not exceeded during normal operations and would not be exceeded for small sulphur fires.

B. AST is not aware of any instances of spontaneous combustion of stored sulphur. In AST's experience, sulphur fires are triggered by a source, such as a hot surface or spark.

C. As stated in the first round of SIRs, because there are no enclosed spaces used to store and handle the sulphur, there is negligible risk of generating a confined condition such that the explosion of sulphur dust is a risk. Such a risk could possibly occur if a building or enclosed space was used to store formed sulphur. The forming process primarily involves the handling of liquid sulphur, which is not prone to generating fugitive dust and therefore is not at risk of generating a possible explosive condition. Standard ventilation of an industrial process area is sufficient to preclude the accumulation of sulphur dust in the processing area, which is the experience of Shell at its Shantz facility.

D. The Worst Case Scenario occurs as a result of a sulphur fire, which generates SO_2 as the product of sulphur combustion. Any H_2S that may be present would also be oxidized to SO_2 by the fire. Hence, there is minimal risk of H_2S exposure to the public during the Worse Case Scenario. Further, the liquid sulphur accepted by the facility will be degassed to contain only a very low level of H_2S (less than 10 ppm). Air quality modelling work completed in support of the original application and environmental assessment indicates that there is no significant risk of H_2S exposure to the public during normal operations when the opportunity for H_2S emissions is highest. This is not a specific conclusion of the Risk Assessment, but can be reasonably concluded based on the Risk Assessment and the result of the air quality component of the EIA.

E. This statement in the Risk Assessment pertains to a situation not addressed by the US EPA RMP rule analysis whereby the accumulating release of combusted gases into a cloud during low wind conditions results in a dense accumulation of these gases in a single cloud; thereby slowing the migration of this cloud. This situation is not expected to develop during the Worst Case Scenario for this Project because the very slow rate of sulphur combustion is unlikely to generate a heavy vapour cloud and because the sulphur combustion process generates heat which would render the combustion gases more buoyant.

HEALTH

18) *Supplemental Information Request Response 73, Page 66*

AST states elemental sulphur and gypsum are two very low toxicity substances.

a) *Provide evidence to support this conclusion.*

A. Elemental Sulphur

Please refer to SIR 21(b) for a detailed description of the evidence supporting the statement that elemental sulphur is a low toxicity substance.

Gypsum

The original statement that gypsum is a very low toxicity substance was based on its common use in every day domestic construction. It is our opinion that a detailed human health risk assessment for gypsum is not warranted in this case because there is no significant exposure pathway. The gypsum will accumulate as precipitate at the bottom of the storm water runoff collection pond as a result of pH neutralization. The gypsum will not be released into the environment for the following reasons:

- The pond is lined, preventing release of gypsum into groundwater.
- The water in the pond will not be released into the environment as this water will be recycled as cooling water.
- The settled gypsum will remain submerged so it cannot be released into the air as a fugitive emission.
- Accumulated gypsum will be appropriately disposed off-Site using standard waste management practices to prevent unintended release into the environment or exposure to workers.

19) *Supplemental Information Request Response 80(a), Page 69 AST was asked were the MPOIs based on the highest predicted ground level air concentration regardless of whether it is located on- or off-site or were the MPOIs based solely on off-site locations? AST responded The MPOIs were based on hypothetical locations determined in the Climate and Air Quality assessment and are located on site.*

a) *As per the original Supplemental Information Request clarify if the Maximum Point of Impingement (MPOIs) were based on the highest predicted ground level air concentration regardless of whether it is located on- or off-site or were the MPOIs based solely on off-site locations.*

A. The MPOIs were based solely on the highest predicted ground level air concentration located off-Site.

20) *Supplemental Information Request Responses 81(a) and 84, Pages 70 to 74*

a) Provide the information outlined in Attachment #6.

b) Ensure that the information includes the same development scenarios assessed in the Environmental Impact Assessment (EIA) (i.e., looks at cumulative impacts).

A, B The updated human health risk assessment is appended to this letter as Attachment 2. This update includes baseline, application and cumulative assessments of VOCs and PAHs.

21) *Supplemental Information Request Responses 81a and 85(c), Pages 70 and 76 to 78*
AST states potential soil acidification from aerial deposition of elemental sulphur will primarily be contained within the PDA. Potential off-site impacts will be managed through an active monitoring program and mitigative measures…. To assess health impacts from ingestion or inhalation of elemental sulphur, Alberta Health and Wellness requires a Human Health Risk Assessment (HHRA) as was requested in 85(c).

a) Provide the assessment.

b) Provide a detailed discussion of the scientific literature regarding potential human health effects as a result of exposure to sulphur.

A. Characterization of Health Risks Associated with Elemental Sulphur

Based on a review of the available literature, it appears that there is not enough information to develop oral or inhalation exposure limits for elemental sulphur. As a result, it is not possible to confidently characterize the health risks associated with the Project's release of elemental sulphur. However, the Air Quality team has advised that the $PM_{2.5}$ air concentrations may be evaluated in relation to elemental sulphur, as sulphur particles make up part of the $PM_{2.5}$ fraction. Therefore, it is worth noting that all predicted $PM_{2.5}$ air concentrations are less than 27 ug/m^3 on a 24-hr basis, which is close to 200 times lower than the ACGIH TLV-TWA of 5,000 ug/m^3 for respirable dust.

B. A detailed discussion of the scientific literature regarding potential human health effects as a result of exposure to sulphur is provided below.

A review of available scientific literature verified the initial statement that sulphur, in its elemental form, exhibits low toxicity.

Sulphur is a ubiquitous, natural component of the environment that occurs both in its elemental state and combined with iron and base metals and sulphide minerals (Komarnisky et al., 2003). In its various forms, sulphur represents approximately 1.9% of the total weight of the earth (EXTOXNET, 1995). Sulphur is essential for both plants and animals because of its incorporation into amino acids, proteins, enzymes, vitamins and other biomolecules (Komarnisky et al., 2003). As such, it is naturally present in many foods and most terrestrial and aquatic environments contain high levels of sulphur. Dietary surveys and food composition data indicate that the average daily intake of sulphur in food by adults is approximately 930 mg, based on the assumption that the sulphur content of foods is derived from protein and is proportionately related to the nitrogen content (ICRP, 1984; Health Canada, 1987).

Currently, elemental sulphur is registered by the U.S. EPA for use as an insecticide, fungicide and rodenticide on several hundred food and feed crop, ornamental, turf and residential sites (U.S. EPA, 1991). Sulphur is applied in dust, granular or liquid form, and is an active ingredient in nearly 300 registered pesticide products in the United States. It is used for control of brown rot of peaches and powdery mildew of apples and other fruits and is also used on livestock and in agricultural premises (EXTOXNET, 1995). Sulphur is also used as a fertilizer or soil amendment for reclaiming alkaline soils (U.S. EPA, 1991). Because sulphur is a natural substance, it can be used in organic farming and it is an important component of Integrated Pest Management Programs (Lee et al., 2005).

Sulphur has been used for medicinal purposes in humans and animals for many years as a keratolytic, mild antiseptic, antifungal agent and parasiticide (EMEA, 2003).

Oral Toxicity

According to the U.S. EPA, sulphur is known to be of low toxicity, and poses very little if any risk to human health (U.S. EPA, 1991). It is generally recognized as safe, as noted in the U.S. 40 Code of Federal Regulations (CFR) 180.2(a), so no tolerances or residue limits have been established for residues of sulphur in or on food or feed commodities. Short-term studies show that sulphur has very low acute toxicity, with oral LD50 values in rats reported to be greater than 5,000 mg/kg (Farm Chemicals Handbook, 1994; U.S. EPA, 1982, OHS database, 1983). In rabbits, an oral LDLO for sulphur of 175 mg/kg has been reported (OHS database, 1983), while another study found no deaths in rabbits fed 98% sulphur at a single dose of 2,000 mg/kg (U.S. EPA, 1982; 1988).

In a summary report on sulphur, the European Agency for the Evaluation of Medicinal Products noted that classical toxicological studies on sulphur have not been reported, but that toxic effects in animals probably do not occur at doses below 4,000 mg/kg body weight (EMEA, 2003). A maximum residue limit was deemed unnecessary for residues of sulphur. The few case reports of sulphur toxicity in the published literature involved excessive doses, considerably higher than therapeutic levels (EMEA, 2003). Ingested sulphur is converted to sulphides in the gastrointestinal tract, and ingestion of 10 to 20 grams has caused irritation of the GI tract and renal injury in people (S.F. Sulphur Corporation, 2000). A man reportedly survived after ingesting 60 grams of sulphur over a period of 24 hours (Gosselin et al., 1984).

Dietary supplementation of 2% and 4% sulphur for 7 days was recently shown to induce preneoplastic altered hepatic foci (AHF) in male Wistar rats using a medium term liver bioassay (Arora and Shukla, 2004). Sulphur supplementation at 1% of the diet failed to significantly induce AHF.

Inhalation Toxicity

The acute inhalation LC50 in rats was shown to be greater than 2,560 mg/m^3 for 98% sulphur and greater than 5,740 mg/m^3 for 80% sulphur (US EPA, 1988). In a rabbit eye irritation test, all irritation had cleared 6 days after 98% sulphur was administered (US EPA, 1988). Short-term inhalation of large amounts of sulphur dust may cause catarrhal inflammation of the nasal mucosa, which may lead to hyperplasia with abundant nasal secretions (EXTOXNET, 1995). In miners exposed to high levels of sulphur dust, trachiobronchitis was a frequent occurrence, with dyspnea, persistent cough and expectoration sometimes streaked with blood (NRC, 1987).

Chronic exposure to elemental sulphur at low levels is generally recognized as safe but repeated or prolonged exposure to sulphur dust may cause irritation to the mucous membranes and reduce pulmonary function (EXTOXNET, 1995). Epidemiological studies show that mine workers exposed to sulphur dust and sulphur dioxide throughout their lives often had eye and respiratory disturbances, chronic bronchitis and chronic sinus effects (U.S. EPA, 1991). A study of metal working fluid (MWF) aerosols and pulmonary function decrements in automobile parts manufacturing workers indicated an association between Forced Expiratory Volume in 1 second (FEV1) decrements and the sulphur content of the MWF aerosols (Sama et al., 1997). However, the sulphur concentrations were low and the investigators suggested sulphur may represent a marker for MWF exposure conditions at the plant that were particularly irritating.

Lee et al. (2005) note that despite extensive use of the dust form of sulphur as a fungicide, respiratory health effects of elemental sulphur are not well documented. They analyzed the California Pesticide Illness Database between 1991 and 2001 and identified 127 reports of definite, probably, and possible illness involving sulphur out of a total of 12,698 pesticide illness cases reported. In 65 cases sulphur was identified as the primary cause of the reported illness and among these, 21 cases were identified as respiratory-related with symptoms including difficulty breathing, coughing, throat irritation, congestion, wheezing, burning chest, throat tightening, chest pain and sneezing. In most cases, the subjects were applying the sulphur using ground application equipment (17 of 21). Three subjects were performing maintenance on equipment used to apply pesticides and one subject was mixing/loading sulphur when injured.

The same investigators used a mouse model to examine whether there was an inflammatory or fibrotic response to elemental sulphur (Lee et al., 2005). Sulphur dust solutions were injected intratracheally into ovalbumin sensitized mice and lung damage was evaluated. Inhalable dust concentrations evaluated were 5,000 mg/L, 10,000 mg/L and 15,000 mg/L, while respirable dust solutions were made in 5,000 mg/L and 10,000 mg/L concentrations (n=3-4/group). Compared to controls, no significant differences in inflammatory response or airway collagen content were observed in the mice exposed to sulphur particles. Assays were conducted two weeks after administration of sulphur and 4 weeks after initiation of exposure to inhaled ovalbumin. On the basis of this data, it was concluded that acute exposure to elemental sulphur itself does not cause an inflammatory reaction, but the investigators suggested further studies are needed to understand the possible health effects of chronic sulphur exposure (Lee et al., 2005).

There are no known reproductive, teratogenic or carcinogenic hazards associated with the use of sulphur (EXTOXNET, 1995). A case-control mortality study of machining fluid exposure in the automobile industry indicated an association between larynx cancer and elemental sulphur commonly added to straight machining fluids (Eisen et al., 1994). However, the high stress operations that require machining fluid enriched with sulphur are also more likely to produce polycyclic aromatic hydrocarbons (PAHs) during the process and this may account for the observed association (Eisen et al., 1994).

Exposure Limits

No regulatory standards exist for inhalation exposure to sulphur dust, but it is typically regulated as a nuisance dust, not otherwise classified. For nuisance dust, the 8-hour TLV-TWA value recommended by ACGIH is 10 mg/m^3 for total dust and 5 mg/m^3 (or 5,000 ug/m^3) for respirable dust.

Since sulphur is a natural component of the diet and is considered to have very low toxicity potential, no oral exposure limits have been recommended.

22) *Supplemental Information Request Response 84, Pages 71 to 74*

a) *Provide a screening of the bioaccumulation potential of Polycyclic Aromatic Hydrocarbons (PAHs).*

b) *If any PAHs show a potential to bioaccumulation, provide a multi-media HHRA.*

c) *Were the most conservative Toxicological Reference Values used in the toxic potency screening? If not, update the screening accordingly.*

A. The following PAHs have been identified through screening as having potential to bio-accumulate based upon criteria from Environment Canada (2008). Substances may have the potential to persist or accumulate within the environment if:

- The half-life in soil is greater than 182 days; and
- The Log Kow value is greater than 5.

A screening of PAH compounds based upon their soil half lives and Kow values was conducted. This screening is provided in Table 22-1 below.

Table 22-1: Chemical fate and persistence screening of PAHs

COPC	Soil Half Life (days)(1)	Log Kow(2)
Acenaphthene	102	3.90
Anthracene	**460**	4.50
Benz(a)anthracene	**681**	**5.70**
Benzo(a)pyrene	**527**	**6.00**
Benzo(b)fluoranthene	**610**	**6.12**
Benzo(g,h,i)perylene	**650**	**7.23**
Benzo(k)fluoranthene	**2,145**	**6.10**
Chrysene	**1,000**	**5.70**
Fluoranthene	**440**	**5.00**
Fluorene	60	4.20

COPC	Soil Half Life (days)[(1)]	Log Kow[(2)]
Indeno(1,2,3-cd)pyrene	**289**	**6.60**
Naphthalene	48	3.30
Phenanthrene	**201**	4.50
Pyrene	**1,950**	4.90

Notes:

(1) Taken from Mackay et al. (1992). Exceptions indeno(1,2,3-cd)pyrene, which was cited from HSDB (2005). Acenaphthene, benzo(a)pyrene, naphthalene, phenanthrene, and pyrene were cited from U.S. EPA OSW (2005).

(2) US EPA Region OSW (2005) or Mackay et al (1992).

Bold parameters represent values that exceed at least one of the fate and persistence criteria.

Based upon the above screening, the following PAHs were determined to have the potential to persist and bioaccumulate:

- Anthracene;
- Benz(a)anthracene;
- Benzo(a)pyrene;
- Benzo(b)fluoranthene;
- Benzo(g,h,i)perylene;
- Benzo(k)fluoranthene;
- Chrysene;
- Fluoranthene;
- Fluorene;
- Indeno(1,2,3-cd)pyrene;
- Phenanthrene; and
- Pyrene.

B. An updated health risk assessment is appended hereto.

C. AST acknowledges that the statement originally made in SIR 84 was incorrect, in that the Toxicological Reference Values used in the screening exercise did not always represent the most stringent of those limits published by either Health Canada or the U.S. Environmental Protection Agency. Instead, the health risk assessment team chose the most scientifically defensible TRVs for the screening exercise.

The following sources were reviewed as part of the TRV selection process:

- Chronic MRLs developed by the US Agency for Toxic Substances and Disease Registry;

- Toxicological Reference Values (TRVs) developed by Health Canada;
- Maximum Permissible Risk Levels developed by the Netherlands National Institute of Public Health and the Environment; and
- Integrated Risk Information System (IRIS) provided by the United States Environmental Protection Agency (U.S. EPA 2008a).

Values for which supporting documentation was available were given preference to permit independent evaluation of the derivation process and toxicological basis of each limit.

23) *Supplemental Information Request Responses 76 and 84, Pages 67 and 71 to 74*
AST states …the project is not expected to emit metals".

a) *Provide evidence to support the lack of inclusion of metals in the assessment.*

A. The potential sources of metals are from haul trucks, train locomotives, and front-end loaders. Predicted long term ground level air concentrations (GLAC) of metals from AST are presented in Table 23-1, and are compared to regional ambient monitoring data in Table 23-2. The predicted metal GLAC for the Project are lower than levels observed in urban (Edmonton central) and rural (High Level) regions in Alberta. In most cases, predicted GLAC for the Project are 10 to 100 times lower than observed data.

Table 23-1: Predicted Annual Metal Air Concentrations for the Alberta Sulphur Terminals Project (2003-2005)

	Metal Concentrations (ug/m^3)				
	2002	**2003**	**2004**	**2005**	**Mean**
Arsenic	0.000019	0.000016	0.000016	0.000019	0.000018
Cadmium	0.000018	0.000015	0.000015	0.000018	0.000016
Chromium	0.0000072	0.0000060	0.0000060	0.0000071	0.0000066
Copper	0.000049	0.000041	0.000041	0.000049	0.000045
Lead	0.00010	0.000084	0.000082	0.000098	0.000091
Manganese	0.000037	0.000031	0.000031	0.000037	0.000034
Mercury	0.000024	0.000020	0.000020	0.000024	0.000022
Nickel	0.000047	0.000039	0.000039	0.000046	0.000043
Selenium	0.000026	0.000022	0.000022	0.000026	0.000024
Zinc	0.00027	0.00023	0.00022	0.00027	0.00025

Table 23-2: Comparison of Predicted Mean Metal concentrations in Air at the Alberta Sulphur Terminals Project to Measured Concentrations from other Areas in Alberta

	Comparison to Edmonton Central			Comparison to High Level		
	AST	Edmonton Central	% Difference	AST	High Level	% Difference
	(ug/m^3)	Annual (ug/m^3)	(AST/Edmonton)	(ug/m^3)	1999 (ug/m^3)	(AST/High Level)
Arsenic	0.000018	0.0010	1.8%	0.000018	0.00017	10%
Cadmium	0.000016	0.00034	4.8%	0.000016	0.000020	82%
Chromium	0.0000066	0.0063	0.1%	0.0000066	0.00011	6.0%
Copper	0.000045	0.012	0.4%	0.000045	0.00082	5.5%
Lead	0.000091	0.0071	1.3%	0.000091	0.00062	15%
Manganese	0.000034	0.018	0.2%	0.000034	0.0043	0.8%
Mercury	0.000022	0.00088	2.5%	0.000022	--	
Nickel	0.000043	0.0027	1.6%	0.000043	0.0030	1.4%
Selenium	0.000024	0.00033	7.4%	0.000024	--	
Zinc	0.00025	0.0150	1.6%	0.00025	0.0063	3.9%

Note:

-- Not available.

The predicted soil concentrations of metals are also compared to Alberta Environment Tier 1 Soil Quality Guidelines (AENV 2007) in Table 23-3. As shown, the soil concentrations are 50 to 2,000-fold lower than the guidelines for the protection of human health and the environment.

Table 23-3: Calculation of Surface Soil Concentrations Predicted from Alberta Sulphur Terminals Metals Emissions and Comparison to AENV Soil Quality Guidelines

	Mean Annual Metal Concentrations (ug/m^3)	Predicted Soil Concentration$^{(1)}$ (mg/kg)	AENV SQG 2007 (mg/kg)
Arsenic	0.000018	0.014	17
Cadmium	0.000016	0.013	1.4
Chromium	0.0000066	0.0052	0.4
Copper	0.000045	0.035	63
Lead	0.000091	0.072	70
Manganese	0.000034	0.027	--

	Mean Annual Metal Concentrations (ug/m^3)	**Predicted Soil Concentration[1] (mg/kg)**	**AENV SQG 2007 (mg/kg)**
Mercury	0.000022	0.017	6.6
Nickel	0.000043	0.034	50
Selenium	0.000024	0.019	1
Zinc	0.000246	0.19	200

Notes:

(1) Data calculated from Equations 1 and 2.

-- Not available.

The predicted soil concentrations are based on the following equations:

Equation 1

[AIR x UnitConversion] x DepVeloc x Conversion = Loading Rate

Where:

Loading Rate = Loading Rate to soil (ug/m^2/yr)
AIR = air concentration (ug/m^3)
Unit Conversion = 1/1000 (ug/m^3 to mg/m^3)
DepVeloc = Deposition Velocity (0.03m/s)
Conversion = Seconds/year (s)

Equation 2

$$\frac{\text{Loading Rate}}{\text{Depth x Bulk}} \text{ x Years} = [\text{Soil}]$$

Where:

Loading Rate = Derived from Equation 1
Soil = Soil Concentration (mg/kg)
Depth = Soil mixing depth (0.02m)
Bulk = Bulk Density of soil (1500kg/m^3)

Calculated surface soil concentrations assumed constant deposition and that no losses of metals from soil would occur (i.e., conservative assumption).

Table 23-4 compares predicted AST mean annual surface soil concentrations for metals with recent measured soil concentrations from Alberta upgrader projects in the Fort Saskatchewan area, including the Total and North American Upgraders. Comparative ratios between AST and upgrader projects range from 0.1% for zinc to 58% for mercury, indicating that AST predicted soil concentrations are consistently lower than concentrations measured in the region.

Table 23-4: Comparison of Predicted Alberta Sulphur Terminals Project Mean Annual Metal Surface Soil Concentrations to recent Measured Soil Concentrations from published Alberta Upgrader Projects

Elements	Comparison to Total Upgrader			Comparison to North American Upgrader		
	Predicted Soil Concentration AST	**TOTAL Upgrader(1)**	**% Difference**	**Predicted Soil Concentration AST**	**North American Upgrader(2)**	**% Difference**
	(mg/kg)	**(mg/kg)**	**(AST/Total)**	**(mg/kg)**	**(mg/kg)**	**(AST/NA)**
Arsenic	0.014	3.7	0.4%	0.014	4.6	0.3%
Cadmium	0.013	<0.5		0.013	0.43	3.0%
Chromium	0.0052	9.5	0.1%	0.0052	19	0.03%
Copper	0.035	10	0.4%	0.035	90	0.04%
Lead	0.072	7.3	1.0%	0.072	11	0.7%
Manganese	0.027	--	--	0.027	--	--
Mercury	0.017	0.030	58%	0.017	0.030	58%
Nickel	0.034	20	0.2%	0.034	21	0.2%
Selenium	0.019	0.30	6.3%	0.019	0.33	5.8%
Zinc	0.19	60	0.3%	0.19	140	0.1%

Notes:

-- Not available.

(1) Data collected from “Integrated Application for Approval of the Total Upgrader. Total E&P Canada Ltd. December 2007”. Mean of 11 measured samples.

(2) Data collected from “Integrated Application for Approval of the North American Oil Sands Corporation (StatOil Hydro). December 2007”. Mean of 6 measured samples.

For the reasons that: (i) air concentrations predicted for the Project would be less than background values measured in both urban and rural areas of Alberta, and (ii) resultant soil concentrations would be well below Alberta Environment soil quality guidelines, metals were not included in the human health risk assessment.

24) *Supplemental Information Request Response 87(a), Page 84 AST states The results of the EIA indicate that predicted impacts are local in geographic extent for acute and chronic human health risks. Even if AST is only contributing a small amount to the region, a cumulative assessment is still required.*

a) Provide the location in the EIA where this information is provided. If it was not provided, update the HHRA accordingly.

A. The updated HHRA hereto includes modelled Base Case, Application Case and CEA Case air concentrations.

25) *Supplemental Information Request Response 90, Page 86*
AST states A separate HHRA was not conducted for the construction phase of the expansion, as

it is not anticipated that potential impacts arising during the expansion will be greater than those assessed for the full scale Project.

a) *Provide evidence to support this conclusion.*

A. The potential impacts associated with the construction phase of the expansion are anticipated to be significantly lower than those associated with the full-scale Project for the following reasons:

- The second phase of construction will include only installation and assembly of pre-fabricated elements of the Project, including above ground liquid sulphur storage tanks, a pre-engineering building extension, and installation and commissioning of the sulphur forming units.
- No grading or earthworks will be completed as part of the expansion. All site preparation work will be completed as part of the initial construction.
- There are no elements of commissioning that could potentially result in spurious or anomalous emissions.
- Rail and truck traffic associated with full-scale operations significantly exceeds that associated with the expansion construction and that will occur while the first phase of the Project is being operated.

The following table compares construction emissions estimates with those for the full-scale operation and confirms that these estimates are very low relative to the emissions associated with full-scale operations.

Table 25-1: Comparison between Emissions of Criteria Pollutants (g/s) Associated with Construction and Operational Stages of the Proposed Alberta Sulphur Terminal

Criteria Pollutant	Construction Stage Emissions (C) g/s	Operational Stage Emissions (O) g/s	C/O (%)
CO	0.02750	1.47	1.87
NO_X	0.00211	5.77	0.04
H_2S	0.00000	0.05	0.00
$PM_{2.5}$	0.00011	0.68	0.02
SO_2	0.00003	0.10	0.03

26) *Supplemental Information Request Response 91, Page 86*

a) *Provide all information used to calculate the results presented in Table 91-9 (e.g., relative risk estimates, etc.).*

b) *Provide an example calculation.*

c) *Confirm that the 98th percentile ambient measurement annually, averaged over 3 consecutive years for Particulate Matter was used as directed by the Canadian Council of*

Ministers of the Environment. If not update the information presented in Supplemental Information Request Response 91.

A. Twenty-four hour $PM_{2.5}$ air concentrations were predicted for the Lamont location for 4 years of meteorological data. The predicted data was identified as the year with highest average and 98th percentile concentrations. These time series data were added to the measured background $PM_{2.5}$ air concentrations[1]. The SUM15 assessment was conducted on a probabilistic basis at the receptor location where maximum or worst case impacts are predicted to occur within each Scenario (i.e., Background and Project+Background). Table 26-1 provides a summary of the air data used for the SUM15 assessment for the above scenarios.

Table 26-1: Summary of 24-hour Average $PM_{2.5}$ Time Series Data Associated with Emissions from AST Project plus Canexus Sodium Chlorate Plant at the Maximum $PM_{2.5}$ Receptor [ug/m^3]

Case	Annual AverageMean(Range)	Median Mean(Range)	98th Percentile Mean(Range)	SUM15 [ug/m^3 - days]Mean(Range)
Background	6.1 (5.3-7.3)	5.1 (4.2-6.4)	17 (16-18)	50.5 (52-79)
Project	0.6	0.2	5.7	0
Background + Project (1)	6.8 (6.0-7.6)	5.8 (5.0 – 6.7)	17.8 (13.9-24.2)	65 (3.4-190)

Note:

(1) Based on probabilistic assessment of 10,000 iterations.

Health risks were calculated using SUM15 methods as described in Health Canada's Addendum to the Science Assessment Document for Particulate Matter (i.e., Health Canada SUM15 method; Health Canada 1999) in combination with measured and predicted $PM_{2.5}$ concentrations on a probabilistic basis. Specifically, the full distribution of measured Baseline $PM_{2.5}$ concentrations (Lamont data) was added to the predicted daily concentrations for one full year. This background value was measured at Lamont under the AST Project plus Canexus Sodium Chlorate Plant assessment scenario (Volume IIA, Section 2: Air Quality of the EIA). The study included three monitoring areas, including Fort Saskatchewan and Elk Island, but identified Lamont as having the most applicable data of the three areas, because it is the closest ambient air monitoring station. As described by Health Canada, health risks were estimated for mortality, respiratory hospital admissions (RHA) and cardiac hospital admissions (CHA).

---

[1] Air quality assessment selected Alberta Environment's ambient air monitoring station located at Lamont to represent ambient air concentrations in the local study area. Daily $PM_{2.5}$ concentrations collected between 2003 to 2007 were used to characterize ambient concentrations.

The type of information that is required to calculate the health risks includes:

- cumulative air concentrations of PM2.5: the one-year sum (i.e., 365 days) of 24-hour PM2.5 concentrations that exceed the Health Canada reference level of 15 µg/m3 (i.e., ∑(24-hour PM2.5 air concentration – 15 µg/m3));
- relative risk estimates for mortality, RHA and CHA; and
- baseline mortality, RHA and CHA incidence rates.

B. Table 26-1 outlines the cumulative concentrations that were determined for the different assessment cases. Health Canada's baseline incidence rates for mortality, CHA and RHA are presented in Table 26-2.

Table 26-2: Baseline incidence rates and relative National risk estimates

Health endpoint	**Incidence rate per 1,000,000 population per day**	**Relative risk per 1 ug/m^3 change in PM$_{2.5}$**	
		Point estimate	**95% confidence interval**
Mortality	18.4	1.0014	1.001 to 1.0018
Respiratory Hospital Admissions (RHA)	16	1.00074	1.00049 to 1.00099
Cardiovascular Hospital Admissions (CHA)	14.4	1.0007	1.00036 to 1.001

Source: Health Canada 1999

Health Canada uses this information to calculate potential health risks related to mortality, RHA, and CHA that may be attributable to PM$_{2.5}$ as follows:

Cumulative PM$_{2.5}$ concentration × incidence rate × (relative risk -1) (Eq. 1)

Using Eq. 1, risks were estimated for each health endpoint. For example, the predicted change in the daily mortality rate in the Background Case that would be attributable to PM$_{2.5}$ was calculated as follows:

Change in mortality rate = 50.5 µg/m^3 × 18.4 per 1,000,000 × (1.0014-1) = 1.3 per 1,000,000

This calculation illustrates that the cumulative PM$_{2.5}$ concentration of 50.5 µg/m^3 predicted for the Background Case was associated with a predicted increase in the non-accident mortality rate of 1.3 per 1,000,000 (i.e., from 18.4 to 19.6).

The remaining results for mortality, RHA and CHA are outlined in Table 26-3. The risk estimates are presented in terms of "health effects per 1,000,000 people". It is unlikely that a PM$_{2.5}$ attributable health effect (as it relates to the predicted air concentrations) could be detected at any of the communities, considering the area's small population size (i.e., when compared to a population of 1,000,000). The results in Table 26-3 indicate that RHA and CHA are below 1, suggesting that increases in risk are low. The average relative risks for mortality are predicted to rise from a low of 1.3 in the Background case to a high of 1.7 in the Background + Project case.

Table 26-3: Estimates of mortality and morbidity rates (per 1,000,000 people) attributed to changes in daily $PM_{2.5}$

Assessment Case [(1)]	Mortality	RHA	CHA
Background	1.3 (0.5-2.3)	0.6 (0.2-1.0)	0.5 (0.2-0.9)
Background + Project	1.7 (0.8-2.8)	0.8 (0.4-1.3)	0.7 (0.3-1.1)
Mortality, RHA and CHA results are provided as mean (5th to 95th percentiles are in parentheses)			

The SUM15 assessment indicates that incremental changes in mortality and morbidity are expected to be small. The Project's $PM_{2.5}$ emissions are not expected to increase the Background mortality and morbidity rates to a measurable extent.

C. The 98th percentile ambient measurements were not used in the original SUM15 analysis. Instead, an annual average value was added to the project's daily $PM_{2.5}$ concentrations. However, as described in our response to 26(a), the updated SUM15 analysis incorporated the measured $PM_{2.5}$ concentrations probabilistically, wherein the full distribution of measured $PM_{2.5}$ data was added to a full year of predicted 24-h $PM_{2.5}$ concentrations.

27) *Supplemental Information Request Response 96(b), Page 91*

a) *If elevated concentrations of arsenic persist, discuss the likelihood that the project will worsen baseline conditions.*

A. The potential for elevated concentrations of arsenic in surface water will continue to be evaluated as part of the surface water and groundwater-monitoring program. Because the arsenic criterion for protection of freshwater aquatic life is very low relative to the Method Detection Limit (MDL) and Practical Quantitation Limit (PQL), exceedances can be observed that are related to laboratory uncertainty and error. It remains our opinion that these measured concentrations are most likely related to laboratory or sampling error.

In the event that these measured concentrations are representative of background conditions the Project is not expected to worsen the baseline condition. Arsenic concentrations can potentially be increased by changing the conditions that control the solubility of the arsenic that is naturally present; or by releasing arsenic to the environment. Factors that control the solubility of arsenic in the natural environment include temperature and pH. Because arsenic is not being handled, or used by the sulphur forming process, release of arsenic into the environment is not anticipated as part of the proposed Project.

Because the sulphur forming process will not alter the temperature of the soils, surface water or groundwater in the PDA, there is no opportunity for greater solubilisation of arsenic due to temperature. Ground temperatures will remain essentially unaffected by the proposed Project. Through work conducted by WorleyParsons on in situ oil sands projects in Alberta it is now understood that a significant increase in temperature, to levels approaching the boiling point of water, is required to mobilize naturally occurring arsenic in the environment.

Non-contact cooling water is used in the sulphur forming process but is contained and recycled as part of this process. A regional water supply will be used to supply this water, which does not have elevated arsenic concentrations.

The pH of the formation fluids also influences the potential for arsenic to dissolve into water. For conditions typical of Alberta till deposits greater arsenic mobility is anticipated as pH increases above nine. In this case, increased dissolution of arsenic into surface water is not anticipated for the following reasons:

- All surface water runoff from area of sulphur deposition will be collected, contained in a surface water runoff pond, and reused as cooling water.
- No water will be released into the environment under normal operating conditions – under upset conditions the pH will be neutralized prior to any release.
- The management of sulphur in the processing area will tend to depress pH not increase it.
- The surrounding, natural surface waters have high alkalinity (300 to 700 mg/L), hence the pH should not be significantly affected by aerial deposition of elemental sulphur outside of the zone of runoff collection.

Notwithstanding the above, groundwater and surface water monitoring is incorporated into the construction and operations phases of the Project development, allowing mitigation measures to be implemented in the unlikely event that Project activities do influence arsenic concentrations in the surrounding surface water.

28) *Supplemental Information Request Response 99, Page 92*

a) *Clarify why there is no possibility that a 70% sodium chlorate and 30% sulphur mixture would occur.*

A. The only opportunity for sulphur to mix with sodium chlorate could occur through the simultaneous deposition of fugitive dust. This is because the respective products are stored and managed within contained areas, and within controlled spaces that are separated by a distance in excess of 600 m.

The maximum anticipated proportion of mixing was estimated by adding 5 years maximum predicted deposition of elemental sulphur onto maximum accumulations of sodium chlorate that were measured on the Canexus property. This resulted in a maximum potential mixing ratio of 99.998% sodium chlorate to 0.002% elemental sulphur. Even this maximum concentration is considered overly conservative where deposited sodium chlorate is present in significant concentrations. This is because elemental sulphur is oxidized by bacteria when it is released to the environment and hence, is not expected to persist and accumulate for 5 years. Additionally, sodium chlorate is extremely soluble and hence, is also unlikely to persist in the natural environment, in its dry, potentially reactive state.

While it is potentially possible for the two compounds to mix at the 70:30 ratio by weight, such mixing could only occur at very low concentrations, at the outer zones of the depositional plumes of the two facilities, where any potential reaction would likely not be detectable.

ERRATA

29) *Supplemental Information Request Responses 22 and 26, Pages 17 and 21*

a) *Confirm that the units for groundwater velocity should be m/y rather than m/s.*

A. The correct units for groundwater velocity should be m/y rather than m/s.

30) *Supplemental Information Request Response 71, Page 66*
AST indicates in the original application that CALPUFF was run with 4 years of meteorological data, while the response to Supplemental Information Request 71 AST indicates that 5 years of data was used.

a) *How many years of data did AST use?*

A. Four years of meteorological data (2001 to 2004 inclusive) were used for the air dispersion modelling using CALPUFF.

31) *Supplemental Information Request Response 137, Page 121*
AST states The total taxes payable by AST are the same in both Volume IID, Section 4.4.3.2 and in Issue 27 of Table 5.7-1. The former section divides these taxes into the two major contributing sources in the tax estimate, land and buildings, and machinery and equipment. The latter table provides an estimate of how these taxes will be directed.

a) *Table 4.4-1 of the EIA shows Estimated Taxes Due 2006 calculated at $345,182.56 whereas the narrative in Sections 4.4.3.2 and in Issue 27 of Table 5.7-1 refers to a total taxes of $460,077. Clarify the apparent discrepancy.*

A. SIR 31 refers to Table 4.4-1. In Volume IID, Section 4 this is Figure 4.4-1. The total discrepancy is $114,894.44. Table 31-1 below identifies the discrepancies between the text in Section 4.4.3.2 and Figure 4.4-1.

Table 31-1: Discrepancies between Figure 4.4-1 and text in Section 4.4.3.2

Contributing tax source	Value in Figure 4.4-1	Value in text in Section 4.4.3.2	Discrepancy
Alberta School Foundation	$37,791	$62,387	$24,596
Municipal	$300,000.57	$388,128	$88,127.43
County of Lamont Foundation	$7,390.99	$9,562	$2,171.01
Total	$345,182.56	$460,077	$114,894.44

The values in Figure 4.4-1 are incorrect and should be consistent with the values in the text in Section 4.4.3.2.

CLOSURE

We trust that this letter adequately addresses your additional SIRs. If you have any questions or additional information requirements, please contact the undersigned.

Sincerely,
WorleyParsons
Infrastructure & Environment

Gordon J. Johnson

Gordon Johnson, M.Sc., P.Eng.
Global Lead - Environment

PERMIT TO PRACTICE
WORLEYPARSONS CANADA LTD.
Signature
Date Aug 22 2008
PERMIT NUMBER: P2306
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

References

SIR 9

City of Calgary Wastewater and Drainage. 2000. Storm water Management and Design Manual. December 2000.

Adams, E.E.; Cosler, D.J.; Helfrich, K.R. 1990. Evaporation From Heated Water Bodies: Predicting Combined Forced Plus Free Convection. Water Resources Research 26(3): 425-435.

SIR 13

Alberta Environment, 2007a. Alberta Tier 1 Soil and Groundwater Remediation Guidelines.

Alberta Environment, 2007b. Alberta Tier 2 Soil and Groundwater Remediation Guidelines.

SIR 14

Internet References

Dybvig, L.; Grover, M.; Thair, S. 1996. Handbook of Disclosure Guidelines for the Valuation of Real Estate Assets. Available at: http://www.aicanada.ca/e/search_results.cfm?keyword=Handbook+of+Disclosure+Guidelines+for+the+Valuation+of+Real+Estate+Assets. Accessed July 15, 2008.

EREB (Edmonton Real Estate Board). Available at http://www.ereb.com/aboutereb/. Accessed July 15, 2008 (Information supplemented by representative, by telephone, for years 2003 and 2004).

Realtors Association of Edmonton. Available at: http://www.ereb.com/REALTORSAssociationOfEdmonton.html. Accessed July 17, 2008.

Personal Communication

Charleboise, Joanne. Representative, Appraisal Institute of Canada. Telephone conversation, July 16, 2008.

Dumaresq, Kathy. Research Analyst, Alberta Economic Development. Edmonton. Telephone conversation. November 2006.

Teal, Suzanne. Representative, Alberta Association of the Appraisal Institute of Canada. Telephone conversation, July 16, 2008.

SIR 15

Personal Communication

Howe, Gary. Alberta Multiplier Creator, Alberta Finance and Enterprise. Telephone conversation July 17 and 18, 2008.

SIR 18

EMEA. 2003. Committee for Veterinary Medicinal Products. Sulphur Summary Report (1). The European Agency for the Evaluation of Medicinal Products. Veterinary Medicines and Inspections. http://www.emea.europa.eu/pdfs/vet/mrls/085302en.pdf

EXTOXNET (Extension Toxicology Network). 1995. Sulphur. A Pesticide Information Project of Cooperative Extension Offices of Cornell University, Michigan State University, Oregon State University, and University of California at Davis. http://pmep.cce.cornell.edu/profiles/extoxnet/pyrethrins-ziram/sulfur-ext.html

Health Canada. 1987. Sulphate fact sheet. Environmental and Workplace Health. http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/sulphate-sulfates/index-eng.php

ICRP (International Commission on Radiological Protection). Report No. 23: Report of the Task Group on Reference Man. Pergamon Press, Oxford, UK (1984). Cited in: Health Canada, 1987.

Komarnisky, L.A., Christopherson, R.J. and Basu, T.K. 2003. Sulfur: Its Clinical and Toxicologic Aspects. Nutrition. 19:54-61.

Lee, K., Smith, J.L., and Last, J.A. 2005. Absence of Respiratory Inflammatory Reaction of Elemental Sulphur Using the California Pesticide Illness Database and a Mouse Model. Journal of Agromedicine. 10(3):41-47.

U.S. EPA. 1991. EPA R.E.D.(Re-registration Eligibility Document) Facts. Sulfur. Pesticides and Toxic Substances. 750RW. 738-F-91-1107. May 1991. http://www.epa.gov/oppsrrd1/REDs/factsheets/0031fact.pdf

SIR 21

Arora, A. and Shukla, Y. 2004. Induction of preneoplastic altered hepatic foci following dietary sulphur supplementation. Human and Experimental Toxicology. 23:229-234.

Eisen, E.A., Tobert, P.E., Hallock, M.F., Monson, R.R., Smith, T.J. and Woskie, S.R. 1994. Mortality Studies of Machining Fluid Exposure in the automobile Industry III: A Case-Control Study of Larynx Cancer. American Journal of Industrial Medicine. 26:185-202.

EMEA. 2003. Committee for Veterinary Medicinal Products. Sulphur Summary Report (1). The European Agency for the Evaluation of Medicinal Products. Veterinary Medicines and Inspections. http://www.emea.europa.eu/pdfs/vet/mrls/085302en.pdf

EXTOXNET (Extension Toxicology Network). 1995. Sulphur. A Pesticide Information Project of Cooperative Extension Offices of Cornell University, Michigan State University, Oregon State University, and University of California at Davis. http://pmep.cce.cornell.edu/profiles/extoxnet/pyrethrins-ziram/sulfur-ext.html

Farm Chemicals Handbook. 1994. Meister publishing Co. Willoughby, OH. Cited In: EXTOXNET, 1995.

Gosselin, R.E., Smith, R.P., and Hodge, H.C. 1984. Clinical Toxicology of Commercial Products. 5th edition. Baltimore. Williams and Wilkins. Cited In: HSDB, 2008.

Komarnisky, L.A., Christopherson, R.J. and Basu, T.K. 2003. Sulfur: Its Clinical and Toxicologic Aspects. Nutrition. 19:54-61.

Lee, K., Smith, J.L., and Last, J.A. 2005. Absence of Respiratory Inflammatory Reaction of Elemental Sulphur Using the California Pesticide Illness Database and a Mouse Model. Journal of Agromedicine. 10(3):41-47.

OHS Database. 1993. Occupational Health Services Inc. 1993 (August) MSDS for Sulphur. OHS Inc., Secaucus, New Jersey. Cited In: EXTOXNET, 1995.

S.F. Sulfur Corporation. 2000. Material Safety Data Sheet - Flaked Sulfur, Prilled Sulfur, and Arrow Roll® Sulfur. http://georgiagulfsulfur.com/sfmsdsflake.htm. Issued April 1st, 2000.

Sama, S.R., Kriebel, D., Woskie, S., Eisen, E. Wegman, D. and Virji, M.A. 1997. A Field Investigation of the Acute Respiratory Effects of Metal Working Fluids. II. Effects of Airborne Sulphur Exposures.

U.S. EPA. 1982. Sulfur Pesticide Registration Standard, L. Rossi et al. U.S EPA, Office of Pesticides and Toxic Substances, Washington DC. Cited In: EXTOXNET, 1995.

U.S. EPA. 1988. Office of Pesticides. TOX Oneliners – Sulfur. August, 1988. Cited In: EXTOXNET, 1995.

U.S. EPA. 1991. EPA R.E.D.(Re-registration Eligibility Document) Facts. Sulfur. Pesticides and Toxic Substances. 750RW. 738-F-91-1107. May 1991. http://www.epa.gov/oppsrrd1/REDs/factsheets/0031fact.pdf

SIR 22

US Environmental Protection Agency (USEPA). 2008. Integrated Risk Information System (IRIS). http://www.epa.gov/iris. Accessed: July 2008

SIR 23

AENV 2007. Alberta Tier 1 Soil and Groundwater Remediation Guidelines. Alberta Environment June 2007.

SIR 26

CARB (California Air Resources Board). 2002. Staff Report: Public Hearing to Consider Amendments to the Ambient Air Quality Standards for Particulate Matter and Sulfates. California Environmental Protection Agency, Air Resources Board. May, 2002.

CCME (Canadian Council of Ministers of the Environment). 2000. Particulate Matter and Ozone Canada-wide Standards. Fact Sheet. Canadian Council for Ministers of the Environment. June 2000.

Cohen A. 2004. Mortality impacts of urban air pollution in comparative quantification of health risks: global and regional burden of disease attributable to selected major risk factors, M. Ezzati et al. World Health Organization, Geneva, pp. 1353-1434.
Health Canada. 1999. National Ambient Air Quality Objectives for Particulate Matter.

Addendum to the Science Assessment Document. A Report by the Federal – Provincial Working Group on Air Quality Objectives and Guidelines. December 1997, Revised April 1999.

Samet, J.M. 2000. The National Morbidity, Mortality and Air Population Study. Part II: Morbidity and mortality from air pollution in the United States. Res. Rep Health Eff. Inst., vol. 94, no. Pt 2, pp. 5-70.

U.S. EPA (United States Environmental Protection Agency). 2005. Review of National Ambient Air Quality Standards for Particulate Matter: Policy Assessment of Scientific and Technical Information. OAQPS Staff Paper Second Draft. January 2005. URL: http://www.epa.gov/ttn/naaqs/standards/pm/data/pm_staff_paper_2nddraft.pdf

WHO (World Health Organization). 2005. WHO Air Quality Guidelines Global Update 2005 Report on a Working Group meeting, Bonn, Germany 18-20 October 2005.

Figures

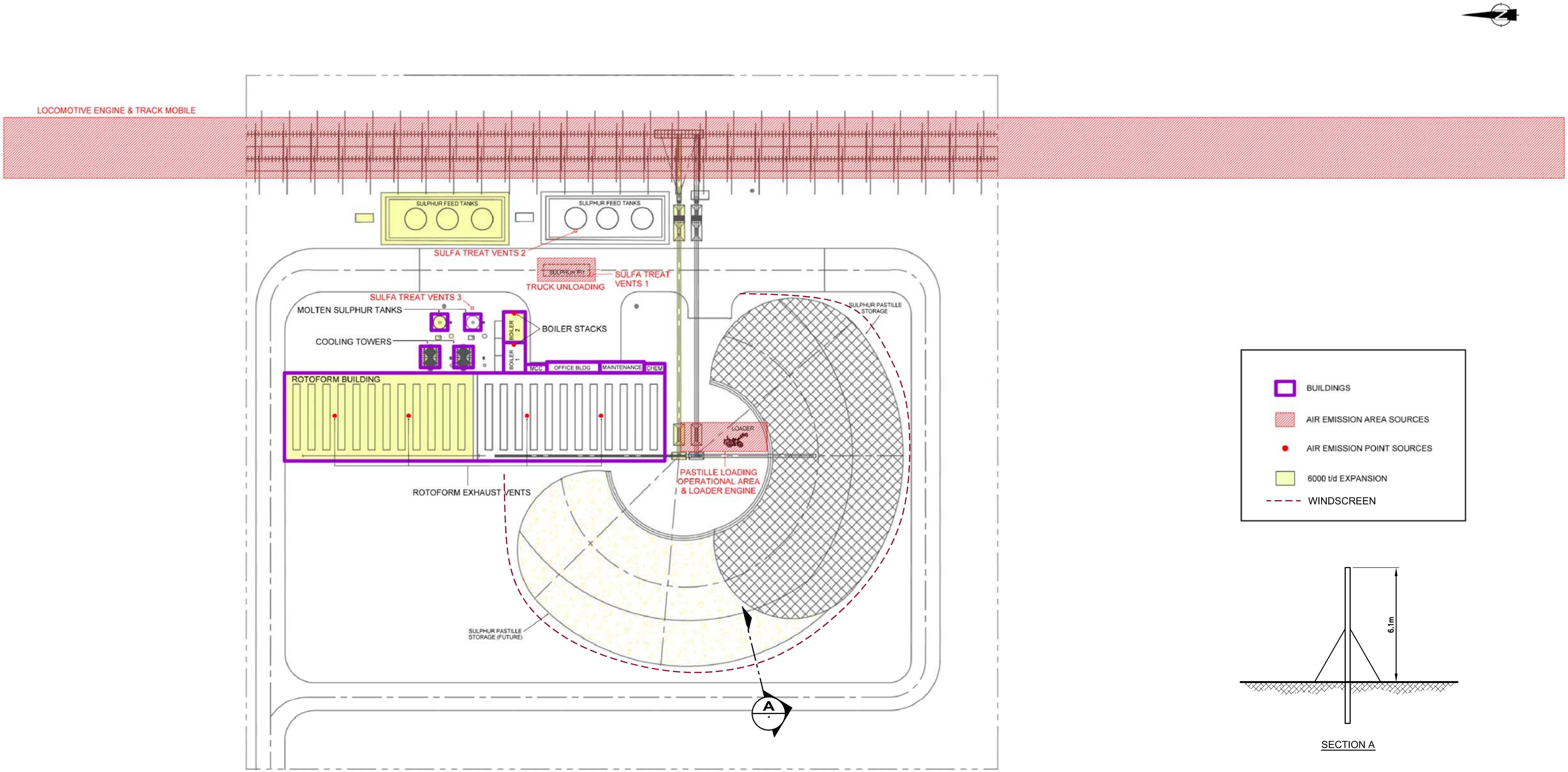

FIGURE 1: LOCATION OF WINDSCREEN

Attachment 1: Town of Lamont Lagoon Discharge Reports

NORWEST LABS

Analytical Report

Norwest Labs
7217 Roper Road NW
Edmonton, AB, T6B 3J4
Phone: (780) 438-5522
Fax: (780) 438-0396

Bill to: Town of Lamont
Report to: Town of Lamont
Box 330
4804 - 51 Street
Lamont, AB, Canada
T0B 2R0
Attn: Elmer Pullishy
Sampled By: E. Pullishy
Company: Town

Project
ID:
Name: Lagoon Draining
Location: Lagoon Fallout
LSD:
P.O.: Bag330
Acct. Code: 2-42-230

NWL Lot ID: 464293
Control Number: E 279767
Date Received: May 17, 2006
Date Reported: May 25, 2006
Report Number: 854980

Page: 1 of 2

Analyte		Units	NWL Number 464293-1 Bample Description Water Sample Matrix Water Results	Results	Results	Detection Limit
Aggregate Organic Constituents						
Biochemical Oxygen Demand	5 Day	mg/L	27			4
Chemical Oxygen Demand		mg O2/L	92			5
Oil and Grease	Total	mg/L	7			5
pH	adjustment required for O&G		No			
Physical and Aggregate Properties						
Solids	Total Suspended	mg/L	27			1
Routine Water						
pH	@ 25 °C	pH	7.56			

Approved by: Darren Crichton

Darren Crichton, BSc, PChem
Operations Chemist

NORWEST
LABS

Analytical Report

Norwest Labs
7217 Roper Road NW
Edmonton, AB. T6B 3J4
Phone: (780) 438-5522
Fax: (780) 438-0396

Bill to: Town of Lamont
Report to: Town of Lamont
Box 330
4804 - 51 Street
Lamont, AB, Canada
T0B 2R0
Attn: Elmer Pullishy
Sampled By: E. Pullishy
Company: Town

Project
ID:
Name: Lamont Sewage Lagoon
Location: Lagoon Fallout
LSD:
P.O.: 3150
Acct. Code: 2-42-230

NWL Lot ID: **50100**
Control Number: E 27976
Date Received: Oct 18,
Date Reported: Oct 25,
Report Number: 923226

NWL Number 501001-1
Sample Description Water Sample
Matrix Water

Analyte		Units	Results	Results	Results	Detec
Aggregate Organic Constituents						
Biochemical Oxygen Demand	5 Day	mg/L	6			4
Chemical Oxygen Demand		mg O2/L	44			5
Oil and Grease	Total	mg/L	6			5
pH	adjustment required for O&G		No			
Physical and Aggregate Properties						
Solids	Total Suspended	mg/L	12			1
Routine Water						
pH	@ 25 °C	pH	8.33			

Approved by: Anthony Neumann

Anthony Neumann, MSc
Laboratory Operations Manager

2006 ANNUAL REPORT - WASTEWATER STABILIZATION POND
ALBERTA ENVIRONMENTAL PROTECTION & ENHANCEMENT ACT

COMMUNITY NAME: TOWN OF LAMONT **APPROVAL NO.** 95-MUN-109

A. DATES OF DISCHARGE	a) May 15th - 19th - 06 b) Oct 16th - 23rd - 06
B. APPROXIMATE VOLUME OF DISCHARGE	a) 65430.45 (m³) b) 74312.55 (m³)
C. DEPTH OF LIQUID IN EVAPORATION CELL	3 meters.
D. COPY OF ANALYSIS TAKEN AT DISCHARGE (Including 5 day Biological Oxygen Demand and Total Suspended Solids.)	*Check one:* ✓ Attached ☐ Previously Submitted
E. GROUNDWATER MONITORING WELL DATA - water levels - analysis	*Check one:* ☐ Attached ☐ Previously Submitted

F. COMMENTS / SUMMARY OF NOTIFICATIONS (*Add additional page if necessary*)

Notifications were mailed out april 24th and Sept. 26th.

To be submitted prior to February 28 for the previous year to: Alberta Environment, Parkland Region, #304 Provincial Building, 4920 - 51 St. RED DEER, AB T4N 6K8 (Fax No. 403 340-5022)

Bodycote TESTING GROUP

Analytical Report

Bill To:	Town of Lamont	Project:		Lot ID:	**544838**
Report To:	Town of Lamont	ID:		Control Number:	E 290180
	Box 330	Name:	Lagoon Draining	Date Received:	May 11, 2007
	4804 - 51 Street	Location:	Lagoon Fallout	Date Reported:	May 22, 2007
	Lamont, AB, Canada	LSD:		Report Number:	1000408
	T0B 2R0	P.O.:	3176		
Attn:	Elmer Pullishy	Acct code:	2-42-230		
Sampled By:	Elmer P.				
Company:	Town of Lamont				

Reference Number 544838-1
Sample Date
Sample Location
Sample Description Lagoon Sample
Matrix Water

Analyte		Units	Results	Results	Results	Detection Limit
Aggregate Organic Constituents						
Biochemical Oxygen Demand	5 Day	mg/L	18			4
Chemical Oxygen Demand		mg O2/L	93			5
Oil and Grease	Total	mg/L	8			5
pH	adjustment required for O&G		No			
Physical and Aggregate Properties						
Solids	Total Suspended	mg/L	18			1
Routine Water						
pH	@ 25 °C	pH	7.37			

Approved by: Anthony Neumann

Anthony Neumann, MSc
Laboratory Operations Manager

Bodycote TESTING GROUP

Analytical Report

Bill To: Town of Lamont
Report To: Town of Lamont
Box 330
4804 - 51 Street
Lamont, AB, Canada
T0B 2R0
Attn: Elmer Pullishy
Sampled By:
Company:

Project:
ID:
Name: Lagoon Draining
Location: Lagoon Fallout
LSD:
P.O.: -3191
Acct code:

Lot ID: **581041**
Control Number: 328792
Date Received: Oct 17, 2007
Date Reported: Oct 25, 2007
Report Number: 1062587

Reference Number	581041-1		
Sample Date			
Sample Location			
Sample Description	Water Sample		
Matrix	Water		

Analyte		Units	Results	Results	Results	Detection Limit
Aggregate Organic Constituents						
Biochemical Oxygen Demand	5 Day	mg/L	<4			4
Chemical Oxygen Demand		mg O2/L	45			5
Oil and Grease	Total	mg/L	<5			5
pH	adjustment required for O&G		No			
Physical and Aggregate Properties						
Solids	Total Suspended	mg/L	10			1
Routine Water						
pH	@ 25 °C	pH	7.94			
Hydroxide		mg/L	<5			5
Carbonate		mg/L	<6			6
Bicarbonate		mg/L	395			5
P-Alkalinity	as CaCO3	mg/L	<5			5
T-Alkalinity	as CaCO3	mg/L	324			5

Approved by: Anthony Neumann

Anthony Neumann, MSc
Laboratory Operations Manager

2007 ANNUAL REPORT - WASTEWATER STABILIZATION POND
ALBERTA ENVIRONMENTAL PROTECTION & ENHANCEMENT ACT

COMMUNITY NAME: Town of Lamont **APPROVAL NO.** 95-Mun-109

A. DATES OF DISCHARGE	a) May 8th - 13th - 07 b) Oct 15th - 23rd - 07
B. APPROXIMATE VOLUME OF DISCHARGE	a) 78247 (m³) b) 75322 (m³)
C. DEPTH OF LIQUID IN EVAPORATION CELL	3 meter.
D. COPY OF ANALYSIS TAKEN AT DISCHARGE (Including 5 day Biological Oxygen Demand and Total Suspended Solids.)	*Check one:* ✓ Attached ___ Previously Submitted
E. GROUNDWATER MONITORING WELL DATA - water levels - analysis	*Check one:* ___ Attached ___ Previously Submitted

F. COMMENTS / SUMMARY OF NOTIFICATIONS (*Add additional page if necessary*)

All landowners down stream were given a months notice.
When we were draining in the spring the County got a little excited about the soap suds that were floating around in the air.

To be submitted prior to February 28 for the previous year to: Alberta Environment.

Attachment 2: Human Health Risk Assessment Update

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APPENDICES

Executive Summary

Alberta Sulphur Terminals Ltd. (AST) submitted an Environmental Impact Assessment (EIA) in June 2007 for its proposed Bruderheim Sulphur Forming and Shipping Facility (the Project). In the human health risk assessment (HHRA) submitted with the EIA, five chemicals of potential concern (COPCs) were evaluated with respect to potential short-term and long-term health impacts. At the request of Alberta Health and Wellness, a toxic potency screening of air emissions was completed to identify whether any additional COPCs should be included in the HHRA. Alberta Health and Wellness also requested that polycyclic aromatic hydrocarbons (PAHs) be included as part of the HHRA. Health risks were to be characterized for all relevant routes of exposure. This document summarizes the results of the screening exercise, which identified four additional volatile organic compounds (VOCs), including: acetaldehyde, acrolein, benzene and formaldehyde. The update presents the results of the health risk assessment of the four additional VOCs and the suite of PAHs. This document represents an update to the original HHRA, but does not supersede it.

The five COPCs evaluated in the original HHRA were not re-assessed as part of this update. However, for the chemical mixtures update, the results of the original HHRA were combined with the results for the additional COPCs to adequately assess the overall potential exposures to chemical mixtures.

Exceedances of health-based guidelines are predicted for:

- acute and chronic acrolein exposures;
- acute eye irritant exposures;
- acute respiratory irritant exposures; and
- chronic nasal irritant exposures.

The acute and chronic health risks associated with inhalation of benzene, acetaldehyde and formaldehyde are predicted to be low for all assessment cases. Likewise, the chronic health risks associated with both inhalation and multi-media exposures of the carcinogenic PAHs are considered to be low for all assessment cases.

In some cases, predicted ground level air concentrations of acrolein are associated with elevated health risks. However, due to the margin of safety incorporated into the exposure limit for acrolein, the potential for adverse health effects is considered low.

The potential health risks predicted for the eye and nasal irritants are largely due to the modelled acrolein concentrations. Again, predicted risks are not expected to translate to measurable health effects, given the conservative nature of the acrolein exposure limit.

The primary contributors to the acute respiratory irritant risks are expected to be nitrogen dioxide, sulphur dioxide and acrolein. Because all three compounds are expected to act on separate regions of the respiratory tract and the likelihood of the maximum air concentrations of all three compounds occurring at

exactly the same time is low, the predicted respiratory risks likely overstate the actual risks that will be posed to area residents.

Overall, health risks associated with the Project are expected to be low.

1. Introduction

Alberta Sulphur Terminals Ltd. (AST) completed an Environmental Impact Assessment (EIA) for its proposed Bruderheim Sulphur Forming and Shipping Facility (the Project) in June 2007. In the human health risk assessment (HHRA) submitted with the EIA, five chemicals of potential concern (COPCs) were evaluated with respect to potential short-term and long-term health impacts.

In response to requests from Alberta Health and Wellness, WorleyParsons Komex provided a revised air emissions profile to include potential products of incomplete combustion (PIC) associated with the Project. Intrinsik Environmental Sciences Inc. (Intrinsik) was then requested to complete a toxic potency screening of these emissions and an updated HHRA, if additional COPCs were identified. The toxic potency screening was completed in response to Supplemental Information Request #78, and identified four “new” COPCs to include in the HHRA update. In addition, an assessment of polycyclic aromatic hydrocarbons has been conducted. This document contains the results of the updated HHRA for the Project.

2. Approach

The original HHRA focused on five COPCs that were identified as being the primary substances of interest regarding potential air quality impacts: CO, H_2S, NO_2, $PM_{2.5}$, and SO_2. An updated air emissions profile was subsequently provided by the Air Quality team that included potential PICs associated with the Project (including polycyclic aromatic hydrocarbons (PAH) and volatile organic compounds (VOC)). A toxic potency screening approach was used to identify those individual COPCs that comprise approximately 99% of the cumulative potency of the Project’s air emissions. COPCs identified from the potency screening were then further screened based upon their respective environmental fate and persistence characteristics. Based upon environmental fate characteristics, PAHs were also included in the risk assessment. This section describes only the methodology used in the updated health risk assessment. For further information regarding the original problem formulation and the overall risk assessment approach, please refer to the June 2007 EIA application, Volume IIA, Section 4: Public Health and Safety.

The following assessment cases were evaluated in this HHRA update:

- Baseline case: includes existing ambient air quality from community and traffic sources, as well as approved and existing commercial and industrial projects or activities in the air quality study area. The approved projects include facilities that have received regulatory approval, but are not yet operating.
- Application case: includes existing ambient air quality, existing and approved regional sources, as well as the proposed Project (i.e., baseline case plus the Project).
- Cumulative effects assessment (Cumulative) case: includes existing ambient air quality, existing and approved regional sources, the proposed Project (i.e., application case), as well as all other planned or proposed industrial activities or projects in the air quality study area.

2.1 Identification of Chemicals of Potential Concern

2.1.1 Toxic Potency Screening

The toxic potency screening involved the following steps:

- Determination of maximum emission rates for all PICs associated with the Project (including PAH and VOC).
- Identification of chronic oral and inhalation toxicity reference values (TRVs) for all PICs. The TRVs adopted for the current exercise represent scientifically defensible values published by either Health Canada or the United States Environmental Protection Agency.
- Calculation of the toxic potency of each PIC using the following equation:

$$\text{Toxic Potency} = \frac{\text{Emission Rate}}{\text{TRV}}$$

- Sorting the PICs according to relative toxic potency
- Identification of those PICs that represent approximately 99% of the cumulative toxic potency of all PICs.

The results of the toxic potency screening exercise using inhalation and oral TRVs, respectively are presented in Tables 2.1.1 and 2.1.2.

Table 2.1.1: PIC Toxic Potency Screening Using Inhalation TRVs

Compound	Annual Emissions (g/sec) (A)	TRV (ug/m^3) (B)	Toxic Potency (A÷B)	Relative Potency	Cumulative Potency
Acrolein	2.31E-03	0.02	1.15E-01	79.8%	79.8%
Formaldehyde	1.95E-02	0.77	2.53E-02	17.5%	97.3%
Acetaldehyde	2.72E-02	17.2	1.58E-03	1.1%	98.4%
Benzene	1.97E-03	1.3	1.52E-03	1.0%	99.5%
1,3 Butadiene	2.00E-04	0.3	6.67E-04	0.5%	99.9%
Xylenes	3.47E-03	100	3.47E-05	0.0%	100.0%
Aldehydes	4.55E-02	1700	2.68E-05	0.0%	100.0%
Pentane	1.44E-02	700	2.06E-05	0.0%	100.0%
Naphthalene	3.74E-05	3	1.25E-05	0.0%	100.0%
Toluene	4.80E-03	5000	9.61E-07	0.0%	100.0%
Benzo(a)pyrene	2.37E-07	0.32	7.39E-07	0.0%	100.0%
Ethylene	5.52E-03	8200	6.73E-07	0.0%	100.0%
Ethylbenzene	3.15E-04	1000	3.15E-07	0.0%	100.0%
Fluoranthene	4.81E-07	6.4	7.52E-08	0.0%	100.0%
Benzo(b)fluoranthene	2.04E-07	3.2	6.38E-08	0.0%	100.0%
Benzo(k)fluoranthene	2.04E-07	6.4	3.19E-08	0.0%	100.0%
Chrysene	1.33E-07	10.7	1.25E-08	0.0%	100.0%
Benzo(a)anthracene	7.24E-07	64	1.13E-08	0.0%	100.0%
Benzo(ghi) perylene	1.67E-07	16	1.04E-08	0.0%	100.0%
Indeno(1,2,3-cd)pyrene	2.69E-08	3.2	8.40E-09	0.0%	100.0%
Acenaphthylene	8.20E-07	200	4.10E-09	0.0%	100.0%
Pyrene	7.51E-07	320	2.35E-09	0.0%	100.0%
Acenaphthene	4.35E-07	200	2.17E-09	0.0%	100.0%
Phenanthrene	1.23E-06	640	1.93E-09	0.0%	100.0%
Fluorene	8.98E-07	640	1.40E-09	0.0%	100.0%
Anthracene	6.68E-07	640	1.04E-09	0.0%	100.0%
TOTAL Toxic Potency			1.44E-01	100.0%	

Table 2.1.2: PIC Toxic Potency Screening Using Oral TRVs

Compound	Annual Emissions (g/sec) (A)	TRV (ug/kg bw/day) (B)	Toxic Potency (A÷B)	Relative Potency	Cumulative Potency
Benzene	1.97E-03	0.032	6.12E-02	92.4%	92.4%
Acrolein	2.31E-03	0.5	4.61E-03	7.0%	99.4%
Benzo(a)pyrene	2.37E-07	0.0014	1.69E-04	0.3%	99.6%
Formaldehyde	1.95E-02	200	9.74E-05	0.1%	99.8%
Toluene	4.80E-03	80	6.00E-05	0.1%	99.9%
Benzaldehyde	2.59E-03	100	2.59E-05	0.0%	99.9%
Xylenes	3.47E-03	200	1.73E-05	0.0%	99.9%
Fluoranthene	4.81E-07	0.028	1.72E-05	0.0%	99.9%
Benzo(b)fluoranthene	2.04E-07	0.014	1.46E-05	0.0%	100.0%
Benzo(k)fluoranthene	2.04E-07	0.028	7.29E-06	0.0%	100.0%
Ethylbenzene	3.15E-04	100	3.15E-06	0.0%	100.0%
Chrysene	1.33E-07	0.047	2.86E-06	0.0%	100.0%
Benzo(a)anthracene	7.24E-07	0.28	2.58E-06	0.0%	100.0%
Benzo(ghi) perylene	1.67E-07	0.07	2.38E-06	0.0%	100.0%
Indeno(1,2,3-cd)pyrene	2.69E-08	0.014	1.92E-06	0.0%	100.0%
Naphthalene	3.74E-05	20.0	1.87E-06	0.0%	100.0%
Pyrene	7.51E-07	1.4	5.36E-07	0.0%	100.0%
Phenanthrene	1.23E-06	2.8	4.41E-07	0.0%	100.0%
Fluorene	8.98E-07	2.8	3.21E-07	0.0%	100.0%
Anthracene	6.68E-07	2.8	2.39E-07	0.0%	100.0%
Acenaphthene group	1.26E-06	40	3.14E-08	0.0%	100.0%
Acetaldehyde	2.72E-02	n/a	0.00E+00	0.0%	100.0%
Aldehydes	4.29E-02	n/a	0.00E+00	0.0%	100.0%
1,3 Butadiene	2.00E-04	n/a	0.00E+00	0.0%	100.0%
Ethylene	5.52E-03	n/a	0.00E+00	0.0%	100.0%
Pentane	1.44E-02	n/a	0.00E+00	0.0%	100.0%
TOTAL Toxic Potency			6.63E-02	100.0%	

Note:
n/a = not available.

According to the toxic potency screening using both inhalation and oral TRVs, the following four compounds constitute 99% of the cumulative potency:

- Acetaldehyde;
- Acrolein;
- Benzene; and
- Formaldehyde.

As PAHs were not screened on, but are known to be persistent in the environment, these substances were carried forward into the environmental fate assessment.

2.2 Environmental Fate Assessment

The toxic potency screening identified four volatile organic compounds (VOCs) as COPCs: acetaldehyde, acrolein, benzene and formaldehyde. All four of these COPCs were assessed in terms of potential human health risks based on acute and chronic inhalation exposure limits. Results are presented in Section 3.0 below. Although PAH compounds did not screen on during the potency evaluation, they were carried forward into the environmental fate screening.

The potential for each of the COPCs to accumulate or persist in the environment was considered to identify whether additional exposure pathways (e.g., country food ingestion) should be assessed.

A summary of the environmental fate and persistence characteristics for the four COPCs are provided in Table 2.2.1.

Table 2.2.1 – Summary of Environmental Fate and Persistence Characteristics

	Soil Half Life (day)	**Log K_{ow}**
Volatile Organic Compounds		
Acetaldehyde	n/a	0.43
Acrolein	n/a	-0.01
Benzene	5–16 d	1.5–2.27
Formaldehyde	n/a	0.35
Polycyclic Aromatic Compounds		
Acenaphthene	102	3.90
Anthracene	**460**	4.50
Benz(a)anthracene	**681**	**5.70**
Benzo(a)pyrene	**527**	**6.00**
Benzo(b)fluoranthene	**610**	**6.12**
Benzo(g,h,i)perylene	**650**	**7.23**
Benzo(k)fluoranthene	**2,145**	**6.10**
Chrysene	**1,000**	**5.70**
Fluoranthene	**440**	**5.00**
Fluorene	60	4.20
Indeno(1,2,3-cd)pyrene	**289**	**6.60**
Naphthalene	48	3.30
Phenanthrene	**201**	4.50
Pyrene	**1,950**	4.90

Note:
n/a = not available.

Environment Canada (2007) has developed criteria for establishing whether substances may persist or accumulate in the environment. These criteria include:

- soil half life >182 days; and
- octanol-water partition coefficient (Log Kow) >5.

As shown in Table 2.2.1, none of the four VOCs met either of the environmental fate and persistence criteria, suggesting that they will not accumulate in environmental media other than air. It is known that VOCs do not significantly contribute to human exposure *via* consumption of plant-based foods. For example, approximately 99% of human exposure to benzene is through inhalation (ATSDR 2005). Therefore, the HHRA assessed benzene through the inhalation pathway only.

Level I fugacity modelling for VOCs such as benzene, toluene, ethylbenzene and xylene indicates that 99% of these compounds will partition to air (Mackay et al. 1992). Persistence or bioaccumulation of these substances in environmental media is unlikely, and direct air inhalation is the pathway associated with the greatest potential for human exposure.

Based on environmental fate characteristics, these four substances will not accumulate in the terrestrial environment, so only the atmospheric inhalation exposure pathway was assessed (additional exposure pathways (e.g., country food ingestion) were not assessed.

Several PAH compounds, however, did demonstrate an ability to persist or accumulate in environmental media other than air and include:

- Anthracene;
- Benz(a)anthracene;
- Benzo(a)pyrene;
- Benzo(b)fluoranthene;
- Benzo(g,h,i)perylene;
- Benzo(k)fluoranthene;
- Chrysene;
- Flouranthene;
- Fluorene;
- Indeno(1,2,3-cd)pyrene;
- Phenanthrene; and
- Pyrene.

These PAHs were selected for further assessment using a multiple-pathway exposure model.

2.3 Exposure Assessment

2.3.1 Exposure Pathway Identification

For chemical exposure to take place, a feasible route of exposure must exist through environmental media that are relevant to the individuals being evaluated.

The inhalation route of exposure was evaluated on an acute (1-hr or 24-hr) basis as well as on a chronic (annual average) basis for the VOCs. PAHs were evaluated only on a chronic basis for the inhalation pathway due to a lack of defensible acute exposure limits for these substances. The inhalation assessment was completed for a number of receptor locations. However, maximum Ground Level Air Concentrations (GLAC) were only evaluated within the acute inhalation assessment given that it represents a scenario where people may be exposed to a GLAC for a short-period of time.

People were assumed to permanently reside in the area over a 75-year lifetime. Given the location of where people may reside, and the types of local foods that may be consumed, the following pathways were included in the multi-pathway exposure model for PAHs:

- inhalation of air and dust;
- incidental ingestion of soil;
- ingestion of local beef, poultry, dairy, eggs, fruits and vegetables; and
- dermal contact with soil.

Due to an absence of measured data, concentrations of the COPCs in soil, dust, animals and animal products, and fruit and vegetables were predicted from the air data for the PAHs. Please refer to Appendices B1 and B2 for further information. The maximum annual average predicted out of the three rural locations modelled (residential location, Lamont and Bruderheim) for each PAH was used in the multi-pathway model.

PAHs in water and fish samples taken from the Ft. Saskatchewan area have shown PAH concentrations to be consistently less than their analytical detection limits (PC 2007, Shell 2007). In addition, surface water concentrations of PAHs in the North Saskatchewan River have been reported to be below analytical detection limits (PC 2007). Thus, it was considered reasonable to conclude that water and fish pathways are not significant sources of PAH exposure to the area residents. PAH compounds are not expected to be released to surface water or groundwater and, as a result, water quality is not anticipated to change. For these reasons, water and fish pathways were not evaluated.

2.3.2 Receptor Characteristics

Four different locations were assessed as part of the updated air quality modelling:

- nearby residential location to AST;
- Bruderheim;
- Lamont; and
- maximum predicted air concentrations (locations shown in Figures 66-1 and 66-2 of SIR 66 submitted April 2008 and Figure 2.5-14 of Volume IIB, Section of the EIA).

The maximum predicted GLAC were assessed only on an acute basis to represent maximum potential short-term exposures. As the chronic assessment assumes that a person would be exposed continuously over a 75-year period, it is not reasonable to assume that the maximum predicted GLAC would occur over this time period.

Persons that reside at, or visit, these locations will include members of the general population. Thus, it is important to consider all age classes or life stages of the people at these locations. The five receptor life stages that were included in the HHRA multi-pathway assessment are consistent with Health Canada guidance (Health Canada 2004a):

- infant (0 to 6 months – 0.5 years);
- toddler (7 months to 4 years – 4.5 years);

- child (5 to 11 years – 7 years);
- adolescent (12 to 19 years – 8 years); and
- adult (20 to 75 years – 56 years).

General physical characteristics of typical Canadians at each life stage were obtained from documents published by Health Canada (2004a), CCME (2006), U.S. EPA (1997) and O'Connor and Richardson (1997). The physical characteristics used in the HHRA are summarized in Table 2.3.1.

Table 2.3.1 – Assumed Physical Characteristics of Human Receptors in Multiple-Pathway Assessment

Physical Characteristic	Life Stage					Reference
	Infant	Toddler	Child	Adolescent	Adult	
Body weight [kg]	8.2	16.5	32.9	59.7	70.7	Health Canada (2004a)
Inhalation rate [m^3/d]	2.1	9.3	14.5	15.8	15.8	Health Canada (2004a)
Soil ingestion rate [g/d]	0.02	0.08	0.02	0.02	0.02	Health Canada (2004a)
Water ingestion rate [L/d]	0.3	0.6	0.8	1.0	1.5	Health Canada (2004a)
Arms and legs body surface area [cm^2]	1,460	2,580	4,550	7,200	8,220	Health Canada (2004a)
Hand surface area [cm^2]	320	430	590	800	890	Health Canada (2004a)
Soil adherence factor [g/m^2/d]	0.1	0.1	0.1	0.1	0.1	CCME (2006); Health Canada (2004a)
Soil adherence factor – hands only [g/m^2/d]	1	1	1	1	1	CCME (2006)

It was assumed that people would maintain permanent residency in the area and that they would never leave their homes. In other words, exposure to the Project emissions would occur 24 hours per day, seven days per week, 52 weeks per year for 75 years. This scenario is considered conservative.

In addition, it was assumed that residential receptors would obtain all (100%) of their country food (i.e., beef, poultry, dairy and eggs) from local sources. Consumption rates were obtained from Health Canada documentation (Health Canada 1994, 2004a). This scenario is considered conservative.

Consumption rates for all life stages are summarized in Table 2.3.2.

Table 2.3.2 – Local Food Consumption Rates

Physical Characteristics	Consumption Rate for Each Life Stage [g/d]					Reference
	Infant	Toddler	Child	Adolescent	Adult	
Beef[1]	0	37	53	89	90	Health Canada (1994)
Poultry	0	13	17	20	21	Health Canada (1994)
Dairy[2,3]	545	677	622	590	297	Health Canada (1994)
Eggs	5	24	21	22	32	Health Canada (1994)

Physical Characteristics	Consumption Rate for Each Life Stage [g/d]					Reference
	Infant	Toddler	Child	Adolescent	Adult	
Fruit[4]	5	40	69	56	46	Health Canada (1994)
Root vegetables	83	105	161	227	188	Health Canada (2004a)
Leafy vegetables	72	67	98	120	137	Health Canada (2004a)

Notes:

[1] Beef consumption rate is based on composite of steak, roast beef, stewing beef, ground beef, pork, and lamb.

[2] Dairy consumption rate is based on composite of whole milk, 2% milk, skim milk, evaporated milk, cream, ice cream, yogurt, cheese, cottage cheese, processed cheese, and butter.

[3] Infants were assumed to consume 545 g/d of breast milk (Health Canada 1994).

[4] Fruit consumption rate is based on composite of apples, apple sauce, cherries, strawberries, blueberries, jams, and honey.

2.4 Toxicity Assessment

2.4.1 Exposure Limits

Potential health risks related to acute and chronic exposures were assessed separately.

Acute exposure limits were identified from a review of the following sources:

- Ambient Air Quality Objectives (AAQOs) developed by Alberta Environment (AENV);
- Acute Minimal Risk Levels (MRLs) for Hazardous Substances developed by the Agency for Toxic Substances and Disease Registry (ATSDR);
- Reference Levels (RELs) recommended by the California Office of Environmental Health Hazard Assessment (OEHHA);
- Ontario Reg. 419/05 Standards and POI Standards, Ambient Air Quality Criteria (AAQCs) of the Ontario Ministry of the Environment (OMOE);
- Air Quality Guidelines for Europe (Second Edition) developed by the World Health Organization (WHO); and
- Effects Screening Levels, Texas Commission of Environmental Quality (TCEQ).

The following sources of the chronic exposure limits as identified by Health Canada (2004a) include:

- Toxicological Reference Values (TRVs) and Health-Based Guidance Values established by Health Canada;
- Minimal Risk Levels for Hazardous Substances developed by the U.S. Agency for Toxic Substances and Disease Registry (ATSDR);
- Maximum Permissible Risk Levels established by the Netherlands National Institute of Public Health and the Environment (RIVM);
- Toxicological Risk Values presented in the Integrated Risk Information System (IRIS) developed by the United States Environmental Protection Agency (U.S. EPA); and
- Air Quality Guidelines for Europe (Second Edition) developed by the World Health Organization (WHO).

In the event that a chronic limit was not identified from the above, the search was expanded to the following agencies:

- Chronic RELs recommended by the California Office of Environmental Health Hazard Assessment (OEHHA); and
- Documentation of the Threshold Limit Values and Biological Exposure Indices (Sixth Edition) developed by the American Conference of Governmental Industrial Hygienists (ACGIH).

The limits used in the assessment are provided within Tables 2.4.1 and 2.4.2.

Table 2.4.1 Summary of Acute Inhalation Exposure Limits

COPC	Averaging Time	Acute Limit (ug/m^3)	References
Acetaldehyde	1-hr	2300	ACGIH 2006
Acrolein	1-hr	0.29	OEHHA 1999
Acrolein (for respiratory mixture only)	1-hr	6.9	ATSDR 2006a
Benzene	1-hr	580	TCEQ 2007
Formaldehyde	1-hr	50	ATSDR 2006b

Table 2.4.2 Summary of Chronic Inhalation and Oral Exposure Limits

COPC[1] (Carcinogens Indicated)	Route	Units	Exposure Limit		References
			Type	Value	
Acetaldehyde (carcinogen)	Inhalation	ug/m^3	RsC	17.2	Health Canada (2004b)
Acrolein	Inhalation	ug/m^3	RfC	0.02	US EPA IRIS 2008
Benzene (carcinogen)	Inhalation	ug/m^3	RsC	1.3	US EPA IRIS 2008
Benzo(a)pyrene (IPM) group (carcinogen)	Inhalation	ug/m^3	RsC	0.32	Health Canada 2004b
	Oral	ug/kg bw/d	RsD	0.0014	US EPA 1994
Benzo(a)pyrene (WMM) group (carcinogen)	Inhalation	ug/m^3	RsC	0.00012	WHO 2000
	Oral	ug/kg bw/d	RsD	0.0034	OMOE 1997
Formaldehyde (carcinogen)	Inhalation	ug/m^3	RsC	0.77	US EPA IRIS 2008

2.4.2 Assessment of Chemical Mixtures

A risk assessment of chemical mixtures was completed in the original HHRA. The predicted chemical mixture risks from the original HHRA were combined with the predicted risks for each additional COPC. As in the original HHRA, the inclusion of a COPC in a chemical mixture for risk assessment was based on the health endpoint of concern. As per Health Canada (2004a) guidance, additivity of risks between mixture components was assumed.

Table 2.4.3 below summarizes the chemical mixtures that were evaluated.

Table 2.4.3 Summary of Revised Chemical Mixtures

	Potential Health Effect	Mixture Class	Mixture Components (COPCs)
Acute Inhalation	Irritation	Eye Irritants	Acetaldehyde, acrolein, formaldehyde
		Respiratory Irritants	Acetaldehyde, acrolein*, hydrogen sulphide, nitrogen dioxide, sulphur dioxide

	Potential Health Effect	Mixture Class	Mixture Components (COPCs)
Chronic Inhalation	Irritation	Nasal Irritants	Acrolein, hydrogen sulphide
		Respiratory Irritants	Nitrogen dioxide, sulphur dioxide
	Cancer	Nasal tumours	Acetaldehyde, formaldehyde

Note:

* Although the exposure limit selected for this HHRA for acrolein was based upon eye irritation, in the past, Alberta Health and Wellness has requested that acrolein be included in the respiratory irritants group as well. Thus, acrolein was assessed on an acute basis using two different exposure limits, with one based on eye irritation (0.29 ug/m^3) and the other based upon respiratory irritation (6.9 ug/m^3).

2.5 Risk Characterization

As in the original HHRA, potential health effects associated with the non-carcinogenic COPCs are expressed as Risk Quotients. Risk Quotients (RQs) were calculated by comparing the predicted levels of exposure for the non-carcinogenic COPCs to their respective exposure limits. RQs were calculated using Equation 1:

$$\textbf{Risk Quotient (RQ)} = \frac{\textbf{Predicted Exposure (ug/m}^3\textbf{ or ug/kg/day)}}{\textbf{Exposure Limit (ug/m}^3\textbf{ or ug/kg/day)}} \qquad \textit{Equation 1}$$

The RQ values were evaluated according to the following:

- **RQ ≤ 1.0** Indicates that the estimated exposure is less than or equal to the exposure limit (i.e., the assumed safe level of exposure). RQs less than or equal to 1.0 are associated with negligible health risks, even in sensitive individuals given the level of conservatism incorporated in the derivation of the exposure limit and exposure estimate.
- **RQ > 1.0** Indicates that the exposure estimate exceeds the exposure limit. This suggests an elevated level of risk, the significance of which must be balanced against the high degree of conservatism incorporated into the risk assessment (i.e., the margin of safety is reduced but not removed entirely).

Potential carcinogenic risks are expressed as lifetime cancer risks (LCRs) for the baseline, application and cumulative cases, and as incremental lifetime cancer risks (ILCRs) for the Project alone. Lifetime cancer risks refer to the predicted number of cancer cases that could potentially result in association with exposures to carcinogens per 100,000 people. There is no clear benchmark for what is an acceptable risk to compare with a calculated LCR, given that the predicted LCRs for these cases not only include background levels (both natural and anthropogenic), but also include emissions from multiple different sources that may impact various environmental media. The overall probability of a person developing cancer in Canada is approximately 0.4 or 40% (Health Canada, 2004a). This probability could be interpreted as a comparative cancer incidence rate in the population; however, no guidance is provided to this effect. Some individuals may be more susceptible to developing cancer than others, and background exposures alone may exceed reasonably safe exposure levels and may result in the development of cancer in such sensitive individuals (Graham, 1993). Thus, the LCR is a predicted incidence rate per 100,000 people in a population, but does not readily distinguish an acceptable vs. unacceptable increased cancer risk above background. The LCR values were calculated according to Equation 2:

$$\mathbf{LCR} = \frac{\text{Baseline, Application or Cumulative Exposure (ug/m}^3\text{ or ug/kg/day)}}{\text{Carcinogenic Exposure Limit (ug/m}^3\text{ or ug/kg/day)}} \qquad \textit{Equation 2}$$

The potential <u>incremental</u> cancer risk due the Project alone was estimated as an ILCR as shown in Equation 3:

$$\mathbf{ILCR} = \frac{\text{Project Exposure (ug/m}^3\text{ or ug/kg/day)}}{\text{Carcinogenic Exposure Limit (ug/m}^3\text{ or ug/kg/day)}} \qquad \textbf{Equation 3}$$

The ILCR values from Equation 3 should be interpreted as follows:

- ILCR ≤1 Denotes an incremental lifetime cancer risk that is below the benchmark ILCR of 1 in 100,000 (i.e., within the accepted level of risk set by provincial and federal regulatory agencies).
- ILCR > 1 Indicates an incremental lifetime cancer risk that is greater than the negligible risk level of 1 in 100,000, the interpretation of which must consider the conservatism incorporated into the assessment.

3. Risk Assessment Results

Results of the acute and chronic health effects assessments are provided separately in Sections 3.1 and 3.2.

3.1 Acute Inhalation Assessment

The predicted acute inhalation risks (expressed as RQ values) for the three assessment cases are presented in Table 3.1-1 to 3.1-4. The Project RQ values represent the potential risks associated with the Project emissions alone.

No acute exposure limits were available for the PAH compounds.

Table 3.1-1 Acute Inhalation Risk Quotients (RQs) – Residence near AST

Acute		Baseline	Application	Cumulative	Project
acetaldehyde	1h	2.7E-03	2.7E-03	2.7E-03	1.4E-04
acrolein	1h	**1.7E+00**	**1.7E+00**	**1.7E+00**	9.1E-02
benzene	1h	9.9E-03	9.9E-03	1.1E-02	3.7E-05
formaldehyde	1h	1.1E-01	1.1E-01	1.1E-01	3.9E-03

Table 3.1-2 Acute Inhalation Risk Quotients (RQs) – Bruderheim

Acute		Baseline	Application	Cumulative	Project
acetaldehyde	1h	3.2E-03	3.2E-03	2.7E-03	9.0E-04
acrolein	1h	**2.0E+00**	**2.0E+00**	**2.2E+00**	5.8E-01
benzene	1h	1.2E-02	1.2E-02	1.3E-02	2.3E-04
formaldehyde	1h	1.2E-01	1.2E-01	1.3E-01	2.5E-02

Table 3.1-3 Acute Inhalation Risk Quotients (RQs) – Lamont

Acute		Baseline	Application	Cumulative	Project
acetaldehyde	1h	5.4E-03	5.4E-03	2.7E-03	6.0E-04
acrolein	1h	**3.3E+00**	**3.3E+00**	**3.3E+00**	3.9E-01
benzene	1h	1.7E-02	1.7E-02	1.7E-02	1.6E-04
formaldehyde	1h	2.1E-01	2.1E-01	2.1E-01	1.7E-02

Table 3.1-4 Acute Inhalation Risk Quotients (RQs) – Maximum GLAC

Acute		Baseline	Application	Cumulative	Project
acetaldehyde	1h	4.2E-03	1.5E-02	2.7E-03	1.5E-02
acrolein	1h	**2.6E+00**	**9.7E+00**	**9.7E+00**	**9.4E+00**
benzene	1h	1.3E-02	1.3E-02	1.4E-02	3.8E-03
formaldehyde	1h	1.6E-01	4.2E-01	4.2E-01	4.0E-01

Acrolein was the only COPC for which predicted RQ values exceeded 1.0 for the Project case.

The maximum predicted 1-h Project acrolein concentration was 2.7 ug/m^3, which translates to an RQ value of 9.4. Exhaust emissions from diesel trucks are the largest contributor (73%) to total predicted acrolein emissions from the Project.

Acrolein exceedances were noted for the baseline, application and cumulative cases for all four receptor types. For the residential, Bruderheim and Lamont receptors, the application and cumulative RQ values are similar to the baseline RQ value indicating that the Project is not expected to have an appreciable effect on GLACs. When maximum GLACs were evaluated for acrolein, the application and cumulative case RQ values were higher than baseline.

The acute exposure limit for acrolein is based on eye irritation, and was derived from a lowest observable adverse effect level (LOAEL) of 138 ug/m^3, based on the observed incidence of eye irritation in humans. The predicted maximum 1-h GLAC for acrolein is 2.7 ug/m^3 , which is more than 50-times less than the lowest effect level (i.e., the LOAEL) for acrolein (Table 3.1.5).

Table 3.1.5 Summary of the Potential Health Effects of Acrolein

Air Concentration[1] (ug/m^3)	**Acute Health Effects**	**Reference**
138[2] to 210	mild eye irritation	Darley et al. (1960); Weber-Tschopp et al. (1977)
230[3]	lacrimation and irritation of the eyes, nose and throat	Fassett (1962)
350	nasal irritation	Weber-Tschopp et al. (1977)
700	decreased respiratory rate and throat irritation	Weber-Tschopp et al. (1977)
350,000[2]	Lethality	Prentiss (1937)

Notes:

[1] On an acute basis, the toxicity of acrolein is determined to a greater extend by the exposure concentration than by duration. As such, the air concentrations were not duration-adjusted. Unless stated otherwise, the air concentrations are based on a 1-h exposure duration.

[2] Air concentration is associated with a 5-minute exposure duration.

[3] Air concentration is associated with a 10-minute exposure duration.

Despite RQ values being greater than 1.0, given that the maximum predicted GLAC is at least 50 times lower than the LOAEL for acrolein in humans, and that people would typically be exposed to much lower air concentrations than the maximum GLAC, no adverse human health effects are expected. At most, infrequent and temporary mild eye irritation may occur to some people in the immediate vicinity of the Project, which relate to the predicted RQ values of 2.6 for baseline to 9.4 for Project and 9.7 for the cumulative case.

3.2 Chronic Inhalation Assessment

3.2.1 Non-Carcinogens

The chronic inhalation RQ values for acrolein (a non-carcinogen) for the three assessment cases are presented in Table 3.2.1. The Project RQ values represent the potential risks associated with the Project maximum GLACs alone.

Table 3.2.1 Summary of Chronic Inhalation Risk Quotients – Acrolein

COPC	Period	Baseline	Application	Cumulative	Project
Residence near AST	annual	**1.6E+00**	**1.6E+00**	**1.7E+00**	3.2E-02
Bruderheim	annual	**2.3E+00**	**2.4E+00**	**2.6E+00**	1.4E-01
Lamont	annual	**2.4E+00**	**2.5E+00**	**2.6E+00**	9.7E-02

Acrolein RQ values were greater than one for the baseline, application and cumulative cases at all receptor locations. All Project RQ values were less than one, suggesting that the Project emissions are expected to have a negligible incremental impact.

Given that the baseline RQ values for Bruderheim, Lamont and the Residence are similar, it appears that existing background sources included in the Baseline Case contribute to future risks. Further, there is some conservatism associated with the exposure limit used for the chronic assessment of acrolein.

The chronic exposure limit for acrolein is based on the incidence of non-cancerous nasal lesions in rats from a subchronic study. No long-term studies of the long-term effects of acrolein are available (U.S. EPA 2003; WHO 2002; CEPA 2000; WHO IPCS 1991), thus the true threshold of effects in humans on a long-term basis is not clear. As a result, studies were based on acute human or acute and subchronic animal exposures. By applying uncertainty factors in the derivation of the exposure limit, the effect-threshold for nasal lesions in rats has been adjusted such that the estimated human threshold is about 1000-times lower than in rats. As such, the true risk of experiencing adverse nasal irritation as a result of current background exposures is likely much less than predicted.

3.2.2 Carcinogens

The lifetime cancer risks (LCR) for the baseline, application and cumulative cases, and the incremental lifetime cancer risks (ILCR) for the Project alone are presented in Tables 3.2.2 to 3.2.4. The risk estimates for the baseline, application and cumulative cases are all considered to be LCRs due to the inclusion of background sources of exposure. The risk estimates for the Project alone describe the incremental cancer risk that is attributable to the Project emissions.

Table 3.2.2 Inhalation Lifetime Cancer Risk (LCRs) and Incremental Lifetime Cancer Risks (ILCRs) – Residence near AST

		LCR			ILCR
COPC	**Period**	**Baseline**	**Application**	**Cumulative**	**Project**
Acetaldehyde	annual	2.2E-02	2.2E-02	2.3E-02	4.5E-04
Benzene	annual	2.9E-01	2.9E-01	3.3E-01	3.9E-04
Formaldehyde	annual	4.7E-01	4.8E-01	5.5E-01	6.1E-03
Benzo(a)pyrene (WMM)	annual	6.2E-03	4.2E-02	4.8E-02	3.6E-02
Benzo(a)pyrene (IPM)	annual	1.1E-05	4.7E-05	5.2E-05	3.6E-05

Notes:
WMM = Whole Mixture Model.
IPM = Individual PAH TEF Model.

Table 3.2.3 Inhalation Lifetime Cancer Risk (LCRs) and Incremental Lifetime Cancer Risks (ILCRs) – Bruderheim

		LCR			ILCR
COPC	**Period**	**Baseline**	**Application**	**Cumulative**	**Project**
Acetaldehyde	annual	3.2E-02	3.3E-02	3.6E-02	2.0E-03
Benzene	annual	4.1E-01	4.2E-01	4.9E-01	1.8E-03
Formaldehyde	annual	6.5E-01	6.7E-01	7.7E-01	2.7E-02
Benzo(a)pyrene (WMM)	annual	7.8E-03	1.1E-01	1.2E-01	1.0E-01
Benzo(a)pyrene (IPM)	annual	1.5E-05	1.2E-04	1.3E-04	1.0E-04

Table 3.2.4 Inhalation Lifetime Cancer Risk (LCRs) and Incremental Lifetime Cancer Risks (ILCRs) – Lamont

		LCR			ILCR
COPC	**Period**	**Baseline**	**Application**	**Cumulative**	**Project**
Acetaldehyde	annual	3.5E-02	3.6E-02	3.7E-02	1.4E-03
Benzene	annual	3.9E-01	3.9E-01	4.1E-01	1.2E-03
Formaldehyde	annual	6.8E-01	7.0E-01	7.5E-01	1.9E-02
Benzo(a)pyrene (WMM)	annual	7.2E-03	1.5E-01	1.5E-01	1.4E-01
Benzo(a)pyrene (IPM)	annual	1.5E-05	1.5E-04	1.6E-04	1.4E-04

All ILCR values for the Project alone are less than 1.0 in 100,000, indicating that the incremental cancer risks associated with the Project emissions are essentially negligible.

As discussed in the Risk Characterization section, there is no clear benchmark for cancer risks that include background exposures (i.e. the LCRs for the baseline, application and cumulative cases).

3.3 Chronic Multi-Pathway Exposure Assessment

The results of the chronic multi-pathway exposure assessment are presented in Table 3.3.1 for the PAHs. The baseline, application and cumulative cases include background thus are expressed as lifetime cancer risks (LCRs). The Project case represents an incremental lifetime cancer risk (ILCR), and represents an assessment of the Project emissions alone.

All cancer risks are associated with a 75-year lifetime where exposure has been amortized over the various lifestages.

Table 3.3.1 Chronic Multi-Pathway Lifetime Cancer Risks and Incremental Lifetime Cancer Risks

COPC	Baseline	Application	Cumulative	Project
Benzo(a)pyrene (WMM)	1.1E-03	2.1E-02	2.2E-02	2.0E-02
Benzo(a)pyrene (IPM)	4.6E-03	5.8E-02	6.1E-02	5.4E-02

All ILCR values for the Project were less than one, indicating that the impacts from the Project emissions are essentially negligible.

3.4 Potential Health Effects Associated With COPC Mixtures

The chemical mixtures included in this HHRA incorporated the COPCs from the original HHRA (i.e., hydrogen sulphide, nitrogen dioxide, and sulphur dioxide) with the additional COPCs identified herein.

3.4.1 Potential Acute Mixture Effects

The acute mixture risk estimates are presented in Tables 3.4.1 to 3.4.3. Please note that acute risk estimates for the common health endpoints are only presented for the residence near AST and the communities of Lamont and Bruderheim. Acute mixture risk estimates are not presented for the maximum GLACs due to the unlikelihood of maximum hourly air concentrations occurring at the same hypothetical location at exactly the same time for each of the compounds in the eye and respiratory irritant groups.

Table 3.4.1 Summary of Acute Inhalation Mixture RQ Values – Residence near AST

Mixtures	Baseline	Application	Cumulative	Project
Eye irritants	**1.8E+00**	**1.8E+00**	**1.9E+00**	9.5E-02
Respiratory irritants	7.4E-01	**1.3E+00**	**1.3E+00**	5.3E-01

Table 3.4.2 Summary of Acute Inhalation Mixture RQ Values – Bruderheim

Mixtures	Baseline	Application	Cumulative	Project
Eye irritants	**2.1E+00**	**2.1E+00**	**2.3E+00**	6.1E-01
Respiratory irritants	7.5E-01	**1.3E+00**	**1.3E+00**	5.6E-01

Table 3.4.3 Summary of Acute Inhalation Mixture RQ Values – Lamont

Mixtures	Baseline	Application	Cumulative	Project
Eye irritants	**3.5E+00**	**3.5E+00**	**3.5E+00**	4.1E-01
Respiratory irritants	8.1E-01	**1.3E+00**	**1.3E+00**	5.5E-01

Risk quotients exceed 1.0 for the eye irritants mixture and the respiratory irritants mixture at all three locations.

The eye irritants mixture includes the following COPCs:

- Acetaldehyde;
- Acrolein; and
- Formaldehyde

In all instances, the mixture component to which the most risk is attributable is acrolein (>90%). As discussed in Section 3.1, the acute exposure limit for acrolein is very conservative (at least 50 times below the observed LOAEL), thus no adverse health effects are expected (despite RQ values exceeding 1.0).

The acute respiratory irritants mixture includes:

- Acetaldehyde;
- Acrolein;
- Hydrogen sulphide;
- Nitrogen dioxide; and
- Sulphur dioxide

The acute respiratory irritants mixture was associated with RQ values slightly greater than 1.0 for the application and cumulative cases at all three locations.

The primary contributors to the RQ values are NO_2, acrolein and SO_2, with some contribution from other COPCs. It should be recognized that these COPCs, although all respiratory irritants, may affect different parts of the respiratory tract. For example, NO_2 may be inhaled deeply into the lungs, acting as a deep-lung irritant, whereas SO_2 is more soluble in water and is readily absorbed through the upper respiratory tract, inducing increases in airway resistance higher up in the respiratory tract (Calabrese 1991). The dose-response relationships for these chemicals are somewhat independent in that the primary responses occur in different regions of the respiratory tract. For this reason, summing the RQ values for the constituents of the respiratory tract irritant mixture is a conservative assumption, and as a result, adverse health effects are not expected. It is also worth noting that none of the compounds exceeded their TRVs (based on respiratory irritation) on their own.

3.4.2 Potential Chronic Mixture Effects

The chronic mixture inhalation risk estimates for the non-carcinogens are presented in Tables 3.4.4 to 3.4.6.

Table 3.4.4 Summary of Chronic Inhalation Mixture Risk Quotients - Residence near AST

Mixtures	Baseline	Application	Future	Project
Nasal Irritants	**1.7E+00**	**2.0E+00**	**2.1E+00**	2.3E-01
Respiratory Irritants	3.7E-01	5.2E-01	5.2E-01	1.5E-01

Table 3.4.5 Summary of Chronic Inhalation Mixture Risk Quotients - Bruderheim

Mixtures	Baseline	Application	Future	Project
Nasal Irritants	**2.4E+00**	**2.7E+00**	**2.9E+00**	3.4E-01
Respiratory Irritants	3.7E-01	5.2E-01	5.2E-01	1.5E-01

Table 3.4.6 Summary of Chronic Inhalation Mixture Risk Quotients - Lamont

Mixtures	Baseline	Application	Future	Project
Nasal Irritants	**2.6E+00**	**2.9E+00**	**2.9E+00**	3.0E-01
Respiratory Irritants	3.7E-01	5.2E-01	5.2E-01	1.5E-01

The RQ values for the nasal irritants mixture were greater than 1.0 in the baseline, application and cumulative cases for all three receptor locations. Components of the nasal irritant mixture include:

- acrolein; and
- hydrogen sulphide.

As is the case for the acute eye irritant risks, the primary determinant of the acute nasal irritant risks appears to be acrolein. As discussed, there is considerable conservatism incorporated into the chronic acrolein exposure limit. For the residential location, and the Bruderheim and Lamont locations, there are only slight increases between the baseline case and the application and cumulative cases, suggesting the baseline sources of the irritants contribute the most risk. For the reasons stated in the chronic acrolein risk discussion, the RQ values for the nasal irritants are expected to overstate the actual health risks.

The chronic mixture risk estimates for the nasal carcinogens are presented in Tables 3.4.7 to 3.4.10.

Table 3.4.7: Summary of Chronic Inhalation Lifetime Cancer Risks (LCR) and Incremental Lifetime Cancer Risks (ILCR) for Nasal Tumours

	LCR			ILCR
Mixture	**Baseline**	**Application**	**Future**	**Project**
Residence near AST	4.9E-01	5.0E-01	5.7E-01	6.5E-03
Bruderheim	6.8E-01	7.0E-01	8.1E-01	2.9E-02
Lamont	7.2E-01	7.4E-01	7.8E-01	2.0E-02

The nasal carcinogenic mixture includes:

- acetaldehyde; and
- formaldehyde

The application and cumulative mixture LCR values are similar to the baseline LCR value, suggesting that the majority of the carcinogenic risks are due to existing sources of acetaldehyde and formaldehyde. The nasal tumour mixture risks associated with the Project alone are less than 1 in 100, 000, which is the benchmark for incremental carcinogenic risks deemed negligible by Alberta Environment and Health Canada.

4. Summary

Exceedances of health-based guidelines were predicted for:

- acute and chronic acrolein exposures;
- acute eye irritant exposures;
- acute respiratory irritant exposures; and
- chronic nasal irritant exposures.

The acute and chronic health risks associated with inhalation of benzene, acetaldehyde and formaldehyde are predicted to be low for all assessment cases. Likewise, the chronic health risks associated with both inhalation and multi-media exposures of the carcinogenic PAHs are considered to be low for all assessment cases.

For the Project, acrolein emissions were associated with an RQ value of 9.4, indicating potential health risks associated with the maximum predicted acrolein GLAC concentrations. However, due to the margin of safety incorporated into the exposure limit for acrolein and the fact that the predicted concentrations correspond to the maximum air concentrations expected to occur off-site, the potential for adverse health effects is considered low. Similarly, long-term risk estimates for acrolein likely overstate the actual risks posed to area residents, primarily due to the conservative nature of the chronic exposure limit.

Potential health risks associated with short-term eye irritation are largely due to the predicted acrolein concentrations. The predicted risks are not expected to translate to measurable health effects, given the conservative nature of the acrolein exposure limit.

The primary contributors to the acute respiratory irritant risks are expected to be nitrogen dioxide, sulphur dioxide and acrolein. Because all three compounds are expected to act on separate regions of the respiratory tract and the likelihood of the maximum air concentrations of all three compounds occurring at exactly the same time is low, the predicted respiratory risks likely overstate the actual risks that will be posed to the area residents.

The chronic nasal irritant risks are primarily due to the acrolein. Due to the conservative nature of acrolein’s chronic exposure limit, the predicted risk estimates likely overstate the true risks to the nasal irritants.

5. References

Alberta Environment (AENV). 2004. Air Quality Monitoring Near Three Residences in the Fort Saskatchewan Area (August 2001-August 2002). February 2004. ISBN 0-7785-3079-5.

Alberta Sulphur Terminals (AST). 2007. Application for Approval of the Bruderheim Sulphur Forming and Shipping Facility. Submitted to Alberta Environment Natural Resources Conservation Board. June 2007.

Agency for Toxic Substances and Disease Registry (ATSDR). 2005. Toxicological Profile for Benzene U.S. Department of Health and Human Services. Atlanta, Georgia.

ATSDR 2006a. Minimal Risk Levels (MRLs) for Hazardous Substances. US Department of Health and Human Services, Public Health Service. Atlanta, GA.

ATSDR 2006b. Toxicological Profile for Formaldehyde. US Department of Health and Human Services, Public Health Service. Atlanta, GA.

American Conference of Governmental Industrial Hygienists (ACGIH). 2006. Guide to Occupational Exposure Values. ACGIH, Inc. Cincinnati, Ohio.

Calabrese, E.J. 1991. Multiple Chemical Interactions. Lewis Publishers Inc., Chelsea, Michigan. Toxicology and Environmental Health Series.

CCME (Canadian Council of Ministers of the Environment). 2006. A Protocol for the Derivation of Environmental and Human Health Soil Quality Guidelines.

CEPA (Canadian Environmental Protection Act). 2000. Priority Substances List Assessment Report: Acrolein. Government of Canada. Ottawa, Ontario. May 2000.

Darley, E.M., Middleton J.T. and M.J. Garber. 1960. Plant damage and eye irritation from ozone-hydrocarbon reactions. J Agricultural Food Chemistry 8:483-485.

Fassett, D.W. 1962. In: F.A.Patty (ed.). Industrial hygiene and toxicology, 2nd revised ed. Vol. II. Toxicology. Chapter XI. New York: Interscience Publishers; 1962. 1832–1835.

Graham, J.D. 1993. The legacy of one in a million. Risk in Perspective 1(1).

Health Canada. 1994. Canadian Environmental Protection Act. Human Health Risk Assessment for Priority Substances. April 1994.

Health Canada. 2004a. Federal Contaminated Site Risk Assessment in Canada. Part I: Guidance on Human Health Preliminary Quantitative Risk Assessment (PQRA). Ottawa, ON: Environmental Health Assessment Services Safe Environments Programme. September 2004. ISBN 0-662-38244-7.

Health Canada. 2004b. Federal Contaminated Site Risk Assessment in Canada. Part II: Health Canada Toxicological Reference Values (TRVs). Ottawa, ON: Environmental Health Assessment Services Safe Environments Programme. September 2004. ISBN 0-662-38245-5.

Mackay, D., Shiu, W.Y., and Ma, K.C. 1992. Illustrated Handbook of Physical-chemical Properties and Environmental Fate for Organic Chemicals. Volume I -IV. Lewis Publishers.

O'Connor Associates Environmental Inc. and G. Mark Richardson. 1997. Compendium of Canadian Human Exposure Factors for Risk Assessment.1155-2720 Queensview Dr., Ottawa, Ontario.

OMOE (Ontario Ministry of the Environment). 1997. Scientific Criteria Document for Multimedia Standards Development - Polycyclic Aromatic Hydrocarbons (PAH). Part 1: Hazard Identification and Dose-response Assessment. Ontario Ministry of Environment and Energy, Standards Development Branch. February 1997.

Petro Canada. 2007. Application for Approval of the Sturgeon Upgrader Project. Environmental Impact Assessment.

Prentiss, A. 1937. Chemicals in War. New York: McGraw-Hill. Pp.139–143.

Shell Canada. 2007. Application for Approval of the Scotford Upgrader Expansion Project. Environmental Impact Assessment. July 2007.

Texas Commission on Environmental Quality. 2007. Benzene (CAS Registry Number: 71-43-2). Development Support Document, Final, October 15, 2007. Prepared by: Joseph T. Haney, Jr., M.S. Toxicology Section, Chief Engineer's Office, Texas Commission on Environmental Quality.

United States Environmental Protection Agency (US EPA). 1994. Benzo[a]pyrene (BaP) (CASRN 50-32-8). Carcinogenicity Assessment. Integrated Risk Information System (IRIS) database on-line search. United States Environmental Protection Agency. Cincinnati, OH. Available at: http://www.epa.gov/iris/subst/0136.htm. Accessed September 2007.

United States Environmental Protection Agency (US EPA).1997. Exposure Factors Handbook. Office of Research and Development. EPA/600/P-95/002Fc. (Wood, P., Phillips, L., Adenuga, A., Koontz, M., Rector, H., Wilkes, C. and Wilson, M.) Vols. 1-3 (Final Report) Environmental Protection Agency (EPA), Washington, DC, .August. Cited in U.S. EPA OSW 2005.

United States Environmental Protection Agency (US EPA). 2003. Toxicological Review of Acrolein. EPA/635/R-03/003.

United States Environmental Protection Agency (USEPA). 2008. http://www.epa.gov/iris.

Weber-Tschopp A, Fischer T, Gierer R, and E. Grandjean. 1977. Experimental irritation by acrolein in human beings. A. Arbeitswiss 32: 166-171. Cited in WHO 2002, WHO 1991 and Government of Canada 2002.

World Health Organization (WHO) IPCS. 1991. Acrolein – Environmental Health Criteria 127. International Program on Chemical Safety.

WHO. 2000. Air Quality Guidelines for Europe, Second Edition. Copenhagen, Denmark: World Health Organization, Regional Office for Europe. WHO Regional Publications, European Series, No. 91. Available at: http://www.euro.who.int/document/e71922.pdf.

World Health Organization (WHO) 2002. Acrolein – Concise International Chemical Assessment Document 43. International Programme on Chemical Safety.

Appendix A: Toxicity Profiles

Appendix A Toxicity Profiles

This Appendix provides additional information regarding the available exposure limits for the chemicals of potential concern (COPCs) identified in the human health risk assessment (HHRA) and the toxicological endpoints of concern upon which they are based. Summarized below are the available exposure limits for the four volatile organic compounds evaluated in the HHRA update, along with the relevant polycyclic aromatic hydrocarbons (PAHs). Values selected for use in the HHRA are **bolded**.

1. Acetaldehyde

Table A1 Acute Inhalation Exposure Limits for Acetaldehyde

Regulatory Agency	Value (µg/m^3)	Averaging Time	Reference
AENV	90	1-hour	AENV (2005)
ATSDR	--	--	ATSDR (2006)
OEHHA	--	--	OEHHA (2000)
OMOE	500	½-hour, 1-hour	OMOE (2008)
WHO	--	--	WHO (2000)
Note: -- = not available.			

AENV (2005) recommends a 1-hour Ambient Air Quality Objective (AAQO) for exposure to acetaldehyde of 90 µg/m^3. However, this objective was adopted from the Texas Natural Resource Conservation Commission, and is odour based. Given that this guideline is not health-based, and limited information is available regarding its basis, this value was not used in the current assessment.

The OMOE (2008) has developed both a ½-hour and 24-hour standard of 500 ug/m^3, presumably because the short-term toxicity of acetaldehyde is more dependent on concentration than duration of exposure. These Ambient Air Quality Criteria (AAQC) were not used in the acute effects assessment as the adequate supporting documentation is not available.

As a result, the toxicity search was expanded to include intermediate Minimal Risk Levels (MRLs) provided by the ATSDR and occupational exposure values established by the ACGIH and the U.S. DOE for acetaldehyde.

The ACGIH provides a 15-min Threshold Limit Value (TLV)-Ceiling of 25 ppm (45 mg/m^3) for eye and upper respiratory tract irritation (ACGIH 1996, 2006). A TLV-Ceiling represents the chemical concentration that should not be exceeded during the workday. Sensitive individuals are reported to experience eye irritation at concentrations as low as 25 ppm of acetaldehyde after a short exposure, with most people only experiencing irritation at concentrations greater than 50 ppm. On this basis, the ACGIH developed the TLV-Ceiling of 25 ppm (45 mg/m^3).

While this TLV-Ceiling is based on 15-minute exposure, the effects of a ceiling limit may feasibly be considered to occur almost immediately. Thus, the TLV-ceiling may reasonably be assumed to represent a 3-minute exposure (as in the odour assessment). The TLV-Ceiling was adjusted from 3-minute exposure to 1-hour exposure using a modified Haber's Law (OEHHA, 1999a).

$$C_{ADJ}^{n} \times T_{ADJ} = C^{n} \times T$$

$$C_1 \times 60 \text{ minutes} = 45^1 \text{ mg/m}^3 \times 3 \text{ minutes}$$

where:

C_{ADJ} = duration-adjusted concentration

T_{ADJ} = desired time of exposure (60 minutes)

C = concentration of exposure (45 mg/m^3)

T = time of exposure (3 minutes)

n = chemical-specific modification factor designed to account for the toxicity of a chemical being concentration and/or deputation dependant (1)

The OEHHA (2000) recommends using a default “n” value of 1 in the adjustment for less than 1 hour exposure. Based on the above conversion factor, the TLV-Ceiling is adjusted to a concentration of 2.3 mg/m^3.

Generally, a 10-fold uncertainty factor would be applied by the study team to this limit, however, as the study was completed in sensitive individuals, the application of this factor was not necessary. Thus, a modified 1 hour limit of **2,300 µg/m^3** was adopted as the short-term exposure limit for this assessment.

Table A-2 Chronic Inhalation Exposure Limits for Acetaldehyde

Regulatory Agency	Value (µg/m3)	Type	Reference
ATSDR	--	--	ATSDR (2006)
Health Canada	390 17.2	RfC RsC	Health Canada (2004a)
RIVM	--	--	RIVM (2001)
U.S. EPA	9 5	RfC RsC	U.S. EPA (2007)
WHO	--	--	WHO (2000)

Note:
-- = not available.

Health Canada and the International Association for Research on Cancer (IARC) classify acetaldehyde as possibly carcinogenic to humans (CEPA, 2000a; IARC, 1999). As a result, acetaldehyde was included as a carcinogen in the chronic effects assessment.

An RsC of 17.2 µg/m^3 was developed from a tumorigenic concentration (TC05) of 86 mg/m^3, which was associated with a 5% increase in nasal adenocarcinomas and squamous cell carcinomas (combined) in the most sensitive sex (males) of Wistar rats exposed for up to 28 months (Health Canada, 2004a; CEPA, 2000a). The TC_{05} was derived by Health Canada using a multistage model, with adjustment for intermittent to continuous exposure (6 hours/24 hours × 5 days/7 days). The RsC represents the daily dose via inhalation that is associated with an increased cancer risk of one in 100,000.

U.S. EPA (2008) also presents a quantitative estimate of carcinogenic risk from inhalation exposure. Its inhalation unit risk of 2.2 x 10-6 per ug/m^3 equates to an RsC of 5 ug/m^3 (corresponding to a risk level of one in 100,000). This unit risk was not used for the current assessment for the following reasons:

- The U.S. EPA last reviewed the carcinogenicity of acetaldehyde in 1991, while the Health Canada value is more recent (published in 2000).
- The Health Canada and U.S. EPA limits are based on studies conducted by the same researchers. However, the Health Canada limit is based on a 1986 study by Woutersen et al. (1986), which is more recent than the work completed by Woutersen and Appelman in 1984, upon which the U.S. EPA limit is based.
- The scientific rationale for the Health Canada limit is considerably more detailed than what the U.S. EPA provides in support of its limit.

Therefore, the Health Canada RsC of **17.2 µg/m^3** was selected for the chronic inhalation assessment of acetaldehyde.

2. Acrolein

Table A-3 Acute Inhalation Exposure Limits for Acrolein

Regulatory Agency	Value (ug/m^3)	Averaging Time	Reference
AENV	--	--	AENV (2005)
ATSDR	6.9	1-hour	ATSDR (2006)
OEHHA	0.19	1-hour	OEHHA (2000)
OMOE	0.24 0.08	½-hour 24-hour	OMOE (2005)
WHO	--	--	WHO (2000)
Note: -- = not available.			

The OEHHA has derived an acute REL of 0.19 ug/m^3 based on a LOAEL of 0.06 ppm for eye irritation in 36 healthy human workers exposed to acrolein for 5 minutes (Darley et al., 1960). In deriving the REL, the OEHHA adjusted the LOAEL to a 1 hour concentration of 0.005 ppm using a modified Haber's Law.

$C_{ADJn} \times T_{ADJ} = C_n \times T$

$C_1 \times 60 \text{ minutes} = 0.061 \text{ ppm} \times 5 \text{ minutes}$

where:

C_{ADJ} = duration-adjusted concentration

T_{ADJ} = desired time of exposure (60 minutes)

C = concentration of exposure (0.06 ppm)

T = time of exposure (5 minutes)

n = chemical-specific modification factor designed to account for the toxicity of a chemical being concentration and/or deputation dependant (1)

According to Haber's Law, the magnitude of "n" is determined by evaluating the concentration versus response relationships for several different exposure durations (OEHHA,1999b). The time-concentration-response relationship will depend on the time-frame considered as well as the endpoint measured. Thus, there are many "n" values for a single chemical that are applicable to different endpoints. The OEHHA (1999b) provides an example using ammonia which has an "n" value of 4.6 for irritation and 2 for lethality. In the case of acrolein, an "n" value of 1.2 is reported for lethality, but an "n" value is not reported for irritation. As such, in all likelihood by defaulting to an "n" value of 1 the OEHHA is overestimating the actual toxicity of acrolein on a 1 hour basis. The study team suggests examining the range of 1 hour concentrations calculated using more probable values of n for irritation, such as 1.2 (actual value identified for lethality) to 2.

Using an "n" value of 1.2 in combination with the cumulative uncertainty factor of 60 applied by the OEHHA in the original REL derivation, a modified 1 hour exposure limit of **0.29 µg/m^3** was calculated, and was used in the acute effects assessment for acrolein. It has been previously requested by Alberta Health and Wellness that acrolein be evaluated as a respiratory irritant within the respiratory irritants mixture. Thus, RQ values based upon the ATSDR respiratory-based MRL of **6.9 µg/m^3** were also determined for the purposes of the acute respiratory irritation mixture.

Table A-4 Chronic Inhalation Exposure Limits for Acrolein

Regulatory Agency	Value (ug/m3)	Type	Reference
ATSDR	--	--	ATSDR (2006)
Health Canada	0.4	TC	Health Canada (2004a)
OEHHA	0.06	REL	OEHHA (2005)
RIVM	--	--	RIVM (2001)
U.S. EPA	0.02	RfC	U.S. EPA (2008)
WHO	--	--	WHO (2000)
Note: :-- = not available.			

Health Canada has established a tolerable concentration (TC) of 0.4 ug/m^3 based on the lower benchmark concentration of 0.14 mg/m^3 associated with a 5% increase in non-neoplastic lesions in the nasal respiratory epithelium of rats exposed for 6 hours/day for 3 consecutive days (Health Canada, 2004a; CEPA 2000b; Cassee et al., 1996). A safety factor of 100 was incorporated to account for interspecies variation (10-fold) and intra-species variation (10-fold). The limit was further adjusted by Health Canada to account for continuous exposure (6 hours/24 hours). Given that Health Canada's TC is based on a short-term exposure (3 days), it was not used in the current chronic assessment of acrolein.

The OEHHA (2005) provides a chronic REL of 0.06 ug/m^3 based on a LOAEL of 0.4 ppm for histological lesions in the upper airways of male Fischer-344 rats exposed for 6 hours/day, 5 days/week for 62 days (Kutzman, 1981; Kutzman et al., 1985; OEHHA, 2005). The OEHHA (2005) adjusted the studies' LOAEL for continuous exposure (6 hours/24 hours x 5 days/7 days) to a concentration of 0.071 ppm. In addition, the OEHHA (2005) calculated the $\text{LOAEL}_{\text{HEC}}$ using the RGDR approach, a factor of 0.14, to determine a human equivalency concentration. The resultant $\text{LOAEL}_{\text{HEC}}$ of 0.0099 ppm was then divided by an uncertainty factor of 300 to account for interspecies variability (3-fold), intra-species variability (10-fold), subchronic to chronic (3-fold), and for use of a minimal LOAEL (3-fold).

The U.S. EPA (2007) has derived an inhalation RfC of 0.02 ug/m^3 based upon a subchronic (i.e., 3 month) rat inhalation study conducted by Feron et al. in 1978. The U.S. EPA adjusted the study LOAEL of 900 µg/m^3 by adjusting for continuous exposure (6 hours/24 hours x 5 days/7 days) and a factor of 0.14 to determine a human equivalency concentration. The resultant LOAEL$_{HEC}$ of 20 ug/m^3 was then divided by an uncertainty factor of 1,000 to account for extrapolation from rat to human (3-fold), intra-species variability (10-fold), subchronic to chronic (10-fold), and for use of a minimal LOAEL (3-fold).

Both the OEHHA (2005) and U.S. EPA (2007) provide guidelines based on a LOAEL of 0.4 ppm. However, the U.S. EPA provides a more conservative uncertainty factor for extrapolation from subchronic to chronic. For this reason the current assessment adopted the U.S. EPA RfC of **0.02 µg/m^3** to evaluate the long-term health risks associated with acrolein.

3. Benzene

Table A-5 Acute Inhalation Exposure Limits for Benzene

Regulatory Agency	Value (µg/m^3)	Averaging Time	Reference
AENV	30	1-hour	AENV (2005)
ATSDR	28.8	24-hour	ATSDR (2006)
OEHHA	1,300	6-hour	OEHHA (2000)
OMOE	--	--	OMOE (2005)
Texas	580	1-hour	TCEQ (2007)
WHO	--	--	WHO (2000)
Note: -- = not available.			

Alberta's AAQO was adopted from the Texas Natural Resource Conservation Commission, but the specific basis of the derivation remains unknown. Although supporting documentation is not available, this AAQO was used in the current short-term assessment of benzene in air, as per discussions with Alberta Health and Wellness. As a result, the study team is unable to comment on the scientific merit of this limit, and it was not used in this assessment.

The ATSDR (2006, 2007) provides an acute MRL of 0.009 ppm (0.03 mg/m^3) based on immunological effects. Male C57BL/6J mice (7 or 8/concentration) were exposed to 0, 10.2, 31, 100, or 301 ppm (0 , 32.6 , 99 , 320 or 960 mg/m^3) benzene in whole-body dynamic inhalation chambers for six hours per day on six consecutive days. The control group was exposed to filtered, conditioned air only. Significant depression of femoral lipopolysaccharide-induced B-colony-forming ability was observed at the 10.2 ppm exposure level in the absence of a significant depression of total number of B cells. Peripheral lymphocyte counts were depressed at all exposure levels. A LOAEL of 10.2 ppm (32.6 mg/m^3) was identified and adjusted from intermittent to continuous exposure (6 hours/24 hours) to a concentration of 2.55 ppm (8.16 mg/m^3). The duration-adjusted LOAEL (LOAEL$_{ADJ}$) was converted to a HEC (LOAEL$_{HEC}$) for a category 3 gas causing respiratory effects. The average ratio of the animal-blood:air partition coefficient would be greater than 1; thus, a default value of 1 was used in calculating the HEC. As a result, the LOAEL$_{HEC}$ of 2.55 ppm (8.16 mg/m^3) was also identified. Finally, a cumulative uncertainty factor of 300 was applied to the $\mathrm{LOAEL}_{\mathrm{HEC}}$ to account for interspecies variability (3-fold), intra-species variability (10-fold), and use of a LOAEL (10-fold). A factor of 3 was applied for the extrapolation of laboratory animal data to humans since the calculation of a HEC addressed the pharmacokinetic aspects of the interspecies uncertainty factor. Accordingly, only the pharmacodynamic aspects of uncertainty remain as a partial factor for interspecies uncertainty.

The key study upon which the ATSDR acute MRL is based is Rozen et al. (1984). The authors note that the study is intended to examine the exposure concentrations that have the potential to interfere with immune function, not to measure actual immune function.

The TCEQ (2007) presents a short-term effects level of 180 µg/m^3. Review of the supporting documentation for this value indicates that TCEQ used the same key study as the ATSDR – Rozen et al. (1984). The same LOAEL value of 10.2 ppm was identified by the TCEQ, and similar to the ATSDR, the average ratio of the animal-blood:air partition coefficient was assumed to be 1. Where the difference between the ATSDR and TCEQ values originates from is the adjustment of the LOAEL for continuous exposure and the uncertainty factors applied by the two agencies. The TCEQ established that the $\mathrm{LOAEL}_{\mathrm{ADJ}}$ or benzene in the Rozen (1984) study was 18.5 ppm, using Haber's law and a default approach for converting exposures >1 hour to a 1-one hour exposure level from TCEQ (2006). An uncertainty factor of 100 was applied to this value to account for interspecies differences (3), intraspecies difference (10), and the use of a LOAEL (3). The result is an acute reference exposure level of **580 µg/m^3.**

Table A-6 Chronic Inhalation Exposure Limits for Benzene

Regulatory Agency	Value (µg/m^3)	Type	Reference
ATSDR	9.6	RsC	ATSDR (2006)
Health Canada	3	RsC	Health Canada (2004a)
RIVM	20	RsC	RIVM (2001)
U.S. EPA	1.3 to 4.5	RsC	U.S. EPA (2007)
WHO	1.7	RsC	WHO (2000)

An RsC of 3 µg/m^3 is reported by Health Canada (2004a) based on an inhalation unit risk of 0.0033 per mg/m^3. This RsC represents the daily dose via inhalation that is associated with an increased cancer risk of 1 in 100,000.

The WHO (2000) provides an RsC of 1.7 µg/m^3, which is associated with an increased cancer risk of one in 100,000. Using multiplicative risk estimates and a cumulative exposure model, a unit risk for lifetime exposure of 1.4 to 1.5 x 10^{-5} per ppb was derived with the Paustenbach exposure matrix and 2.4 x 10^{-5} per ppb with the Crump and Allen exposure matrix (WHO, 2000). These unit risks equate to a range of 4.4 x 10^{-6} per µg/m^3 to 7.5 x 10^{-6} per µg/m^3. From this the WHO (2000) selected a representative unit risk of 6 x 10^{-6} per µg/m^3.

The U.S. EPA (2007) presents a range of potential carcinogenic risks from inhalation of benzene based on the incidence of leukemia from human occupational studies. Its inhalation unit risks of 2.2 x 10^{-6} to 7.8 x 10^{-6} per µg/m^3 equate to an RsC of 1.3 to 4.5 ug/m^3 (corresponding to risk levels of one in 100,000). Benzene is noted to have a genotoxic mechanism of action that is potentially mediated via the primary benzene metabolites phenol, hydroquinone and catechol and possibly an intermediate – benzene oxide. The most stringent RsC of **1.3 µg/m^3** has been selected for use in this assessment.

4. Benzo(a)pyrene and Polycyclic Aromatic Hydrocarbons

Table A-7 Acute Inhalation Exposure Limits for the Benzo(a)pyrene Group

Regulatory Agency	Value (µg/m^3)	Averaging Time	Source
AENV	--	--	AENV (2007)
ATSDR	--	--	ATSDR (2006)
OEHHA	--	--	OEHHA (1994)
OMOE	0.0011	24-hour	OMOE (2005)
WHO	--	--	WHO (2000)

Note:
-- = not available.

The only regulatory agency that has a public acute exposure limit for benzo(a)pyrene is the OMOE (2005), which provides a 24-hour standard of 0.0011 µg/m3 for benzo(a)pyrene. This limit is based on the carcinogenic potential for benzo(a)pyrene and was derived based on an annual exposure limit of 0.00022 µg/m3 for protection against carcinogenic effects using a simple extrapolation factor generally considered to be overly conservative. This limit was not used in the acute effects assessment for the benzo(a)pyrene group as it did not account for the influence of exposure duration on the carcinogenic action of a chemical.

After reviewing available information and determining that there are no available criteria, guidelines or objectives for the benzo(a)pyrene group with adequate supporting documentation, the benzo(a)pyrene group was not assessed on an acute basis.

As recommended by the OMOE (1997), the assessment of carcinogenic PAHs can be based on two approaches: (1) the Whole-Mixture Model (WMM) and (2) the Individual PAH Model (IPM). The WMM approach is based on the conservative assumption that the potency of the PAH fraction of any environmental mixture is proportional to the benzo(a)pyrene content of the mixture (OMOE 1997). The WMM was derived from the methodology of the OMOE (1997), using the concentration of benzo(a)pyrene together with the toxic potency of the PAH-WMM group. The cancer slope factor for oral exposure to benzo(a)pyrene was estimated by the OMOE, based on an examination of the composition and toxic potency of PAH mixtures derived from many different sources (e.g., coal tar, coke oven emissions, diesel emissions and wood burning). The unit risk for inhalation exposure to benzo(a)pyrene was developed based on a weight-of-evidence review of numerous epidemiology and rodent toxicity studies of benzo(a)pyrene. Critical effects included lung cancer and genitourinary tract cancer in humans. This approach, used in conjunction with the IPM, ensures that potential risks are not underestimated in the current assessment (OMOE 1997).

The IPM health risks are based on the sum of attributable risks for each individual PAH. The first step in the IPM requires an estimate of the inhalation potency of benzo(a)pyrene and other PAHs relative to benzo(a)pyrene. This step involves the use of Toxic Equivalency Factors (TEFs) to denote the cancer potency of specific PAH compounds relative to the potency of benzo(a)pyrene (Bostrom et al. 2002). Toxic Equivalency Factors allow large groups of compounds with a common mechanism of action such as

PAHs to be assessed when limited data is available for all but one of the compounds (i.e., benzo(a)pyrene). Table A-8 shows the TEFs used in the current assessment of PAHs via the IPM approach.

Table A-8 Relative Potency of Individual Polycyclic Aromatic Hydrocarbons Compared with Benzo(a)pyrene

Compound[1]	Toxic Equivalency Factor
Anthracene	0.0005
Benz(a)anthracene	0.005
Benzo(a)pyrene	1
Benzo(b)fluoranthene	0.1
Benzo(g,h,i)perylene	0.02
Benzo(k)fluoranthene	0.05
Chrysene	0.03
Fluoranthene	0.05
Fluorene	0.0005
Indeno(1,2,3-cd)pyrene	0.1
Phenanthrene	0.0005
Pyrene	0.001

Note:

[1] All compounds for which TEFs were identified in Larsen and Larsen (1998) were addressed as part of the IPM approach.

For the chronic assessment, benzo(a)pyrene was evaluated together with all other carcinogenic PAHs. The chronic inhalation exposure limits used in this assessment are summarized in Table A-9.

Table A-9 Chronic Inhalation Exposure Limits for the Benzo(a)pyrene Group

Regulatory Agency	Value (µg/m^3)	Type	Source
ATSDR	--	--	ATSDR (2006)
Health Canada	0.32	RsC	Health Canada (2004b)
RIVM	--	--	RIVM (2001)
U.S. EPA	--	--	U.S. EPA (1994)
WHO	0.00012	RsC	WHO (2000)

Note:

-- = not available.

The WHO (2000) recommends an inhalation unit risk of 0.087 per µg/m^3 based on epidemiological data from studies in coke-oven workers. The WHO identified an upper-bound individual lifetime unit risk estimate of 0.00062 associated with continuous exposure to 1 µg/m^3 of benzene-soluble compounds of coke-oven emissions in ambient air based on a linearized multistage model. Benzo(a)pyrene was selected as an indicator of general PAH mixtures from emissions of coke ovens and similar combustion processes in urban air. In the benzene-soluble fraction of coke oven emissions, 0.71% is reported to be benzo(a)pyrene. On this basis, the lifetime risk of respiratory cancer of 0.087 per µg/m^3 was calculated (WHO 2000), which equates to an RsC of 0.00012 µg/m^3 that is associated with an acceptable incremental lifetime cancer risk of one in 100,000. This RsC was selected for the chronic inhalation assessment of the benzo(a)pyrene (WMM) group. It is equivalent to an inhaled dose of 0.000026 µg/kg bw/d based on the following assumptions:

- adult body weight of 70.7 kg (Health Canada 2004b); and
- adult inhalation rate of 15.8 m3/day (Health Canada 2004b).

The Health Canada (2004a) provided an inhalation unit risk of 0.0033 per µg/m^3. This RsC of 0.32 µg/m^3 is associated with an acceptable incremental lifetime cancer risk of development of lung tumours of one in 100,000. The RsC was developed via multi-stage modeling of respiratory tract tumours in Syrian golden hamsters (Thyssen et al. 1981). In the key study, groups of 24 male Syrian golden hamsters were exposed by inhalation (nose only) to 0, 2.2, 9.5, or 45.6 mg/m^3 benzo(a)pyrene for 4.5 hours per day, seven days per week for the first 10 weeks, and for three hours per day for the rest of the exposure period (up to 96 weeks). A decrease in body weight gain in exposed animals was observed during the first 10 weeks of the study; however, from the tenth to the sixtieth week, the body weights of all surviving exposed animals were similar to those of the controls (with the exception of the high exposure group). Mean survival was also decreased in the highest exposure group. The incidences of unspecified tumours of the respiratory tract (nasal cavity, larynx, and trachea) were:

- 0/27 for controls
- 0/27 for the low-dose group
- 9/26 (35%) for the mid-dose group
- 13/25 (52%) for the high-dose group

Exposure related neoplasms (unspecified) were present in the pharynx (0, 0, 23, and 56% for control, low-, mid-, and high-dose, respectively), esophagus (0, 0, 0, and 8% for control, low-, mid-, and high-dose, respectively), and forestomach (0, 0, 4, and 4% for control, low-, mid-, and high-dose, respectively). Lung tumours were not observed. The Health Canada RsC of 0.32 µg/m^3 was selected for the chronic inhalation assessment of the benzo(a)pyrene (IPM) group and is equivalent to an inhaled dose of 0.072 µg/kg bw/d (based on the above adjustments).

Although Health Canada (2004a) has established inhalation unit risks for benzo(b)fluoranthene, benzo(k)fluoranthene, and indeno(1,2,3-cd)pyrene, these TRVs were not used in the current assessment of PAHs. The IPM approach provides a more conservative assessment of the potential cancer risk to humans than the inhalation unit risk values for the same end point (i.e., cancer). As well, the scientific basis for these inhalation unit risk values is unknown.

The individual constituents of the benzo(a)pyrene group were identified as potentially persistent and bioaccumulative chemicals in the environmental media. Therefore, the benzo(a)pyrene (IPM and WMM) group was assessed via multiple exposure pathways and required an oral exposure limit.

Table A-10 Chronic Oral Exposure Limits for the Benzo(a)pyrene Group

Regulatory Agency	Value (µg/kg bw/d)	Type	Source
ATSDR	--	--	ATSDR (2006)
Health Canada	0.0043	RsD	Health Canada (2004a)
RIVM	0.5	RsD	RIVM (2001)
U.S. EPA	0.0014	RsD	U.S. EPA (2008)
WHO	0.023	RsD	WHO (2000)
Note: -- = not available.			

Health Canada provides an oral slope factor of 2.3 per mg/kg bw/d based on the Canadian guidelines for drinking water quality of 0.00001 mg/L (Health Canada 1988, 2004a). The Canadian drinking water quality guideline for benzo(a)pyrene was established based on an increased incidence of stomach tumours (squamous cell papillomas and some carcinomas) (Health Canada 1988; Neal and Rigdon 1967). In the key study, male and female CFW-Swiss mice were fed concentrations of 0, 1, 10, 20, 40, 45, 50, 100 or 250 ppm benzo(a)pyrene in the diet (purity was not reported). The control group contained 289 mice (number of mice/sex was not specified). No forestomach tumours were reported in the 0-, 1-, or 10-ppm dose groups. The incidence of forestomach tumours in the 20-, 40-, 45-, 50-, 100- or 250-ppm dose groups were 1/23, 0/37, 1/40, 4/40, 23/40, 19/23 and 66/73, respectively. Incorporating a surface area correction and using the robust linear extrapolation model, the unit lifetime risk associated with the ingestion of 1 µg/L benzo(a)pyrene in drinking water was estimated as 5×10^{-5}. Using an adult body weight of 70.7 kg and an adult water ingestion rate of 1.5 L/d (Health Canada 2004a), an oral slope factor of 2.3 per mg/kg bw/d was calculated. The Health Canada oral slope factor equates to an RsD of 0.0043 µg/kg bw/d that is associated with an acceptable incremental lifetime cancer risk of one in 100,000.

The U.S. EPA provides an oral slope factor of 7.3 per mg/kg bw/d based on the geometric mean of four slope factors obtained by different modeling procedures and multiple datasets from two different studies, including the Neal and Rigdon (1967) study that was used in the Health Canada assessment (U.S. EPA 1994; Health Canada 1988). The U.S. EPA considered each of these datasets to be acceptable for the derivation of an oral slope factor, but less-than-optimal. As a result, the use of a geometric mean of the four slope factors was preferred because it made use of more of the available data (U.S. EPA 1994). The four slope factors were calculated as follows.

The Neal and Rigdon (1967) data was fit to a two-stage dose response model that included a term to permit the modelling of benzo(a)pyrene as its own promoter (modification of Moolgavkar-Venson-Knudson, generalized forms of two-stage model). In this model, the transition rates and the growth rate of preneoplastic cells were both considered to be exposure-dependent. In addition to the Neal and Rigdon (1967) control group, historical control stomach tumour data from a related, but not identical, mouse strain (SWR/J Swill) was used in the modelling (Rabstein et al. 1973). In the historical control data, the forestomach tumour incidence rate was 2/268 and 1/402 for males and females, respectively. The lifetime unit risk for humans was calculated based on the following standard assumptions: mouse food consumption was 13% of its body weight per day, human body weight was assumed to be 70 kg, and the assumed body weight of the mouse 0.034 kg. The standard assumption of surface area equivalence between mice and humans was the cube root of 70 kg/0.034 kg. A conditional upper-bound estimate was calculated to be 5.9 per mg/kg bw/day.

The same dataset as above was used to generate an upper-bound estimate extrapolated linearly from the 10% response point to the background of an empirically fitted dose-response curve (modification of Moolgavkar-Venson-Knudson, generalized forms of two-stage model). An upper-bound was calculated to be 9.0 per mg/kg bw/day.

In order to reflect the partial lifetime exposure pattern over different parts of the animals' lifetimes, a generalized Weibull-type dose-response model was selected to assess the Neal and Rigdon (1967) data alone (i.e., excluding the two additional control groups from Rabstein et al.). An upper-bound was calculated to be 4.5 per mg/kg bw/d.

A linearized multistage procedure was used to calculate an upper bound estimate for humans from the Brune et al. (1981) rat dataset. Thirty-two Sprague-Dawley (rats/sex/group) were fed 0.15 mg/kg benzo(a)pyrene (reported to be "highly pure") in the diet of either every 9th day or five times per week. These treatments resulted in annual average doses of 6 or 39 mg/kg, respectively. The control group contained 32 rats per sex. Treatment continued until the rats were moribund or dead; survival was similar in all groups. The combined incidence of tumours of the forestomach, esophagus and larynx was 3/64, 3/64 and 10/64 in the control group, the group fed benzo(a)pyrene every 9th day, and the group fed benzo(a)pyrene five times per week, respectively. A trend analysis showed a statistically significant tendency for the proportion of animals with tumours of the forestomach, esophagus or larynx to increase steadily with dose. An oral slope factor of 11.7 per mg/kg bw/d was calculated.

Because the U.S. EPA considered in its development of an oral slope factor (i) different modelling procedures, (ii) multiple datasets from two different studies, and (iii) both sexes of more than one strain of mice and species of out bred rodents, the U.S. EPA RsD of 0.0014 µg/kg bw/d was selected as the chronic oral limit for the benzo(a)pyrene (IPM) group.

The toxicity search was expanded to include the OMOE (1997) for the benzo(a)pyrene (WMM) group since the chronic oral limits listed in Table 38 were developed for benzo(a)pyrene alone and thus are not representative of the whole PAH mixture. The OMOE (1997) provides an oral slope factor of 4.2 x 10^{-8} per ng/day for stomach tumours. Assuming an adult body weight of 70.7 kg, an RsD of 0.0034 µg/kg bw/d was calculated that is associated with an acceptable incremental lifetime cancer risk of one in 100,000. The OMOE RsD of 0.0034 µg/kg bw/d was selected as the chronic oral limit for the benzo(a)pyrene (WMM) group.

5. Formaldehyde

Table A-11 Acute Inhalation Exposure Limits for Formaldehyde

Regulatory Agency	Value (µg/m^3)	Averaging Time	Reference
AENV	65	1-hour	AENV (2005)
ATSDR	49.3	2-hour	ATSDR (2006)
OEHHA	94	1-hour	OEHHA (2000)
OMOE	65	24-hour	OMOE (2005)
WHO	--	--	WHO (2000)
Note: -- = not available.			

The ATSDR has developed an acute inhalation MRL for formaldehyde of **50 µg/m^3** (0.04 ppm) based on a LOAEL of 0.4 ppm for nasal and eye irritation (ATSDR 1999). Occupationally exposed patients with skin hypersensitivity to formaldehyde and unexposed (control) patients, all of whom were non-smokers, were separated into two groups. The first group included seven male and three female volunteers with skin hypersensitivity to formaldehyde and the second included 11 healthy males with no history of allergic diseases. Nasal washings were performed in both groups immediately before and after a 2 hour exposure to 0 (placebo) or 0.5 mg/m^3 (0.4 ppm) formaldehyde, and again four and 18 hours after the exposure period. A cumulative uncertainty factor of 10 was incorporated by the ATSDR (1999) to account for the use of a minimal LOAEL (3-fold) and to account for intra-species variability (3-fold). An uncertainty factor of 3 was considered adequately protective of human variability as the observed symptoms of irritation were recorded in a potentially sensitive group of subjects. This 2 hour MRL was conservatively used as the 1 hour exposure limit in the acute effects assessment for formaldehyde.

Table A-12 Chronic Inhalation Exposure Limits for Formaldehyde

Regulatory Agency	Value (µg/m^3)	Type	Reference
Health Canada	1.9	RsC	CEPA (2001)
ATSDR	0.01	MRL	ATSDR (2006)
RIVM	--	--	RIVM (2001)
U.S. EPA	0.8	RsC	U.S. EPA (2007)
WHO	--	--	WHO (2000)
Note: -- = not available.			

The IARC classifies formaldehyde as carcinogenic to humans (Group 1), on the basis of sufficient evidence in humans and sufficient evidence in experimental animals (IARC, 1999). Health Canada previously derived tumourigenic concentration (TC_{05}) of 9.5 mg/m^3 (CEPA, 2001). This TC_{05} represents the total intake associated with a 5% increase in incidence of nasal squamous tumours in rats exposed to formaldehyde for up to 24 months. The TC_{05} corresponds to an RsC of 1.9 µg/m^3, which is associated with an increased cancer risk of one in 100,000.

The U.S. EPA has derived a URE of 1.3 x 10^{-5} (µg/m^3)$^{-1}$ based upon the incidence of squamous cell carcinoma in rats (U.S. EPA 2007), although this limit is under re-evaluation.

However, there is some controversy over whether carcinogenic effects are the most sensitive and relevant endpoint to humans. A recent review by Health Canada (2005) established an 8 hour indoor air quality objective of 50 µg/m^3 for formaldehyde that was also based upon respiratory effects but is also protective of carcinogenic effects (Health Canada, 2005). The OMOE has established a 24 hour AAQC of 65 ug/m^3 based on respiratory irritation and odour (OMOE, 1998). In addition the WHO has established a 30 minute criteria of 100 ug/m^3, based upon respiratory irritation (although the limit is noted to also protective of upper respiratory tract cancers) (WHO, 2000). The ATSDR (2006) presents a chronic inhalation MRL of 0.01 ug/m^3.

Both Health Canada and the U.S. EPA have determined that formaldehyde is carcinogenic. The most conservative carcinogenic exposure limit is the U.S. EPA URE of 1.3 x 10^{-5} (µg/m^3)$^{-1}$, which translates to a RsD of **0.77 µg/m^3** in association with a 1 in 100,000 cancer risk. This limit has been incorporated into the assessment.

6. Assessment of Chemical Mixtures

As exposure to chemicals typically does not occur in isolation, consideration was given to the potential health risks that might be presented by chemicals acting in combination. The interaction between chemicals can take many forms, all of which are of toxicological interest and some of which might be relevant to assessing potential health risks. The most common forms of interaction are:

- Additivity: where the effect may be estimated through the addition of the potency weighted exposure levels (dose addition), or of the response (response addition);
- Synergism: the combined effects of two chemicals are much greater than additive;
- Antagonism: the effect of the mixture is less than additive;
- Potentiation: one chemical does not have a toxic effect but in the presence of a second chemical, increases the effect of the second chemical; or
- Masking: the mixture components produce opposite effects on an organ system, decreasing or cancelling the effects of one or more of the components (ATSDR, 2004; U.S. EPA, 2000).

Toxicological interactions between mixture components depend on each component, their mode of action, and their concentrations. The primary mechanisms for chemical interactions are chemical-chemical, pharmacokinetic, and pharmacodynamic (ATSDR 2004).

Within this HHRA, as per Health Canada's guidance, chemical interactions were assumed to be additive in nature (Health Canada 2004b). The mixtures included in this HHRA incorporated the COPCs from the original HHRA (carbon monoxide, hydrogen sulphide, nitrogen dioxide, sulphur dioxide and $PM_{2.5}$) with the COPCs from this HHRA update to fully characterize the potential mixture effects associated with the Project emissions. Table A-13 summarizes the mixtures evaluated.

Table A-13 Summary of Revised Chemical Mixtures

	Potential Health Effect of Mixture	Toxicant Designation	Mixture Components
Acute Inhalation	Irritation	Eye Irritants	Acetaldehyde, acrolein, formaldehyde
		Respiratory Irritants	Acetaldehyde, acrolein*, hydrogen sulphide, nitrogen dioxide, sulphur dioxide
Chronic Inhalation	Irritation	Nasal Irritants	Acrolein, hydrogen sulphide
		Respiratory Irritants	Nitrogen dioxide, sulphur dioxide
	Cancer	Nasal tumours	Acetaldehyde, formaldehyde

* Although the exposure limit selected for this HHRA for acrolein was based upon eye irritation, it has been requested by Alberta Health and Wellness in the past to also include acrolein in the respiratory irritants group. Thus acrolein was assessed on an acute basis using two different exposure limits, with one based on eye irritation (0.29 $\mu g/m^3$) and the other based upon respiratory irritation (6.9 $\mu g/m^3$).

7. References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological Profile for Formaldehyde. Atlanta, GA: US Department of Health and Human Services, Public Health Service. July 1999.

Agency for Toxic Substances and Disease Registry (ATSDR). 2004. Guidance Manual for the Assessment of Joint Toxic Action of Chemical Mixtures. May 2004.

Agency for Toxic Substances and Disease Registry (ATSDR). 2006. Minimal Risk Levels. U.S. Department of Health and Human Services. Atlanta, Georgia.

Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Toxicological Profile for Benzene U.S. Department of Health and Human Services. Atlanta, Georgia.

Alberta Environment (AENV). 2007. Alberta Ambient Air Quality Objectives. Facts at your Fingertips, http://www3.gov.ab.ca/env/protenf/approvals/factsheets/ABAmbientAirQuality.pdf

Alberta Environment (AENV). 2005. Alberta Ambient Air Quality Objectives. Facts at your Fingertips. April 2005. URL: http://environment.gov.ab.ca/info/library/5726.pdf

American Conference of Governmental Industrial Hygienists (ACGIH). 1996. Documentation of the Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs). Cincinnati, OH, Inc.

American Conference of Governmental Industrial Hygienists (ACGIH). 2006. Guide to Occupational Exposure Values. ACGIH, Inc. Cincinnati, Ohio.

Bostrom, C., P. Gerde, H. Hanberg, B. Jerstrom, C. Johansson, T. Kyrklund, A. Rannug, M. Tornqvist, K. Victorin and R. Westerholm. 2002. Cancer Risk Assessment, Indicators and Guidelines for Polycyclic Aromatic Hydrocarbons in the Ambient Air. Environmental Health Perspectives 110(Suppl 3):451-488.

Brune, H., R.P. Deutsch-Wenzel, M. Habs, S. Ivankovic and D. Schmahl. 1981. Investigation of the tumorigenic response to benzo(a)pyrene in aqueous caffeine solution applied orally to Sprague-Dawley rats. J Cancer Res Clin Oncol 102(2): 153-157.

Canadian Environmental Protection Act 2000a. Canadian Environmental Protection Act (CEPA) Priority Substances List Assessment Report: Acetaldehyde. Ottawa, ON: Government of Canada.

Canadian Environmental Protection Act (CEPA). 2000b. Priority Substances List Assessment Report: Acrolein. Government of Canada. Ottawa, Ontario. May 2000.

Canadian Environmental Protection Act (CEPA). 2001. Priority Substances List Assessment Report: Formaldehyde. Government of Canada. Ottawa, Ontario. February 2001.

Cassee, F., J. Groten and V. Feron. 1996. Changes in the nasal epithelium of rats exposed by inhalation to mixtures of formaldehyde, acetaldehyde, and acrolein. Fundam. Appl. Toxicol. 29: 208-218.

Darley, E.M., Middleton J.T. and M.J. Garber. 1960. Plant damage and eye irritation from ozone-hydrocarbon reactions. J Agricultural Food Chemistry 8:483-485.

Feron, VJ, A. Kryusse, H.P. Til, et al. 1978. Repeated exposure to acrolein vapour: subacute studies in hamsters, rats and rabbits. Toxicology 9:47-57. Cited In: OMOE 2004.

Health Canada 1988. Guidelines for Canadian Drinking Water Quality - Supporting Document for Benzo(a)pyrene. Prepared by the Federal-Provincial-Territorial Committee on Drinking Water of the Federal-Provincial-Territorial Committee on Health and the Environment. Health Canada. Ottawa, Ontario.

Health Canada. 2004a. Federal Contaminated Site Risk Assessment in Canada. Part II: Health Canada Toxicological Reference Values (TRVs). Ottawa, ON: Environmental Health Assessment Services Safe Environments Programme. September 2004. ISBN 0-662-38245-5.

Health Canada. 2004b. Federal Contaminated Site Risk Assessment in Canada. Part I: Guidance on Human Health Preliminary Quantitative Risk Assessment (PQRA). Ottawa, ON: Environmental Health Assessment Services Safe Environments Programme. September 2004. ISBN 0-662-38244-7.

Health Canada. 2005. Proposed Residential Indoor Air Quality Guidelines for Formaldehyde.

IARC (World Health Organization International Agency for Research on Cancer). 1999. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. April 1999.

Volume 71IARC 2004. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Volume 88. Formaldehyde, 2-Butoxyethanol and 1-tert-Butoxy-2-propanol. Summary of Data Reported and Evaluation. International Agency for Research on Cancer, World Health Organization. September 2004.

Kutzman, R.S. 1981. A subchronic inhalation study of Fischer 344 rats exposed to 0, 0.4 1.4, or 4.0 ppm acrolein. Brookhaven National Laboratory, Upton, NY. National Toxicology Program: Interagency Agreement No. 222-Y01-ES-9-0043. Cited In: OMOE 2004.

Kutzman, R.S., E.A. Popenoe, M. Schmaeler, and R.T. Drew. 1985. Changes in rat lung structure and composition as a result of subchronic exposure to acrolein. Toxicology 34(2):139-151. Cited In: OMOE 2004.

Larsen, J.C. and P.B. Larsen. 1998. Chemical carcinogens: In: R.E. Hester and R.M. Harrison (eds) Air Pollution and Health (pp. 33-56). Cambridge, UK: The Royal Society of Chemistry.

Neal, J. and R.H. Rigdon. 1967. Gastric tumors in mice fed benzo[a]pyrene - A quantitative study. Tex. Rep. Biol. Med. 25(4): 553-557.

OEHHA (California Office of Environmental Health Hazard Assessment). 1999a. Determination of Acute Reference Exposure Levels for Airborne Toxicants. Acute Toxicity Summary: Methyl Ethyl Ketone. Sacramento, CA: California Environmental Protection Agency, Office of Environmental Health Hazard Assessment. March 1999.

OEHHA (California Office of Environmental Health Hazard Assessment). 1999b Determination of Acute Reference Exposure Levels for Airborne Toxicants. Acrolein (CAS 107-02-8). March 1999. http://www.oehha.org/air/acute_rels/allAcRELs.html. Accessed August 2008.

OEHHA (California Office of Environmental Health Hazard Assessment). 2000. All Acute Exposure Levels Adopted by OEHHA as of May 2000. California Environmental Protection Agency, Office of Environmental Health Hazard Assessment. May 2000. Available at: http://www.oehha.org/air/acute_rels/allAcRELs.html.

OEHHA (California Office of Environmental Health Hazard Assessment). 2005. All Chronic Reference Exposure Levels Adopted by OEHHA as of February 2005. Sacramento, CA: California Environmental Protection Agency, Office of Environmental Health Hazard Assessment. February 2005.

OMOE (Ontario Ministry of the Environment). 1997. Scientific Criteria Document for Multimedia Standards Development - Polycyclic Aromatic Hydrocarbons (PAH). Part 1: Hazard Identification and Dose-response Assessment. Ontario Ministry of Environment and Energy, Standards Development Branch. February 1997.

OMOE (Ontario Ministry of the Environment). 2005. Summary of O. Reg. 419/05 Standards and Point of Impingement Guidelines and Ambient Air Quality Criteria (AAQCs). Standards Development Branch, Ontario Ministry of the Environment.

OMOE (Ontario Ministry of the Environment). 2008. Summary of Standards and Guidelines to Support Ontario Regulation 419: Air Pollution, Local Air Quality. Standards Development Branch, Ontario Ministry of the Environment. December 2008.

Rabstein, L.S., R.L. Peters and G.J. Spahn. 1973. Spontaneous tumours and pathologic lesions in SWR/J mice. J Natl Cancer Inst 50: 751-758.

RIVM (National Institute of Public Health and the Environment, NIPHE). 2001. Re-evaluation of human toxicological maximum permissible risk levels. RIVM Report 711701 025. March 2001.

Rozen MG, Snyder CA, Albert RE. 1984. Depressions in B- and T-lymphocyte mitogen-inducted blastogenesis in mice exposed to low concentrations of benzene. Tox Lett 1984 20: 343-349.

Texas Commission on Environmental Quality (TCEQ). 2006. Guidelines to Develop Effects Screening Levels, Reference Values, and Unit Risk Factors. RG-442. November 2006.

Texas Commission on Environmental Quality (TCEQ). 2007. Benzene. Development Support Document. October 2007.

Thyssen, J., J. Althoff, G. Kimmerle and U. Mohr. 1981. Inhalation Studies with Benzo[a]pyrene in Syrian Golden Hamsters. J Natl Cancer Inst 66: 575-577. Cited in CEPA. 1994. Priority Substances List Assessment Report. Polycyclic Aromatic Hydrocarbons. Government of Canada. Ottawa, ON.

USEPA (United States Environmental Protection Agency). 1994. Benzo[a]pyrene (BaP) (CASRN 50-32-8). Carcinogenicity Assessment. Integrated Risk Information System (IRIS) database on-line search. United States Environmental Protection Agency. Cincinnati, OH. Available at: http://www.epa.gov/iris/subst/0136.htm. Accessed August 2008

USEPA (United States Environmental Protection Agency). 2000. Supplementary guidance for conducting health risk assessment of chemical mixtures. EPZ/630R-00/002.

USEPA (United States Environmental Protection Agency). 2007. Integrated Risk Information System (IRIS) database on-line search. United States Environmental Protection Agency. Cincinnati, OH. Available at: http://www.epa.gov/iris/. Accessed August 2008.

USEPA (United States Environmental Protection Agency). 2008. http://www.epa.gov/iris.

Woutersen, R., L. Appleman, A. Van Garderen-Hoetmer, and V. Feron. 1986. Inhalation toxicity of acetaldehyde in rats. III. Carcinogenicity study. Toxicology 41: 213-231. Cited In: CEPA 2000b.

Woutersen, R.A. and L.M. Appleman. 1984. Lifespan inhalation carcinogenicity study of acetaldehyde in rats. III. Recovery after 52 weeks of exposure. Report No. V84.288/190172. CIVO-Institutes TNO, The Netherlands. Cited In: U.S. EPA 1991a.

WHO (World Health Organization). 2000. Air Quality Guidelines for Europe, Second Edition. Copenhagen: World Health Organization, Regional Office for Europe. WHO Regional Publications, European Series No. 91. URL: http://www.euro.who.int/document/e71922.pdf

Appendix B1: Multiple Pathway Exposure Model for the Human Health Risk Assessment

Table B1-1 Summary of Risk Quotient (RQ) Values for the Agricultural Receptor [Unitless]

Case	Chemical	Type	Infant	Toddler	Child	Adolescent	Adult	LCR/ILCR	TEF	B(a)P IPM TEQ
Base	Anthracene	RsD	8.1E-06	4.3E-05	5.6E-05	4.1E-05	2.5E-04	4.0E-04	2.0E-07	
Base	Benzo(a)anthracene	RsD	2.1E-04	9.4E-04	1.2E-03	9.2E-04	5.6E-03	8.9E-03	4.4E-05	
Base	Benzo(a)pyrene	RsD	6.4E-05	2.8E-04	3.6E-04	2.7E-04	1.6E-03	2.6E-03	2.6E-03	
Base	Benzo(b)fluoranthene	RsD	5.6E-06	2.3E-05	2.9E-05	2.2E-05	1.3E-04	2.1E-04	2.1E-05	
Base	Benzo(ghi) perylene	RsD	4.9E-03	8.8E-03	1.0E-02	7.9E-03	4.1E-02	7.3E-02	1.5E-03	
Base	Benzo(k)fluoranthene	RsD	1.0E-04	4.8E-04	5.8E-04	4.4E-04	2.6E-03	4.2E-03	2.1E-04	
Base	Chrysene	RsD	1.3E-04	6.0E-04	7.4E-04	5.6E-04	3.4E-03	5.4E-03	1.6E-04	
Base	Fluoranthene	RsD	4.9E-05	3.1E-04	3.8E-04	2.8E-04	1.6E-03	2.7E-03	1.3E-04	
Base	Fluorene	RsD	7.0E-07	6.4E-06	7.9E-06	5.5E-06	3.0E-05	5.0E-05	2.5E-08	
Base	Indeno(1,2,3-cd)pyrene	RsD	2.5E-04	6.0E-04	8.0E-04	6.1E-04	3.8E-03	6.1E-03	3.0E-06	
Base	Phenanthrene	RsD	1.9E-05	1.2E-04	1.5E-04	1.1E-04	6.4E-04	1.0E-03	5.2E-07	
Base	Pyrene	RsD	2.3E-05	1.5E-04	1.8E-04	1.3E-04	7.4E-04	1.2E-03	1.2E-06	
Base	Benzo(a)pyreneWMM	RsD	2.6E-05	1.2E-04	1.5E-04	1.1E-04	6.6E-04	1.1E-03	0.0E+00	
Base	Benzo(a)pyrene IPM	RsD								4.6E-03
Application	Anthracene	RsD	1.2E-05	6.3E-05	8.3E-05	6.0E-05	3.7E-04	5.8E-04	2.9E-07	
Application	Benzo(a)anthracene	RsD	1.2E-03	3.0E-03	3.8E-03	2.9E-03	1.8E-02	2.8E-02	1.4E-04	
Application	Benzo(a)pyrene	RsD	3.7E-03	5.4E-03	6.8E-03	5.2E-03	3.1E-02	5.2E-02	5.2E-02	
Application	Benzo(b)fluoranthene	RsD	3.9E-03	4.5E-03	5.8E-03	4.5E-03	2.6E-02	4.5E-02	4.5E-03	
Application	Benzo(ghi) perylene	RsD	1.0E-02	9.2E-03	1.1E-02	8.3E-03	4.3E-02	8.2E-02	1.6E-03	
Application	Benzo(k)fluoranthene	RsD	2.8E-04	6.1E-04	7.5E-04	5.6E-04	3.3E-03	5.5E-03	2.7E-04	
Application	Chrysene	RsD	1.4E-04	6.2E-04	7.7E-04	5.8E-04	3.5E-03	5.6E-03	1.7E-04	
Application	Fluoranthene	RsD	5.0E-05	3.1E-04	3.9E-04	2.9E-04	1.7E-03	2.7E-03	1.3E-04	
Application	Fluorene	RsD	7.1E-07	6.5E-06	8.0E-06	5.6E-06	3.0E-05	5.1E-05	2.6E-08	
Application	Indeno(1,2,3-cd)pyrene	RsD	3.0E-04	6.1E-04	8.1E-04	6.2E-04	3.9E-03	6.2E-03	3.1E-06	
Application	Phenanthrene	RsD	1.9E-05	1.2E-04	1.5E-04	1.1E-04	6.4E-04	1.0E-03	5.2E-07	
Application	Pyrene	RsD	2.9E-05	1.7E-04	2.1E-04	1.5E-04	8.6E-04	1.4E-03	1.4E-06	
Application	Benzo(a)pyreneWMM	RsD	1.5E-03	2.2E-03	2.8E-03	2.1E-03	1.3E-02	2.1E-02	0.0E+00	
Application	Benzo(a)pyrene IPM	RsD								5.8E-02
Project	Anthracene	RsD	2.5E-06	1.2E-05	1.6E-05	1.2E-05	7.1E-05	1.1E-04	5.7E-08	
Project	Benzo(a)anthracene	RsD	1.0E-03	2.0E-03	2.6E-03	2.0E-03	1.2E-02	2.0E-02	9.8E-05	
Project	Benzo(a)pyrene	RsD	3.6E-03	5.1E-03	6.5E-03	4.9E-03	2.9E-02	4.9E-02	4.9E-02	
Project	Benzo(b)fluoranthene	RsD	3.9E-03	4.5E-03	5.8E-03	4.4E-03	2.6E-02	4.5E-02	4.5E-03	
Project	Benzo(ghi) perylene	RsD	5.4E-03	3.8E-04	4.5E-04	3.4E-04	1.8E-03	8.3E-03	1.7E-04	
Project	Benzo(k)fluoranthene	RsD	1.8E-04	1.3E-04	1.6E-04	1.2E-04	7.1E-04	1.3E-03	6.5E-05	
Project	Chrysene	RsD	1.8E-05	2.7E-05	3.3E-05	2.5E-05	1.5E-04	2.5E-04	7.6E-06	
Project	Fluoranthene	RsD	8.9E-07	3.6E-06	4.5E-06	3.3E-06	1.9E-05	3.1E-05	1.6E-06	
Project	Fluorene	RsD	1.6E-08	1.3E-07	1.6E-07	1.1E-07	6.0E-07	1.0E-06	5.0E-10	
Project	Indeno(1,2,3-cd)pyrene	RsD	5.1E-05	1.1E-05	1.5E-05	1.1E-05	7.0E-05	1.6E-04	7.9E-08	
Project	Phenanthrene	RsD	3.0E-07	1.6E-06	2.1E-06	1.5E-06	8.6E-06	1.4E-05	7.0E-09	
Project	Pyrene	RsD	5.6E-06	2.5E-05	3.0E-05	2.2E-05	1.3E-04	2.1E-04	2.1E-07	
Project	Benzo(a)pyreneWMM	RsD	1.5E-03	2.1E-03	2.7E-03	2.0E-03	1.2E-02	2.0E-02	0.0E+00	
Project	Benzo(a)pyrene IPM	RsD								5.4E-02
CEA	Anthracene	RsD	1.7E-05	8.6E-05	1.1E-04	8.3E-05	5.0E-04	8.0E-04	4.0E-07	
CEA	Benzo(a)anthracene	RsD	1.3E-03	3.2E-03	4.2E-03	3.2E-03	1.9E-02	3.1E-02	1.6E-04	
CEA	Benzo(a)pyrene	RsD	3.7E-03	5.6E-03	7.1E-03	5.4E-03	3.2E-02	5.4E-02	5.4E-02	
CEA	Benzo(b)fluoranthene	RsD	3.9E-03	4.6E-03	5.8E-03	4.5E-03	2.6E-02	4.5E-02	4.5E-03	
CEA	Benzo(ghi) perylene	RsD	1.1E-02	1.1E-02	1.3E-02	9.5E-03	5.0E-02	9.4E-02	1.9E-03	
CEA	Benzo(k)fluoranthene	RsD	3.7E-04	1.0E-03	1.2E-03	9.4E-04	5.5E-03	9.0E-03	4.5E-04	
CEA	Chrysene	RsD	2.3E-04	1.1E-03	1.3E-03	1.0E-03	6.0E-03	9.6E-03	2.9E-04	
CEA	Fluoranthene	RsD	8.3E-05	5.3E-04	6.5E-04	4.8E-04	2.8E-03	4.5E-03	2.3E-04	
CEA	Fluorene	RsD	1.2E-06	1.1E-05	1.3E-05	9.4E-06	5.1E-05	8.5E-05	4.3E-08	
CEA	Indeno(1,2,3-cd)pyrene	RsD	4.5E-04	9.8E-04	1.3E-03	9.9E-04	6.2E-03	9.9E-03	4.9E-06	
CEA	Phenanthrene	RsD	2.9E-05	1.9E-04	2.4E-04	1.7E-04	1.0E-03	1.6E-03	8.2E-07	
CEA	Pyrene	RsD	3.2E-05	2.0E-04	2.4E-04	1.7E-04	9.8E-04	1.6E-03	1.6E-06	
CEA	Benzo(a)pyreneWMM	RsD	1.5E-03	2.3E-03	2.9E-03	2.2E-03	1.3E-02	2.2E-02	0.0E+00	
CEA	Benzo(a)pyrene IPM	RsD								6.1E-02

Table B1-2   Summary of Estimated Daily Intake for the Agricultural Receptor [ug/kg/day]

Case	Chemical	Infant	Toddler	Child	Adolescent	Adult
Base	Anthracene	1.7E-06	1.3E-06	8.4E-07	5.4E-07	4.7E-07
Base	Benzo(a)anthracene	4.3E-05	2.8E-05	1.8E-05	1.2E-05	1.0E-05
Base	Benzo(a)pyrene	1.3E-05	8.5E-06	5.4E-06	3.6E-06	3.0E-06
Base	Benzo(b)fluoranthene	1.2E-06	6.9E-07	4.4E-07	2.9E-07	2.5E-07
Base	Benzo(ghi) perylene	1.0E-03	2.6E-04	1.6E-04	1.0E-04	7.7E-05
Base	Benzo(k)fluoranthene	2.2E-05	1.4E-05	8.8E-06	5.8E-06	4.8E-06
Base	Chrysene	2.7E-05	1.8E-05	1.1E-05	7.3E-06	6.3E-06
Base	Fluoranthene	1.0E-05	9.3E-06	5.7E-06	3.7E-06	3.1E-06
Base	Fluorene	1.5E-07	1.9E-07	1.2E-07	7.3E-08	5.6E-08
Base	Indeno(1,2,3-cd)pyrene	5.3E-05	1.8E-05	1.2E-05	8.0E-06	7.1E-06
Base	Phenanthrene	3.9E-06	3.6E-06	2.3E-06	1.4E-06	1.2E-06
Base	Pyrene	4.8E-06	4.4E-06	2.7E-06	1.7E-06	1.4E-06
Application	Anthracene	2.6E-06	1.9E-06	1.2E-06	7.9E-07	6.8E-07
Application	Benzo(a)anthracene	2.6E-04	8.9E-05	5.7E-05	3.8E-05	3.3E-05
Application	Benzo(a)pyrene	7.7E-04	1.6E-04	1.0E-04	6.8E-05	5.7E-05
Application	Benzo(b)fluoranthene	8.2E-04	1.4E-04	8.7E-05	5.9E-05	4.9E-05
Application	Benzo(ghi) perylene	2.1E-03	2.7E-04	1.6E-04	1.1E-04	8.1E-05
Application	Benzo(k)fluoranthene	5.9E-05	1.8E-05	1.1E-05	7.4E-06	6.1E-06
Application	Chrysene	3.0E-05	1.9E-05	1.2E-05	7.6E-06	6.6E-06
Application	Fluoranthene	1.0E-05	9.4E-06	5.8E-06	3.8E-06	3.1E-06
Application	Fluorene	1.5E-07	1.9E-07	1.2E-07	7.4E-08	5.7E-08
Application	Indeno(1,2,3-cd)pyrene	6.3E-05	1.8E-05	1.2E-05	8.1E-06	7.3E-06
Application	Phenanthrene	4.0E-06	3.6E-06	2.3E-06	1.5E-06	1.2E-06
Application	Pyrene	6.0E-06	5.2E-06	3.2E-06	2.0E-06	1.6E-06
CEA	Anthracene	3.5E-06	2.6E-06	1.7E-06	1.1E-06	9.4E-07
CEA	Benzo(a)anthracene	2.7E-04	9.7E-05	6.3E-05	4.2E-05	3.6E-05
CEA	Benzo(a)pyrene	7.8E-04	1.7E-04	1.1E-04	7.0E-05	6.0E-05
CEA	Benzo(b)fluoranthene	8.3E-04	1.4E-04	8.7E-05	5.9E-05	4.9E-05
CEA	Benzo(ghi) perylene	2.3E-03	3.2E-04	1.9E-04	1.3E-04	9.3E-05
CEA	Benzo(k)fluoranthene	7.7E-05	3.1E-05	1.9E-05	1.2E-05	1.0E-05
CEA	Chrysene	4.9E-05	3.2E-05	2.0E-05	1.3E-05	1.1E-05
CEA	Fluoranthene	1.7E-05	1.6E-05	9.7E-06	6.3E-06	5.2E-06
CEA	Fluorene	2.5E-07	3.2E-07	2.0E-07	1.2E-07	9.5E-08
CEA	Indeno(1,2,3-cd)pyrene	9.4E-05	2.9E-05	1.9E-05	1.3E-05	1.2E-05
CEA	Phenanthrene	6.2E-06	5.7E-06	3.6E-06	2.3E-06	1.9E-06
CEA	Pyrene	6.8E-06	5.9E-06	3.6E-06	2.2E-06	1.8E-06
Project	Anthracene	5.3E-07	3.7E-07	2.4E-07	1.6E-07	1.3E-07
Project	Benzo(a)anthracene	2.1E-04	6.1E-05	3.9E-05	2.6E-05	2.2E-05
Project	Benzo(a)pyrene	7.6E-04	1.5E-04	9.7E-05	6.5E-05	5.5E-05
Project	Benzo(b)fluoranthene	8.2E-04	1.4E-04	8.7E-05	5.8E-05	4.8E-05
Project	Benzo(ghi) perylene	1.1E-03	1.1E-05	6.7E-06	4.5E-06	3.3E-06
Project	Benzo(k)fluoranthene	3.7E-05	4.0E-06	2.4E-06	1.6E-06	1.3E-06
Project	Chrysene	3.9E-06	8.0E-07	5.0E-07	3.3E-07	2.8E-07
Project	Fluoranthene	1.9E-07	1.1E-07	6.7E-08	4.3E-08	3.6E-08
Project	Fluorene	3.3E-09	3.8E-09	2.4E-09	1.5E-09	1.1E-09
Project	Indeno(1,2,3-cd)pyrene	1.1E-05	3.3E-07	2.2E-07	1.5E-07	1.3E-07
Project	Phenanthrene	6.3E-08	4.9E-08	3.1E-08	2.0E-08	1.6E-08
Project	Pyrene	1.2E-06	7.5E-07	4.6E-07	2.8E-07	2.4E-07

Table B1- 3 Summary of Berries Concentrations Used to Estimate Human Exposures [mg/kg]

Chemical	Receptor	Base	Application	Project	CEA
Anthracene	AGRI	5.4E-08	7.9E-08	1.5E-08	1.1E-07
Benzo(a)anthracene	AGRI	7.1E-08	2.2E-07	1.5E-07	2.4E-07
Benzo(a)pyrene	AGRI	1.6E-08	3.0E-07	2.8E-07	3.1E-07
Benzo(b)fluoranthene	AGRI	1.9E-09	3.8E-07	3.8E-07	3.9E-07
Benzo(ghi) perylene	AGRI	3.0E-08	3.1E-08	1.3E-09	3.6E-08
Benzo(k)fluoranthene	AGRI	6.2E-08	7.9E-08	1.7E-08	1.3E-07
Chrysene	AGRI	2.3E-07	2.4E-07	1.0E-08	4.2E-07
Fluoranthene	AGRI	1.7E-07	1.7E-07	1.9E-09	2.8E-07
Fluorene	AGRI	1.2E-08	1.2E-08	2.4E-10	2.0E-08
Indeno(1,2,3-cd)pyrene	AGRI	2.0E-08	2.0E-08	3.6E-10	3.2E-08
Phenanthrene	AGRI	1.5E-07	1.5E-07	2.0E-09	2.3E-07
Pyrene	AGRI	3.2E-07	3.7E-07	5.4E-08	4.3E-07

Table B1- 4 Summary of Plant Concentrations Used to Estimate Human Exposures [mg/kg]

Chemical	Receptor	Base	Application	Project	CEA
Anthracene	AGRI	1.8E-07	2.6E-07	5.1E-08	3.6E-07
Benzo(a)anthracene	AGRI	4.3E-06	1.3E-05	9.2E-06	1.5E-05
Benzo(a)pyrene	AGRI	1.2E-06	2.2E-05	2.1E-05	2.3E-05
Benzo(b)fluoranthene	AGRI	8.6E-08	1.7E-05	1.7E-05	1.7E-05
Benzo(ghi) perylene	AGRI	1.8E-05	1.9E-05	7.9E-07	2.2E-05
Benzo(k)fluoranthene	AGRI	1.7E-06	2.2E-06	4.8E-07	3.7E-06
Chrysene	AGRI	2.4E-06	2.5E-06	1.1E-07	4.4E-06
Fluoranthene	AGRI	1.1E-06	1.1E-06	1.2E-08	1.8E-06
Fluorene	AGRI	1.4E-08	1.4E-08	2.8E-10	2.4E-08
Indeno(1,2,3-cd)pyrene	AGRI	3.2E-06	3.2E-06	5.8E-08	5.1E-06
Phenanthrene	AGRI	4.0E-07	4.0E-07	5.4E-09	6.3E-07
Pyrene	AGRI	4.0E-07	4.7E-07	6.8E-08	5.4E-07

Table B1- 5 Summary of Soil Concentrations Used to Estimate Human Exposures [mg/kg]

Chemical	Receptor	Base	Application	Project	CEA
Anthracene	AGRI	1.6E-06	2.4E-06	4.7E-07	3.3E-06
Benzo(a)anthracene	AGRI	1.1E-05	3.3E-05	2.3E-05	3.6E-05
Benzo(a)pyrene	AGRI	3.5E-06	6.6E-05	6.3E-05	6.8E-05
Benzo(b)fluoranthene	AGRI	5.1E-07	1.0E-04	1.0E-04	1.0E-04
Benzo(ghi) perylene	AGRI	3.4E-05	3.6E-05	1.5E-06	4.1E-05
Benzo(k)fluoranthene	AGRI	1.6E-05	2.0E-05	4.4E-06	3.4E-05
Chrysene	AGRI	3.5E-05	3.6E-05	1.6E-06	6.2E-05
Fluoranthene	AGRI	9.8E-06	9.9E-06	1.1E-07	1.7E-05
Fluorene	AGRI	2.4E-07	2.4E-07	4.8E-09	4.1E-07
Indeno(1,2,3-cd)pyrene	AGRI	9.9E-06	1.0E-05	1.8E-07	1.6E-05
Phenanthrene	AGRI	4.4E-06	4.5E-06	6.0E-08	7.0E-06
Pyrene	AGRI	1.7E-05	1.9E-05	2.8E-06	2.2E-05

Table B1- 6 Summary of Predicted Human Exposures for Each Scenario, Site, Receptor and Chemical

								Environmental Concentrations									EDI														
								Plant	Plant	Plant	Berries	Root	Beef	Dairy	Chicken	Eggs	Soil	Dust	Plant	Berries	Root	Beef	Dairy	Chicken	Eggs	Dermal	Dermal	Breast Milk	Total	Total	RQ
				Soil	Surface Soil	Air	Dust	Deposition	Air	Soil	Soil	Soil					SIR	AIR	Plant	Berries	Root	Beef	Dairy	Chicken	Eggs	Hands	Other	Breast Milk	EDI	EDI	
Scenario	Site	Receptor	Chemical	mg/kg	mg/kg	ug/m^3	ug/m^3	mg/kg ww	mg/kg ww	mg/kg ww	mg/kg ww	mg/kg ww	mg/kg ww	mg/kg ww	mg/kg ww	mg/kg ww	ug/day	ug/day	ug/day	ug/day	ug/day	ug/day	ug/day	ug/day	ug/day	ug/day	ug/day	ug/day	ug/day	ug/kg-BW/day	Unitless
Base	AGRI	Adolescent	Anthracene	1.63E-06	1.63E-05	3.54E-05	1.24E-11	1.21E-07	1.93E-09	5.39E-08	5.39E-08	4.08E-09	2.83E-08	5.95E-09	1.19E-09	4.43E-10	3.27E-07	1.96E-10	2.12E-05	3.02E-06	9.26E-07	2.52E-06	3.51E-06	2.42E-08	9.52E-09	3.79E-07	3.41E-07	0.00E+00	3.22E-05	5.40E-07	3.9E-04
Base	AGRI	Adolescent	Benzo(a)anthracene	1.06E-05	1.06E-04	4.73E-06	8.03E-11	4.16E-06	4.53E-08	7.06E-08	7.06E-08	1.66E-08	9.18E-07	1.93E-07	3.41E-08	1.27E-08	2.11E-06	1.27E-09	5.14E-04	3.95E-06	3.77E-06	8.17E-05	1.14E-04	6.93E-07	2.73E-07	1.69E-06	1.52E-06	0.00E+00	7.23E-04	1.21E-05	8.7E-03
Base	AGRI	Adolescent	Benzo(a)pyrene	3.47E-06	3.47E-05	9.34E-07	2.64E-11	1.12E-06	3.53E-08	1.56E-08	1.56E-08	3.49E-09	3.21E-07	6.77E-08	1.19E-08	4.43E-09	6.95E-07	4.17E-10	1.41E-04	8.72E-07	7.91E-07	2.86E-05	3.99E-05	2.42E-07	9.53E-08	5.56E-07	5.00E-07	0.00E+00	2.13E-04	3.57E-06	2.6E-03
Base	AGRI	Adolescent	Benzo(b)fluoranthene	5.09E-07	5.09E-06	1.40E-06	3.87E-12	8.13E-08	2.34E-09	1.93E-09	1.93E-09	9.72E-09	2.22E-08	4.66E-09	8.54E-10	3.18E-10	1.02E-07	6.11E-11	1.03E-05	1.08E-07	2.21E-06	1.97E-06	2.75E-06	1.73E-08	6.84E-09	8.15E-08	7.33E-08	0.00E+00	1.76E-05	2.95E-07	2.1E-04
Base	AGRI	Adolescent	Benzo(ghi) perylene	3.44E-05	3.44E-04	6.77E-06	2.61E-10	1.09E-05	7.43E-06	3.00E-08	3.00E-08	3.09E-06	1.53E-05	3.22E-06	5.47E-07	2.04E-07	6.88E-06	4.13E-09	2.20E-03	1.68E-06	7.02E-04	1.36E-03	1.90E-03	1.11E-05	4.38E-06	4.95E-06	4.46E-06	0.00E+00	6.20E-03	1.04E-04	7.4E-02
Base	AGRI	Adolescent	Benzo(k)fluoranthene	1.58E-05	1.58E-04	1.29E-06	1.20E-10	1.60E-06	7.66E-08	6.21E-08	6.21E-08	1.60E-08	5.65E-07	1.19E-07	2.22E-08	8.26E-09	3.17E-06	1.90E-09	2.09E-04	3.48E-06	3.63E-06	5.03E-05	7.02E-05	4.51E-07	1.78E-07	2.53E-06	2.28E-06	0.00E+00	3.45E-04	5.78E-06	4.1E-03
Base	AGRI	Adolescent	Chrysene	3.49E-05	3.49E-04	5.07E-06	2.65E-10	2.21E-06	2.68E-09	2.33E-07	2.33E-07	5.49E-08	4.64E-07	9.78E-08	2.15E-08	8.02E-09	6.98E-06	4.19E-09	2.94E-04	1.31E-05	1.25E-05	4.13E-05	5.77E-05	4.38E-07	1.72E-07	5.59E-06	5.03E-06	0.00E+00	4.36E-04	7.31E-06	5.2E-03
Base	AGRI	Adolescent	Fluoranthene	9.78E-06	9.78E-05	6.23E-05	7.43E-11	8.49E-07	4.68E-08	1.66E-07	1.66E-07	2.42E-08	3.53E-07	7.43E-08	1.39E-08	5.18E-09	1.96E-06	1.17E-09	1.27E-04	9.29E-06	5.50E-06	3.14E-05	4.38E-05	2.82E-07	1.11E-07	1.56E-06	1.41E-06	0.00E+00	2.23E-04	3.73E-06	2.7E-03
Base	AGRI	Adolescent	Fluorene	2.40E-07	2.40E-06	7.91E-05	1.82E-12	0.00E+00	2.11E-09	1.18E-08	1.18E-08	7.55E-10	8.02E-09	1.69E-09	2.80E-10	1.05E-10	4.80E-08	2.88E-11	1.67E-06	6.61E-07	1.71E-07	7.13E-07	9.96E-07	5.69E-09	2.25E-09	3.84E-08	3.46E-08	0.00E+00	4.34E-06	7.27E-08	5.2E-05
Base	AGRI	Adolescent	Indeno(1,2,3-cd)pyrene	9.88E-06	9.88E-05	1.85E-06	7.51E-11	3.14E-06	3.55E-09	1.99E-08	1.99E-08	8.67E-09	4.20E-07	8.84E-08	1.60E-08	5.96E-09	1.98E-06	1.19E-09	3.79E-04	1.12E-06	1.97E-06	3.74E-05	5.22E-05	3.25E-07	1.28E-07	1.58E-06	1.42E-06	0.00E+00	4.77E-04	7.99E-06	5.7E-03
Base	AGRI	Adolescent	Phenanthrene	4.41E-06	4.41E-05	1.36E-04	3.35E-11	2.32E-07	2.11E-08	1.46E-07	1.46E-07	1.34E-08	1.18E-07	2.48E-08	4.67E-09	1.74E-09	8.82E-07	5.30E-10	4.78E-05	8.15E-06	3.04E-06	1.05E-05	1.47E-05	9.49E-08	3.74E-08	6.35E-07	5.72E-07	0.00E+00	8.64E-05	1.45E-06	1.0E-03
Base	AGRI	Adolescent	Pyrene	1.65E-05	1.65E-04	7.47E-06	1.25E-10	7.63E-08	6.42E-09	3.20E-07	3.20E-07	3.97E-08	7.53E-08	1.58E-08	4.96E-09	1.85E-09	3.30E-06	1.98E-09	4.83E-05	1.79E-05	9.01E-06	6.70E-06	9.35E-06	1.01E-07	3.97E-08	2.64E-06	2.38E-06	0.00E+00	9.97E-05	1.67E-06	1.2E-03
Base	AGRI	Adult	Anthracene	1.63E-06	1.63E-05	3.54E-05	1.24E-11	1.21E-07	1.93E-09	5.39E-08	5.39E-08	4.08E-09	2.83E-08	5.95E-09	1.19E-09	4.43E-10	3.27E-07	1.96E-10	2.42E-05	2.48E-06	7.67E-07	2.54E-06	1.77E-06	2.52E-08	1.43E-08	4.22E-07	3.89E-07	0.00E+00	3.29E-05	4.65E-07	3.3E-04
Base	AGRI	Adult	Benzo(a)anthracene	1.06E-05	1.06E-04	4.73E-06	8.03E-11	4.16E-06	4.53E-08	7.06E-08	7.06E-08	1.66E-08	9.18E-07	1.93E-07	3.41E-08	1.27E-08	2.11E-06	1.27E-09	5.86E-04	3.25E-06	3.12E-06	8.26E-05	5.74E-05	7.22E-07	4.10E-07	1.88E-06	1.74E-06	0.00E+00	7.40E-04	1.05E-05	7.5E-03
Base	AGRI	Adult	Benzo(a)pyrene	3.47E-06	3.47E-05	9.34E-07	2.64E-11	1.12E-06	3.53E-08	1.56E-08	1.56E-08	3.49E-09	3.21E-07	6.77E-08	1.19E-08	4.43E-09	6.95E-07	4.17E-10	1.61E-04	7.16E-07	6.55E-07	2.89E-05	2.01E-05	2.52E-07	1.43E-07	6.18E-07	5.71E-07	0.00E+00	2.13E-04	3.02E-06	2.2E-03
Base	AGRI	Adult	Benzo(b)fluoranthene	5.09E-07	5.09E-06	1.40E-06	3.87E-12	8.13E-08	2.34E-09	1.93E-09	1.93E-09	9.72E-09	2.22E-08	4.66E-09	8.54E-10	3.18E-10	1.02E-07	6.11E-11	1.17E-05	8.90E-08	1.83E-06	1.99E-06	1.39E-06	1.81E-08	1.03E-08	9.06E-08	8.37E-08	0.00E+00	1.73E-05	2.45E-07	1.8E-04
Base	AGRI	Adult	Benzo(ghi) perylene	3.44E-05	3.44E-04	6.77E-06	2.61E-10	1.09E-05	7.43E-06	3.00E-08	3.00E-08	3.09E-06	1.53E-05	3.22E-06	5.47E-07	2.04E-07	6.88E-06	4.13E-09	2.52E-03	1.38E-06	5.82E-04	1.38E-03	9.57E-04	1.16E-05	6.58E-06	5.51E-06	5.09E-06	0.00E+00	5.47E-03	7.74E-05	5.5E-02
Base	AGRI	Adult	Benzo(k)fluoranthene	1.58E-05	1.58E-04	1.29E-06	1.20E-10	1.60E-06	7.66E-08	6.21E-08	6.21E-08	1.60E-08	5.65E-07	1.19E-07	2.22E-08	8.26E-09	3.17E-06	1.90E-09	2.39E-04	2.86E-06	3.00E-06	5.08E-05	3.53E-05	4.70E-07	2.67E-07	2.82E-06	2.60E-06	0.00E+00	3.40E-04	4.81E-06	3.4E-03
Base	AGRI	Adult	Chrysene	3.49E-05	3.49E-04	5.07E-06	2.65E-10	2.21E-06	2.68E-09	2.33E-07	2.33E-07	5.49E-08	4.64E-07	9.78E-08	2.15E-08	8.02E-09	6.98E-06	4.19E-09	3.35E-04	1.07E-05	1.03E-05	4.18E-05	2.90E-05	4.56E-07	2.59E-07	6.21E-06	5.74E-06	0.00E+00	4.47E-04	6.32E-06	4.5E-03
Base	AGRI	Adult	Fluoranthene	9.78E-06	9.78E-05	6.23E-05	7.43E-11	8.49E-07	4.68E-08	1.66E-07	1.66E-07	2.42E-08	3.53E-07	7.43E-08	1.39E-08	5.18E-09	1.96E-06	1.17E-09	1.45E-04	7.63E-06	4.56E-06	3.18E-05	2.21E-05	2.94E-07	1.67E-07	1.74E-06	1.61E-06	0.00E+00	2.17E-04	3.07E-06	2.2E-03
Base	AGRI	Adult	Fluorene	2.40E-07	2.40E-06	7.91E-05	1.82E-12	0.00E+00	2.11E-09	1.18E-08	1.18E-08	7.55E-10	8.02E-09	1.69E-09	2.80E-10	1.05E-10	4.80E-08	2.88E-11	1.91E-06	5.43E-07	1.42E-07	7.21E-07	5.01E-07	5.93E-09	3.38E-09	4.27E-08	3.95E-08	0.00E+00	3.95E-06	5.59E-08	4.0E-05
Base	AGRI	Adult	Indeno(1,2,3-cd)pyrene	9.88E-06	9.88E-05	1.85E-06	7.51E-11	3.14E-06	3.55E-09	1.99E-08	1.99E-08	8.67E-09	4.20E-07	8.84E-08	1.60E-08	5.96E-09	1.98E-06	1.19E-09	4.33E-04	9.17E-07	1.63E-06	3.78E-05	2.63E-05	3.39E-07	1.92E-07	1.76E-06	1.62E-06	0.00E+00	5.05E-04	7.15E-06	5.1E-03
Base	AGRI	Adult	Phenanthrene	4.41E-06	4.41E-05	1.36E-04	3.35E-11	2.32E-07	2.11E-08	1.46E-07	1.46E-07	1.34E-08	1.18E-07	2.48E-08	4.67E-09	1.74E-09	8.82E-07	5.30E-10	5.46E-05	6.70E-06	2.52E-06	1.06E-05	7.38E-06	9.89E-08	5.62E-08	7.07E-07	6.53E-07	0.00E+00	8.42E-05	1.19E-06	8.5E-04
Base	AGRI	Adult	Pyrene	1.65E-05	1.65E-04	7.47E-06	1.25E-10	7.63E-08	6.42E-09	3.20E-07	3.20E-07	3.97E-08	7.53E-08	1.58E-08	4.96E-09	1.85E-09	3.30E-06	1.98E-09	5.52E-05	1.47E-05	7.46E-06	6.77E-06	4.71E-06	1.05E-07	5.96E-08	2.94E-06	2.71E-06	0.00E+00	9.79E-05	1.39E-06	9.9E-04
Base	AGRI	Child	Anthracene	1.63E-06	1.63E-05	3.54E-05	1.24E-11	1.21E-07	1.93E-09	5.39E-08	5.39E-08	4.08E-09	2.83E-08	5.95E-09	1.19E-09	4.43E-10	3.27E-07	1.80E-10	1.73E-05	3.72E-06	6.56E-07	1.50E-06	3.70E-06	1.99E-08	9.33E-09	2.79E-07	2.16E-07	0.00E+00	2.77E-05	8.43E-07	6.0E-04
Base	AGRI	Child	Benzo(a)anthracene	1.06E-05	1.06E-04	4.73E-06	8.03E-11	4.16E-06	4.53E-08	7.06E-08	7.06E-08	1.66E-08	9.18E-07	1.93E-07	3.41E-08	1.27E-08	2.11E-06	1.16E-09	4.19E-04	4.87E-06	2.67E-06	4.86E-05	1.20E-04	5.70E-07	2.67E-07	1.25E-06	9.61E-07	0.00E+00	6.01E-04	1.83E-05	1.3E-02
Base	AGRI	Child	Benzo(a)pyrene	3.47E-06	3.47E-05	9.34E-07	2.64E-11	1.12E-06	3.53E-08	1.56E-08	1.56E-08	3.49E-09	3.21E-07	6.77E-08	1.19E-08	4.43E-09	6.95E-07	3.83E-10	1.15E-04	1.07E-06	5.61E-07	1.70E-05	4.21E-05	1.99E-07	9.33E-08	4.10E-07	3.16E-07	0.00E+00	1.78E-04	5.40E-06	3.9E-03
Base	AGRI	Child	Benzo(b)fluoranthene	5.09E-07	5.09E-06	1.40E-06	3.87E-12	8.13E-08	2.34E-09	1.93E-09	1.93E-09	9.72E-09	2.22E-08	4.66E-09	8.54E-10	3.18E-10	1.02E-07	5.61E-11	8.38E-06	1.34E-07	1.57E-06	1.17E-06	2.90E-06	1.43E-08	6.69E-09	6.01E-08	4.63E-08	0.00E+00	1.44E-05	4.37E-07	3.1E-04
Base	AGRI	Child	Benzo(ghi) perylene	3.44E-05	3.44E-04	6.77E-06	2.61E-10	1.09E-05	7.43E-06	3.00E-08	3.00E-08	3.09E-06	1.53E-05	3.22E-06	5.47E-07	2.04E-07	6.88E-06	3.79E-09	1.80E-03	2.07E-06	4.98E-04	8.11E-04	2.00E-03	9.14E-06	4.29E-06	3.65E-06	2.82E-06	0.00E+00	5.14E-03	1.56E-04	1.1E-01
Base	AGRI	Child	Benzo(k)fluoranthene	1.58E-05	1.58E-04	1.29E-06	1.20E-10	1.60E-06	7.66E-08	6.21E-08	6.21E-08	1.60E-08	5.65E-07	1.19E-07	2.22E-08	8.26E-09	3.17E-06	1.75E-09	1.71E-04	4.29E-06	2.57E-06	2.99E-05	7.40E-05	3.71E-07	1.74E-07	1.87E-06	1.44E-06	0.00E+00	2.88E-04	8.77E-06	6.3E-03
Base	AGRI	Child	Chrysene	3.49E-05	3.49E-04	5.07E-06	2.65E-10	2.21E-06	2.68E-09	2.33E-07	2.33E-07	5.49E-08	4.64E-07	9.78E-08	2.15E-08	8.02E-09	6.98E-06	3.85E-09	2.40E-04	1.61E-05	8.83E-06	2.46E-05	6.08E-05	3.60E-07	1.69E-07	4.12E-06	3.18E-06	0.00E+00	3.65E-04	1.11E-05	7.9E-03
Base	AGRI	Child	Fluoranthene	9.78E-06	9.78E-05	6.23E-05	7.43E-11	8.49E-07	4.68E-08	1.66E-07	1.66E-07	2.42E-08	3.53E-07	7.43E-08	1.39E-08	5.18E-09	1.96E-06	1.08E-09	1.04E-04	1.14E-05	3.90E-06	1.87E-05	4.62E-05	2.32E-07	1.09E-07	1.15E-06	8.90E-07	0.00E+00	1.89E-04	5.73E-06	4.1E-03
Base	AGRI	Child	Fluorene	2.40E-07	2.40E-06	7.91E-05	1.82E-12	0.00E+00	2.11E-09	1.18E-08	1.18E-08	7.55E-10	8.02E-09	1.69E-09	2.80E-10	1.05E-10	4.80E-08	2.65E-11	1.36E-06	8.15E-07	1.21E-07	4.25E-07	1.05E-06	4.68E-09	2.21E-09	2.83E-08	2.19E-08	0.00E+00	3.88E-06	1.18E-07	8.4E-05
Base	AGRI	Child	Indeno(1,2,3-cd)pyrene	9.88E-06	9.88E-05	1.85E-06	7.51E-11	3.14E-06	3.55E-09	1.99E-08	1.99E-08	8.67E-09	4.20E-07	8.84E-08	1.60E-08	5.96E-09	1.98E-06	1.09E-09	3.10E-04	1.38E-06	1.40E-06	2.23E-05	5.50E-05	2.67E-07	1.25E-07	1.17E-06	8.99E-07	0.00E+00	3.94E-04	1.20E-05	8.6E-03
Base	AGRI	Child	Phenanthrene	4.41E-06	4.41E-05	1.36E-04	3.35E-11	2.32E-07	2.11E-08	1.46E-07	1.46E-07	1.34E-08	1.18E-07	2.48E-08	4.67E-09	1.74E-09	8.82E-07	4.86E-10	3.91E-05	1.00E-05	2.16E-06	6.25E-06	1.54E-05	7.81E-08	3.67E-08	4.68E-07	3.61E-07	0.00E+00	7.48E-05	2.27E-06	1.6E-03
Base	AGRI	Child	Pyrene	1.65E-05	1.65E-04	7.47E-06	1.25E-10	7.63E-08	6.42E-09	3.20E-07	3.20E-07	3.97E-08	7.53E-08	1.58E-08	4.96E-09	1.85E-09	3.30E-06	1.82E-09	3.95E-05	2.21E-05	6.39E-06	3.99E-06	9.86E-06	8.29E-08	3.89E-08	1.95E-06	1.50E-06	0.00E+00	8.86E-05	2.69E-06	1.9E-03
Base	AGRI	Infant	Anthracene	1.63E-06	1.63E-05	3.54E-05	1.24E-11	1.21E-07	1.93E-09	5.39E-08	5.39E-08	4.08E-09	2.83E-08	5.95E-09	1.19E-09	4.43E-10	3.27E-07	2.61E-11	1.27E-05	2.69E-07	3.38E-07	0.00E+00	0.00E+00	0.00E+00	2.07E-09	1.52E-07	6.92E-08	1.08E-07	1.40E-05	1.70E-06	1.2E-03
Base	AGRI	Infant	Benzo(a)anthracene	1.06E-05	1.06E-04	4.73E-06	8.03E-11	4.16E-06	4.53E-08	7.06E-08	7.06E-08	1.66E-08	9.18E-07	1.93E-07	3.41E-08	1.27E-08	2.11E-06	1.69E-10	3.08E-04	3.53E-07	1.38E-06	0.00E+00	0.00E+00	0.00E+00	5.93E-08	6.76E-07	3.08E-07	4.18E-05	3.55E-04	4.33E-05	3.1E-02
Base	AGRI	Infant	Benzo(a)pyrene	3.47E-06	3.47E-05	9.34E-07	2.64E-11	1.12E-06	3.53E-08	1.56E-08	1.56E-08	3.49E-09	3.21E-07	6.77E-08	1.19E-08	4.43E-09	6.95E-07	5.54E-11	8.45E-05	7.79E-08	2.89E-07	0.00E+00	0.00E+00	0.00E+00	2.07E-08	2.22E-07	1.01E-07	2.36E-05	1.10E-04	1.34E-05	9.5E-03
Base	AGRI	Infant	Benzo(b)fluoranthene	5.09E-07	5.09E-06	1.40E-06	3.87E-12	8.13E-08	2.34E-09	1.93E-09	1.93E-09	9.72E-09	2.22E-08	4.66E-09	8.54E-10	3.18E-10	1.02E-07	8.13E-12	6.16E-06	9.67E-09	8.07E-07	0.00E+00	0.00E+00	0.00E+00	1.49E-09	3.26E-08	1.49E-08	2.57E-06	9.70E-06	1.18E-06	8.4E-04
Base	AGRI	Infant	Benzo(ghi) perylene	3.44E-05	3.44E-04	6.77E-06	2.61E-10	1.09E-05	7.43E-06	3.00E-08	3.00E-08	3.09E-06	1.53E-05	3.22E-06	5.47E-07	2.04E-07	6.88E-06	5.49E-10	1.32E-03	1.50E-07	2.57E-04	0.00E+00	0.00E+00	0.00E+00	9.51E-07	1.98E-06	9.04E-07	6.77E-03	8.36E-03	1.02E-03	7.3E-01
Base	AGRI	Infant	Benzo(k)fluoranthene	1.58E-05	1.58E-04	1.29E-06	1.20E-10	1.60E-06	7.66E-08	6.21E-08	6.21E-08	1.60E-08	5.65E-07	1.19E-07	2.22E-08	8.26E-09	3.17E-06	2.53E-10	1.25E-04	3.11E-07	1.33E-06	0.00E+00	0.00E+00	0.00E+00	3.86E-08	1.01E-06	4.62E-07	4.76E-05	1.79E-04	2.19E-05	1.6E-02
Base	AGRI	Infant	Chrysene	3.49E-05	3.49E-04	5.07E-06	2.65E-10	2.21E-06	2.68E-09	2.33E-07	2.33E-07	5.49E-08	4.64E-07	9.78E-08	2.15E-08	8.02E-09	6.98E-06	5.57E-10	1.76E-04	1.17E-06	4.55E-06	0.00E+00	0.00E+00	0.00E+00	3.75E-08	2.23E-06	1.02E-06	2.53E-05	2.18E-04	2.65E-05	1.9E-02
Base	AGRI	Infant	Fluoranthene	9.78E-06	9.78E-05	6.23E-05	7.43E-11	8.49E-07	4.68E-08	1.66E-07	1.66E-07	2.42E-08	3.53E-07	7.43E-08	1.39E-08	5.18E-09	1.96E-06	1.56E-10	7.64E-05	8.29E-07	2.01E-06	0.00E+00	0.00E+00	0.00E+00	2.42E-08	6.26E-07	2.86E-07	2.41E-06	8.46E-05	1.03E-05	7.4E-03
Base	AGRI	Infant	Fluorene	2.40E-07	2.40E-06	7.91E-05	1.82E-12	0.00E+00	2.11E-09	1.18E-08	1.18E-08	7.55E-10	8.02E-09	1.69E-09	2.80E-10	1.05E-10	4.80E-08	3.83E-12	1.00E-06	5.91E-08	6.26E-08	0.00E+00	0.00E+00	0.00E+00	4.89E-10	1.54E-08	7.01E-09	7.10E-09	1.20E-06	1.47E-07	1.0E-04
Base	AGRI	Infant	Indeno(1,2,3-cd)pyrene	9.88E-06	9.88E-05	1.85E-06	7.51E-11	3.14E-06	3.55E-09	1.99E-08	1.99E-08	8.67E-09	4.20E-07	8.84E-08	1.60E-08	5.96E-09	1.98E-06	1.58E-10	2.27E-04	9.97E-08	7.20E-07	0.00E+00	0.00E+00	0.00E+00	2.78E-08	6.33E-07	2.89E-07	2.00E-04	4.32E-04	5.26E-05	3.8E-02
Base	AGRI	Infant	Phenanthrene	4.41E-06	4.41E-05	1.36E-04	3.35E-11	2.32E-07	2.11E-08	1.46E-07	1.46E-07	1.34E-08	1.18E-07	2.48E-08	4.67E-09	1.74E-09	8.82E-07	7.04E-11	2.87E-05	7.28E-07	1.11E-06	0.00E+00	0.00E+00	0.00E+00	8.13E-09	2.54E-07	1.16E-07	2.87E-07	3.21E-05	3.91E-06	2.8E-03
Base	AGRI	Infant	Pyrene	1.65E-05	1.65E-04	7.47E-06	1.25E-10	7.63E-08	6.42E-09	3.20E-07	3.20E-07	3.97E-08	7.53E-08	1.58E-08	4.96E-09	1.85E-09	3.30E-06	2.63E-10	2.90E-05	1.60E-06	3.29E-06	0.00E+00	0.00E+00	0.00E+00	8.62E-09	1.06E-06	4.82E-07	7.68E-07	3.95E-05	4.82E-06	3.4E-03
Base	AGRI	Toddler	Anthracene	1.63E-06	1.63E-05	3.54E-05	1.24E-11	1.21E-07	1.93E-09	5.39E-08	5.39E-08	4.08E-09	2.83E-08	5.95E-09	1.19E-09	4.43E-10	1.31E-06	1.15E-10	1.18E-05	2.16E-06	4.28E-07	1.05E-06	4.03E-06	1.57E-08	1.07E-08	2.04E-07	1.22E-07	0.00E+00	2.11E-05	1.28E-06	9.2E-04
Base	AGRI	Toddler	Benzo(a)anthracene	1.06E-05	1.06E-04	4.73E-06	8.03E-11	4.16E-06	4.53E-08	7.06E-08	7.06E-08	1.66E-08	9.18E-07	1.93E-07	3.41E-08	1.27E-08	8.45E-06	7.47E-10	2.87E-04	2.82E-06	1.74E-06	3.40E-05	1.31E-04	4.51E-07	3.07E-07	9.08E-07	5.45E-07	0.00E+00	4.67E-04	2.83E-05	2.0E-02
Base	AGRI	Toddler	Benzo(a)pyrene	3.47E-06	3.47E-05	9.34E-07	2.64E-11	1.12E-06	3.53E-08	1.56E-08	1.56E-08	3.49E-09	3.21E-07	6.77E-08	1.19E-08	4.43E-09	2.78E-06	2.46E-10	7.86E-05	6.23E-07	3.66E-07	1.19E-05	4.58E-05	1.58E-07	1.07E-07	2.99E-07	1.79E-07	0.00E+00	1.41E-04	8.54E-06	6.1E-03
Base	AGRI	Toddler	Benzo(b)fluoranthene	5.09E-07	5.09E-06	1.40E-06	3.87E-12	8.13E-08	2.34E-09	1.93E-09	1.93E-09	9.72E-09	2.22E-08	4.66E-09	8.54E-10	3.18E-10	4.07E-07	3.60E-11	5.73E-06	7.74E-08	1.02E-06	8.20E-07	3.16E-06	1.13E-08	7.68E-09	4.38E-08	2.63E-08	0.00E+00	1.13E-05	6.85E-07	4.9E-04
Base	AGRI	Toddler	Benzo(ghi) perylene	3.44E-05	3.44E-04	6.77E-06	2.61E-10	1.09E-05	7.43E-06	3.00E-08	3.00E-08	3.09E-06	1.53E-05	3.22E-06	5.47E-07	2.04E-07	2.75E-05	2.43E-09	1.23E-03	1.20E-06	3.25E-04	5.66E-04	2.18E-03	7.24E-06	4.92E-06	2.66E-06	1.60E-06	0.00E+00	4.35E-03	2.64E-04	1.9E-01
Base	AGRI	Toddler	Benzo(k)fluoranthene	1.58E-05	1.58E-04	1.29E-06	1.20E-10	1.60E-06	7.66E-08	6.21E-08	6.21E-08	1.60E-08	5.65E-07	1.19E-07	2.22E-08	8.26E-09	1.27E-05	1.12E-09	1.17E-04	2.49E-06	1.68E-06	2.09E-05	8.05E-05	2.94E-07	2.00E-07	1.36E-06	8.17E-07	0.00E+00	2.38E-04	1.44E-05	1.0E-02
Base	AGRI	Toddler	Chrysene	3.49E-05	3.49E-04	5.07E-06	2.65E-10	2.21E-06	2.68E-09	2.33E-07	2.33E-07	5.49E-08	4.64E-07	9.78E-08	2.15E-08	8.02E-09	2.79E-05	2.47E-09	1.64E-04	9.33E-06	5.76E-06	1.72E-05	6.62E-05	2.85E-07	1.94E-07	3.00E-06	1.80E-06	0.00E+00	2.96E-04	1.79E-05	1.3E-02
Base	AGRI	Toddler	Fluoranthene	9.78E-06	9.78E-05	6.23E-05	7.43E-11	8.49E-07	4.68E-08	1.66E-07	1.66E-07	2.42E-08	3.53E-07	7.43E-08	1.39E-08	5.18E-09	7.82E-06	6.91E-10	7.11E-05	6.63E-06	2.54E-06	1.31E-05	5.03E-05	1.84E-07	1.25E-07	8.41E-07	5.05E-07	0.00E+00	1.53E-04	9.28E-06	6.6E-03
Base	AGRI	Toddler	Fluorene	2.40E-07	2.40E-06	7.91E-05	1.82E-12	0.00E+00	2.11E-09	1.18E-08	1.18E-08	7.55E-10	8.02E-09	1.69E-09	2.80E-10	1.05E-10	1.92E-07	1.70E-11	9.33E-07	4.72E-07	7.92E-08	2.97E-07	1.14E-06	3.71E-09	2.53E-09	2.07E-08	1.24E-08	0.00E+00	3.15E-06	1.91E-07	1.4E-04
Base	AGRI	Toddler	Indeno(1,2,3-cd)pyrene	9.88E-06	9.88E-05	1.85E-06	7.51E-11	3.14E-06	3.55E-09	1.99E-08	1.99E-08	8.67E-09	4.20E-07	8.84E-08	1.60E-08	5.96E-09	7.91E-06	6.99E-10	2.12E-04	7.97E-07	9.11E-07	1.55E-05	5.99E-05	2.12E-07	1.44E-07	8.50E-07	5.10E-07	0.00E+00	2.98E-04	1.81E-05	1.3E-02
Base	AGRI	Toddler	Phenanthrene	4.41E-06	4.41E-05	1.36E-04	3.35E-11	2.32E-07	2.11E-08	1.46E-07	1.46E-07	1.34E-08	1.18E-07	2.48E-08	4.67E-09	1.74E-09	3.53E-06	3.12E-10	2.67E-05	5.82E-06	1.41E-06	4.36E-06	1.68E-05	6.19E-08	4.21E-08	3.41E-07	2.05E-07	0.00E+00	5.93E-05	3.59E-06	2.6E-03
Base	AGRI	Toddler	Pyrene	1.65E-05	1.65E-04	7.47E-06	1.25E-10	7.63E-08	6.42E-09	3.20E-07	3.20E-07	3.97E-08	7.53E-08	1.58E-08	4.96E-09	1.85E-09	1.32E-05	1.17E-09	2.70E-05	1.28E-05	4.17E-06	2.79E-06	1.07E-05	6.56E-08	4.46E-08	1.42E-06	8.52E-07	0.00E+00	7.30E-05	4.43E-06	3.2E-03
Application	AGRI	Adolescent	Anthracene	2.40E-06	2.40E-05	5.21E-05	1.83E-11	1.77E-07	2.84E-09	7.93E-08	7.93E-08	6.00E-09	4.16E-08	8.75E-09	1.75E-09	6.52E-10	4.80E-07	2.88E-10	3.11E-05	4.44E-06	1.36E-06	3.70E-06	5.17E-06	3.55E-08	1.40E-08	5.57E-07	5.02E-07	0.00E+00	4.74E-05	7.94E-07	5.7E-04
Application	AGRI	Adolescent	Benzo(a)anthracene	3.32E-05	3.32E-04	1.49E-05	2.52E-10	1.31E-05	1.42E-07	2.22E-07	2.22E-07	5.21E-08	2.88E-06	6.07E-07	1.07E-07	3.99E-08	6.63E-06	3.98E-09	1.61E-03	1.24E-05	1.18E-05	2.56E-04	3.58E-04	2.18E-06	8.58E-07	5.31E-06	4.78E-06	0.00E+00	2.27E-03	3.80E-05	2.7E-02
Application	AGRI	Adolescent	Benzo(a)pyrene	6.60E-05	6.60E-04	1.77E-05	5.01E-10	2.13E-05	6.70E-07	2.96E-07	2.96E-07	6.62E-08	6.11E-06	1.29E-06	2.26E-07	8.42E-08	1.32E-05	7.92E-09	2.68E-03	1.66E-05	1.50E-05	5.43E-04	7.58E-04	4.59E-06	1.81E-06	1.06E-05	9.50E-06	0.00E+00	4.05E-03	6.78E-05	4.8E-02
Application	AGRI	Adolescent	Benzo(b)fluoranthene	1.01E-04	1.01E-03	2.79E-04	7.69E-10	1.62E-05	4.65E-07	3.85E-07	3.85E-07	1.93E-06	4.40E-06	9.27E-07	1.70E-07	6.32E-08	2.02E-05	1.22E-08	2.04E-03	2.15E-05	4.39E-04	3.92E-04	5.47E-04	3.45E-06	1.36E-06	1.62E-05	1.46E-05	0.00E+00	3.50E-03	5.86E-05	4.2E-02
Application	AGRI	Adolescent	Benzo(ghi) perylene	3.59E-05	3.59E-04	7.07E-06	2.73E-10	1.14E-05	7.75E-06	3.13E-08	3.13E-08	3.23E-06	1.60E-05	3.36E-06	5.70E-07	2.12E-07	7.17E-06	4.31E-09	2.30E-03	1.75E-06	7.32E-04	1.42E-03	1.98E-03	1.16E-05	4.57E-06	5.17E-06	4.65E-06	0.00E+00	6.47E-03	1.08E-04	7.7E-02
Application	AGRI	Adolescent	Benzo(k)fluoranthene	2.02E-05	2.02E-04	1.65E-06	1.54E-10	2.04E-06	9.77E-08	7.93E-08	7.93E-08	2.04E-08	7.20E-07	1.52E-07	2.83E-08	1.05E-08	4.04E-06	2.43E-09	2.67E-04	4.44E-06	4.63E-06	6.41E-05	8.95E-05	5.75E-07	2.27E-07	3.23E-06	2.91E-06	0.00E+00	4.40E-04	7.37E-06	5.3E-03
Application	AGRI	Adolescent	Chrysene	3.63E-05	3.63E-04	5.27E-06	2.76E-10	2.30E-06	2.78E-09	2.42E-07	2.42E-07	5.70E-08	4.83E-07	1.02E-07	2.24E-08	8.34E-09	7.26E-06	4.36E-09	3.05E-04	1.36E-05	1.29E-05	4.30E-05	6.00E-05	4.55E-07	1.79E-07	5.81E-06	5.23E-06	0.00E+00	4.54E-04	7.60E-06	5.4E-03
Application	AGRI	Adolescent	Fluoranthene	9.87E-06	9.87E-05	6.29E-05	7.50E-11	8.57E-07	4.73E-08	1.67E-07	1.67E-07	2.45E-08	3.56E-07	7.49E-08	1.40E-08	5.22E-09	1.97E-06	1.18E-09	1.29E-04	9.37E-06	5.55E-06	3.17E-05	4.42E-05	2.85E-07	1.12E-07	1.58E-06	1.42E-06	0.00E+00	2.25E-04	3.76E-06	2.7E-03
Application	AGRI	Adolescent	Fluorene	2.44E-07	2.44E-06	8.04E-05	1.85E-12	0.00E+00	2.14E-09	1.20E-08	1.20E-08	7.66E-10	8.14E-09	1.71E-09	2.84E-10	1.06E-10	4.88E-08	2.93E-11	1.70E-06	6.72E-07	1.74E-07	7.24E-07	1.01E-06	5.78E-09	2.29E-09	3.90E-08	3.51E-08	0.00E+00	4.41E-06	7.38E-08	5.3E-05
Application	AGRI	Adolescent	Indeno(1,2,3-cd)pyrene	1.01E-05	1.01E-04	1.88E-06	7.65E-11	3.19E-06	3.61E-09	2.03E-08	2.03E-08	8.83E-09	4.28E-07	9.00E-08	1.63E-08	6.07E-09	2.01E-06	1.21E-09	3.86E-04	1.14E-06	2.00E-06	3.81E-05	5.31E-05	3.31E-07	1.30E-07	1.61E-06	1.45E-06	0.00E+00	4.86E-04	8.14E-06	5.8E-03
Application	AGRI	Adolescent	Phenanthrene	4.47E-06	4.47E-05	1.38E-04	3.40E-11	2.35E-07	2.13E-08	1.48E-07	1.48E-07	1.36E-08	1.20E-07	2.52E-08	4.74E-09	1.76E-09	8.94E-07	5.37E-10	4.85E-05	8.26E-06	3.08E-06	1.06E-05	1.49E-05	9.62E-08	3.79E-08	6.44E-07	5.79E-07	0.00E+00	8.76E-05	1.47E-06	1.0E-03
Application	AGRI	Adolescent	Pyrene	1.93E-05	1.93E-04	8.73E-06	1.47E-10	8.93E-08	7.52E-09	3.74E-07	3.74E-07	4.64E-08	8.81E-08	1.85E-08	5.80E-09	2.16E-09	3.86E-06	2.32E-09	5.65E-05	2.10E-05	1.05E-05	7.84E-06	1.09E-05	1.18E-07	4.64E-08	3.09E-06	2.78E-06	0.00E+00	1.17E-04	1.95E-06	1.4E-03
Application	AGRI	Adult	Anthracene	2.40E-06	2.40E-05	5.21E-05	1.83E-11	1.77E-07	2.84E-09	7.93E-08	7.93E-08	6.00E-09	4.16E-08	8.75E-09	1.75E-09	6.52E-10	4.80E-07	2.88E-10	3.55E-05	3.65E-06	1.13E-06	3.74E-06	2.60E-06	3.70E-08	2.10E-08	6.20E-07	5.73E-07	0.00E+00	4.84E-05	6.85E-07	4.9E-04
Application	AGRI	Adult	Benzo(a)anthracene	3.32E-05	3.32E-04	1.49E-05	2.52E-10	1.31E-05	1.42E-07	2.22E-07	2.22E-07	5.21E-08	2.88E-06	6.07E-07	1.07E-07	3.99E-08	6.63E-06	3.98E-09	1.84E-03	1.02E-05	9.80E-06	2.59E-04	1.80E-04	2.27E-06	1.29E-06	5.90E-06	5.45E-06	0.00E+00	2.32E-03	3.29E-05	2.3E-02
Application	AGRI	Adult	Benzo(a)pyrene	6.60E-05	6.60E-04	1.77E-05	5.01E-10	2.13E-05	6.70E-07	2.96E-07	2.96E-07	6.62E-08	6.11E-06	1.29E-06	2.26E-07	8.42E-08	1.32E-05	7.92E-09	3.05E-03	1.36E-05	1.24E-05	5.49E-04	3.82E-04	4.79E-06	2.72E-06	1.17E-05	1.08E-05	0.00E+00	4.05E-03	5.74E-05	4.1E-02
Application	AGRI	Adult	Benzo(b)fluoranthene	1.01E-04	1.01E-03	2.79E-04	7.69E-10	1.62E-05	4.65E-07	3.85E-07	3.85E-07	1.93E-06	4.40E-06	9.27E-07	1.70E-07	6.32E-08	2.02E-05	1.22E-08	2.33E-03	1.77E-05	3.63E-04	3.96E-04	2.75E-04	3.59E-06	2.04E-06	1.80E-05	1.66E-05	0.00E+00	3.44E-03	4.87E-05	3.5E-02
Application	AGRI	Adult	Benzo(ghi) perylene	3.59E-05	3.59E-04	7.07E-06	2.73E-10	1.14E-05	7.75E-06	3.13E-08	3.13E-08	3.23E-06	1.60E-05	3.36E-06	5.70E-07	2.12E-07	7.17E-06	4.31E-09	2.62E-03	1.44E-06	6.07E-04	1.44E-03	9.98E-04	1.21E-05	6.86E-06	5.75E-06	5.31E-06	0.00E+00	5.71E-03	8.07E-05	5.8E-02
Application	AGRI	Adult	Benzo(k)fluoranthene	2.02E-05	2.02E-04	1.65E-06	1.54E-10	2.04E-06	9.77E-08	7.93E-08	7.93E-08	2.04E-08	7.20E-07	1.52E-07	2.83E-08	1.05E-08	4.04E-06	2.43E-09	3.04E-04	3.65E-06	3.83E-06	6.48E-05	4.50E-05	5.99E-07	3.40E-07	3.60E-06	3.32E-06	0.00E+00	4.34E-04	6.13E-06	4.4E-03
Application	AGRI	Adult	Chrysene	3.63E-05	3.63E-04	5.27E-06	2.76E-10	2.30E-06	2.78E-09	2.42E-07	2.42E-07	5.70E-08	4.83E-07	1.02E-07	2.24E-08	8.34E-09	7.26E-06	4.36E-09	3.49E-04	1.12E-05	1.07E-05	4.34E-05	3.02E-05	4.74E-07	2.69E-07	6.46E-06	5.97E-06	0.00E+00	4.64E-04	6.57E-06	4.7E-03
Application	AGRI	Adult	Fluoranthene	9.87E-06	9.87E-05	6.29E-05	7.50E-11	8.57E-07	4.73E-08	1.67E-07	1.67E-07	2.45E-08	3.56E-07	7.49E-08	1.40E-08	5.22E-09	1.97E-06	1.18E-09	1.47E-04	7.70E-06	4.60E-06	3.20E-05	2.23E-05	2.97E-07	1.69E-07	1.76E-06	1.62E-06	0.00E+00	2.19E-04	3.10E-06	2.2E-03
Application	AGRI	Adult	Fluorene	2.44E-07	2.44E-06	8.04E-05	1.85E-12	0.00E+00	2.14E-09	1.20E-08	1.20E-08	7.66E-10	8.14E-09	1.71E-09	2.84E-10	1.06E-10	4.88E-08	2.93E-11	1.94E-06	5.52E-07	1.44E-07	7.33E-07	5.09E-07	6.02E-09	3.44E-09	4.34E-08	4.01E-08	0.00E+00	4.02E-06	5.68E-08	4.1E-05
Application	AGRI	Adult	Indeno(1,2,3-cd)pyrene	1.01E-05	1.01E-04	1.88E-06	7.65E-11	3.19E-06	3.61E-09	2.03E-08	2.03E-08	8.83E-09	4.28E-07	9.00E-08	1.63E-08	6.07E-09	2.01E-06	1.21E-09	4.41E-04	9.34E-07	1.66E-06	3.85E-05	2.67E-05	3.45E-07	1.96E-07	1.79E-06	1.65E-06	0.00E+00	5.15E-04	7.28E-06	5.2E-03
Application	AGRI	Adult	Phenanthrene	4.47E-06	4.47E-05	1.38E-04	3.40E-11	2.35E-07	2.13E-08	1.48E-07	1.48E-07	1.36E-08	1.20E-07	2.52E-08	4.74E-09	1.76E-09	8.94E-07	5.37E-10	5.54E-05	6.79E-06	2.55E-06	1.08E-05	7.48E-06	1.00E-07	5.70E-08	7.16E-07	6.61E-07	0.00E+00	8.54E-05	1.21E-06	8.6E-04
Application	AGRI	Adult	Pyrene	1.93E-05	1.93E-04	8.73E-06	1.47E-10	8.93E-08	7.52E-09	3.74E-07	3.74E-07	4.64E-08	8.81E-08	1.85E-08	5.80E-09	2.16E-09	3.86E-06	2.32E-09	6.45E-05	1.72E-05	8.73E-06	7.92E-06	5.51E-06	1.23E-07	6.97E-08	3.44E-06	3.17E-06	0.00E+00	1.15E-04	1.62E-06	1.2E-03
Application	AGRI	Child	Anthracene	2.40E-06	2.40E-05	5.21E-05	1.83E-11	1.77E-07	2.84E-09	7.93E-08	7.93E-08	6.00E-09	4.16E-08	8.75E-09	1.75E-09	6.52E-10	4.80E-07	2.65E-10	2.54E-05	5.47E-06	9.65E-07	2.20E-06	5.45E-06	2.92E-08	1.37E-08	4.11E-07	3.17E-07	0.00E+00	4.08E-05	1.24E-06	8.9E-04
Application	AGRI	Child	Benzo(a)anthracene	3.32E-05	3.32E-04	1.49E-05	2.52E-10	1.31E-05	1.42E-07	2.22E-07	2.22E-07	5.21E-08	2.88E-06	6.07E-07	1.07E-07	3.99E-08	6.63E-06	3.66E-09	1.32E-03	1.53E-05	8.39E-06	1.53E-04	3.77E-04	1.79E-06	8.40E-07	3.91E-06	3.02E-06	0.00E+00	1.89E-03	5.74E-05	4.1E-02
Application	AGRI	Child	Benzo(a)pyrene	6.60E-05	6.60E-04	1.77E-05	5.01E-10	2.13E-05	6.70E-07	2.96E-07	2.96E-07	6.62E-08	6.11E-06	1.29E-06	2.26E-07	8.42E-08	1.32E-05	7.27E-09	2.18E-03	2.04E-05	1.07E-05	3.24E-04	7.99E-04	3.78E-06	1.77E-06	7.79E-06	6.00E-06	0.00E+00	3.37E-03	1.02E-04	7.3E-02
Application	AGRI	Child	Benzo(b)fluoranthene	1.01E-04	1.01E-03	2.79E-04	7.69E-10	1.62E-05	4.65E-07	3.85E-07	3.85E-07	1.93E-06	4.40E-06	9.27E-07	1.70E-07	6.32E-08	2.02E-05	1.12E-08	1.67E-03	2.65E-05	3.11E-04	2.33E-04	5.77E-04	2.84E-06	1.33E-06	1.19E-05	9.21E-06	0.00E+00	2.86E-03	8.69E-05	6.2E-02

Table B1- 6 Summary of Predicted Human Exposures for Each Scenario, Site, Receptor and Chemical

								Environmental Concentrations									EDI														
								Plant	Plant	Plant	Berries	Root	Beef	Dairy	Chicken	Eggs	Soil	Dust	Plant	Berries	Root	Beef	Dairy	Chicken	Eggs	Dermal	Dermal	Breast Milk	Total	Total	RQ
				Soil	Surface Soil	Air	Dust	Deposition	Air	Soil	Soil	Soil					SIR	AIR	Plant	Berries	Root	Beef	Dairy	Chicken	Eggs	Hands	Other	Breast Milk	EDI	EDI	
Scenario	Site	Receptor	Chemical	mg/kg	mg/kg	ug/m^3	ug/m^3	mg/kg ww	mg/kg ww	mg/kg ww	mg/kg ww	mg/kg ww	mg/kg ww	mg/kg ww	mg/kg ww	mg/kg ww	ug/day	ug/day	ug/day	ug/day	ug/day	ug/day	ug/day	ug/day	ug/day	ug/day	ug/day	ug/day	ug/day	ug/kg-BW/day	Unitless
Application	AGRI	Child	Benzo(ghi) perylene	3.59E-05	3.59E-04	7.07E-06	2.73E-10	1.14E-05	7.75E-06	3.13E-08	3.13E-08	3.23E-06	1.60E-05	3.36E-06	5.70E-07	2.12E-07	7.17E-06	3.95E-09	1.88E-03	2.16E-06	5.19E-04	8.46E-04	2.09E-03	9.54E-06	4.47E-06	3.81E-06	2.94E-06	0.00E+00	5.36E-03	1.63E-04	1.2E-01
Application	AGRI	Child	Benzo(k)fluoranthene	2.02E-05	2.02E-04	1.65E-06	1.54E-10	2.04E-06	9.77E-08	7.93E-08	7.93E-08	2.04E-08	7.20E-07	1.52E-07	2.83E-08	1.05E-08	4.04E-06	2.23E-09	2.18E-04	5.47E-06	3.28E-06	3.82E-05	9.43E-05	4.73E-07	2.22E-07	2.38E-06	1.84E-06	0.00E+00	3.68E-04	1.12E-05	8.0E-03
Application	AGRI	Child	Chrysene	3.63E-05	3.63E-04	5.27E-06	2.76E-10	2.30E-06	2.78E-09	2.42E-07	2.42E-07	5.70E-08	4.83E-07	1.02E-07	2.24E-08	8.34E-09	7.26E-06	4.00E-09	2.49E-04	1.67E-05	9.18E-06	2.56E-05	6.32E-05	3.74E-07	1.76E-07	4.28E-06	3.30E-06	0.00E+00	3.79E-04	1.15E-05	8.2E-03
Application	AGRI	Child	Fluoranthene	9.87E-06	9.87E-05	6.29E-05	7.50E-11	8.57E-07	4.73E-08	1.67E-07	1.67E-07	2.45E-08	3.56E-07	7.49E-08	1.40E-08	5.22E-09	1.97E-06	1.09E-09	1.05E-04	1.15E-05	3.94E-06	1.89E-05	4.66E-05	2.34E-07	1.10E-07	1.16E-06	8.98E-07	0.00E+00	1.90E-04	5.79E-06	4.1E-03
Application	AGRI	Child	Fluorene	2.44E-07	2.44E-06	8.04E-05	1.85E-12	0.00E+00	2.14E-09	1.20E-08	1.20E-08	7.66E-10	8.14E-09	1.71E-09	2.84E-10	1.06E-10	4.88E-08	2.69E-11	1.39E-06	8.28E-07	1.23E-07	4.31E-07	1.07E-06	4.76E-09	2.24E-09	2.88E-08	2.22E-08	0.00E+00	3.94E-06	1.20E-07	8.6E-05
Application	AGRI	Child	Indeno(1,2,3-cd)pyrene	1.01E-05	1.01E-04	1.88E-06	7.65E-11	3.19E-06	3.61E-09	2.03E-08	2.03E-08	8.83E-09	4.28E-07	9.00E-08	1.63E-08	6.07E-09	2.01E-06	1.11E-09	3.15E-04	1.40E-06	1.42E-06	2.27E-05	5.60E-05	2.72E-07	1.28E-07	1.19E-06	9.16E-07	0.00E+00	4.01E-04	1.22E-05	8.7E-03
Application	AGRI	Child	Phenanthrene	4.47E-06	4.47E-05	1.38E-04	3.40E-11	2.35E-07	2.13E-08	1.48E-07	1.48E-07	1.36E-08	1.20E-07	2.52E-08	4.74E-09	1.76E-09	8.94E-07	4.93E-10	3.96E-05	1.02E-05	2.19E-06	6.34E-06	1.57E-05	7.92E-08	3.71E-08	4.75E-07	3.66E-07	0.00E+00	7.58E-05	2.30E-06	1.6E-03
Application	AGRI	Child	Pyrene	1.93E-05	1.93E-04	8.73E-06	1.47E-10	8.93E-08	7.52E-09	3.74E-07	3.74E-07	4.64E-08	8.81E-08	1.85E-08	5.80E-09	2.16E-09	3.86E-06	2.13E-09	4.62E-05	2.58E-05	7.47E-06	4.67E-06	1.15E-05	9.69E-08	4.55E-08	2.28E-06	1.76E-06	0.00E+00	1.04E-04	3.15E-06	2.3E-03
Application	AGRI	Infant	Anthracene	2.40E-06	2.40E-05	5.21E-05	1.83E-11	1.77E-07	2.84E-09	7.93E-08	7.93E-08	6.00E-09	4.16E-08	8.75E-09	1.75E-09	6.52E-10	4.80E-07	3.83E-11	1.87E-05	3.96E-07	4.98E-07	0.00E+00	0.00E+00	0.00E+00	3.04E-09	2.23E-07	1.02E-07	9.03E-07	2.13E-05	2.60E-06	1.9E-03
Application	AGRI	Infant	Benzo(a)anthracene	3.32E-05	3.32E-04	1.49E-05	2.52E-10	1.31E-05	1.42E-07	2.22E-07	2.22E-07	5.21E-08	2.88E-06	6.07E-07	1.07E-07	3.99E-08	6.63E-06	5.29E-10	9.68E-04	1.11E-06	4.33E-06	0.00E+00	0.00E+00	0.00E+00	1.86E-07	2.12E-06	9.69E-07	1.12E-03	2.10E-03	2.56E-04	1.8E-01
Application	AGRI	Infant	Benzo(a)pyrene	6.60E-05	6.60E-04	1.77E-05	5.01E-10	2.13E-05	6.70E-07	2.96E-07	2.96E-07	6.62E-08	6.11E-06	1.29E-06	2.26E-07	8.42E-08	1.32E-05	1.05E-09	1.61E-03	1.48E-06	5.49E-06	0.00E+00	0.00E+00	0.00E+00	3.93E-07	4.22E-06	1.93E-06	4.67E-03	6.30E-03	7.69E-04	5.5E-01
Application	AGRI	Infant	Benzo(b)fluoranthene	1.01E-04	1.01E-03	2.79E-04	7.69E-10	1.62E-05	4.65E-07	3.85E-07	3.85E-07	1.93E-06	4.40E-06	9.27E-07	1.70E-07	6.32E-08	2.02E-05	1.62E-09	1.22E-03	1.92E-06	1.60E-04	0.00E+00	0.00E+00	0.00E+00	2.95E-07	6.48E-06	2.96E-06	5.35E-03	6.76E-03	8.25E-04	5.9E-01
Application	AGRI	Infant	Benzo(ghi) perylene	3.59E-05	3.59E-04	7.07E-06	2.73E-10	1.14E-05	7.75E-06	3.13E-08	3.13E-08	3.23E-06	1.60E-05	3.36E-06	5.70E-07	2.12E-07	7.17E-06	5.73E-10	1.38E-03	1.56E-07	2.68E-04	0.00E+00	0.00E+00	0.00E+00	9.92E-07	2.07E-06	9.43E-07	1.60E-02	1.76E-02	2.15E-03	**1.5E+00**
Application	AGRI	Infant	Benzo(k)fluoranthene	2.02E-05	2.02E-04	1.65E-06	1.54E-10	2.04E-06	9.77E-08	7.93E-08	7.93E-08	2.04E-08	7.20E-07	1.52E-07	2.83E-08	1.05E-08	4.04E-06	3.22E-10	1.60E-04	3.96E-07	1.69E-06	0.00E+00	0.00E+00	0.00E+00	4.92E-08	1.29E-06	5.90E-07	3.18E-04	4.86E-04	5.93E-05	4.2E-02
Application	AGRI	Infant	Chrysene	3.63E-05	3.63E-04	5.27E-06	2.76E-10	2.30E-06	2.78E-09	2.42E-07	2.42E-07	5.70E-08	4.83E-07	1.02E-07	2.24E-08	8.34E-09	7.26E-06	5.79E-10	1.83E-04	1.21E-06	4.73E-06	0.00E+00	0.00E+00	0.00E+00	3.89E-08	2.32E-06	1.06E-06	4.84E-05	2.48E-04	3.03E-05	2.2E-02
Application	AGRI	Infant	Fluoranthene	9.87E-06	9.87E-05	6.29E-05	7.50E-11	8.57E-07	4.73E-08	1.67E-07	1.67E-07	2.45E-08	3.56E-07	7.49E-08	1.40E-08	5.22E-09	1.97E-06	1.57E-10	7.71E-05	8.37E-07	2.03E-06	0.00E+00	0.00E+00	0.00E+00	2.44E-08	6.31E-07	2.88E-07	3.00E-06	8.59E-05	1.05E-05	7.5E-03
Application	AGRI	Infant	Fluorene	2.44E-07	2.44E-06	8.04E-05	1.85E-12	0.00E+00	2.14E-09	1.20E-08	1.20E-08	7.66E-10	8.14E-09	1.71E-09	2.84E-10	1.06E-10	4.88E-08	3.89E-12	1.02E-06	6.00E-08	6.36E-08	0.00E+00	0.00E+00	0.00E+00	4.97E-10	1.56E-08	7.12E-09	9.98E-09	1.22E-06	1.49E-07	1.1E-04
Application	AGRI	Infant	Indeno(1,2,3-cd)pyrene	1.01E-05	1.01E-04	1.88E-06	7.65E-11	3.19E-06	3.61E-09	2.03E-08	2.03E-08	8.83E-09	4.28E-07	9.00E-08	1.63E-08	6.07E-09	2.01E-06	1.61E-10	2.32E-04	1.01E-07	7.33E-07	0.00E+00	0.00E+00	0.00E+00	2.83E-08	6.44E-07	2.94E-07	2.85E-04	5.20E-04	6.34E-05	4.5E-02
Application	AGRI	Infant	Phenanthrene	4.47E-06	4.47E-05	1.38E-04	3.40E-11	2.35E-07	2.13E-08	1.48E-07	1.48E-07	1.36E-08	1.20E-07	2.52E-08	4.74E-09	1.76E-09	8.94E-07	7.14E-11	2.91E-05	7.38E-07	1.13E-06	0.00E+00	0.00E+00	0.00E+00	8.24E-09	2.58E-07	1.17E-07	3.70E-07	3.26E-05	3.98E-06	2.8E-03
Application	AGRI	Infant	Pyrene	1.93E-05	1.93E-04	8.73E-06	1.47E-10	8.93E-08	7.52E-09	3.74E-07	3.74E-07	4.64E-08	8.81E-08	1.85E-08	5.80E-09	2.16E-09	3.86E-06	3.08E-10	3.39E-05	1.87E-06	3.85E-06	0.00E+00	0.00E+00	0.00E+00	1.01E-08	1.24E-06	5.64E-07	3.80E-06	4.91E-05	5.99E-06	4.3E-03
Application	AGRI	Toddler	Anthracene	2.40E-06	2.40E-05	5.21E-05	1.83E-11	1.77E-07	2.84E-09	7.93E-08	7.93E-08	6.00E-09	4.16E-08	8.75E-09	1.75E-09	6.52E-10	1.92E-06	1.70E-10	1.74E-05	3.17E-06	6.30E-07	1.54E-06	5.93E-06	2.31E-08	1.57E-08	3.00E-07	1.80E-07	0.00E+00	3.11E-05	1.88E-06	1.3E-03
Application	AGRI	Toddler	Benzo(a)anthracene	3.32E-05	3.32E-04	1.49E-05	2.52E-10	1.31E-05	1.42E-07	2.22E-07	2.22E-07	5.21E-08	2.88E-06	6.07E-07	1.07E-07	3.99E-08	2.65E-05	2.34E-09	9.01E-04	8.87E-06	5.47E-06	1.07E-04	4.11E-04	1.42E-06	9.64E-07	2.85E-06	1.71E-06	0.00E+00	1.47E-03	8.88E-05	6.3E-02
Application	AGRI	Toddler	Benzo(a)pyrene	6.60E-05	6.60E-04	1.77E-05	5.01E-10	2.13E-05	6.70E-07	2.96E-07	2.96E-07	6.62E-08	6.11E-06	1.29E-06	2.26E-07	8.42E-08	5.28E-05	4.66E-09	1.49E-03	1.18E-05	6.95E-06	2.26E-04	8.70E-04	2.99E-06	2.03E-06	5.67E-06	3.40E-06	0.00E+00	2.68E-03	1.62E-04	1.2E-01
Application	AGRI	Toddler	Benzo(b)fluoranthene	1.01E-04	1.01E-03	2.79E-04	7.69E-10	1.62E-05	4.65E-07	3.85E-07	3.85E-07	1.93E-06	4.40E-06	9.27E-07	1.70E-07	6.32E-08	8.10E-05	7.15E-09	1.14E-03	1.54E-05	2.03E-04	1.63E-04	6.28E-04	2.25E-06	1.53E-06	8.71E-06	5.22E-06	0.00E+00	2.25E-03	1.36E-04	9.7E-02
Application	AGRI	Toddler	Benzo(ghi) perylene	3.59E-05	3.59E-04	7.07E-06	2.73E-10	1.14E-05	7.75E-06	3.13E-08	3.13E-08	3.23E-06	1.60E-05	3.36E-06	5.70E-07	2.12E-07	2.87E-05	2.54E-09	1.28E-03	1.25E-06	3.39E-04	5.91E-04	2.28E-03	7.55E-06	5.13E-06	2.78E-06	1.67E-06	0.00E+00	4.54E-03	2.75E-04	2.0E-01
Application	AGRI	Toddler	Benzo(k)fluoranthene	2.02E-05	2.02E-04	1.65E-06	1.54E-10	2.04E-06	9.77E-08	7.93E-08	7.93E-08	2.04E-08	7.20E-07	1.52E-07	2.83E-08	1.05E-08	1.62E-05	1.43E-09	1.49E-04	3.17E-06	2.14E-06	2.67E-05	1.03E-04	3.75E-07	2.55E-07	1.74E-06	1.04E-06	0.00E+00	3.03E-04	1.84E-05	1.3E-02
Application	AGRI	Toddler	Chrysene	3.63E-05	3.63E-04	5.27E-06	2.76E-10	2.30E-06	2.78E-09	2.42E-07	2.42E-07	5.70E-08	4.83E-07	1.02E-07	2.24E-08	8.34E-09	2.90E-05	2.56E-09	1.70E-04	9.70E-06	5.99E-06	1.79E-05	6.88E-05	2.96E-07	2.01E-07	3.12E-06	1.87E-06	0.00E+00	3.07E-04	1.86E-05	1.3E-02
Application	AGRI	Toddler	Fluoranthene	9.87E-06	9.87E-05	6.29E-05	7.50E-11	8.57E-07	4.73E-08	1.67E-07	1.67E-07	2.45E-08	3.56E-07	7.49E-08	1.40E-08	5.22E-09	7.89E-06	6.97E-10	7.18E-05	6.69E-06	2.57E-06	1.32E-05	5.07E-05	1.86E-07	1.26E-07	8.49E-07	5.09E-07	0.00E+00	1.55E-04	9.36E-06	6.7E-03
Application	AGRI	Toddler	Fluorene	2.44E-07	2.44E-06	8.04E-05	1.85E-12	0.00E+00	2.14E-09	1.20E-08	1.20E-08	7.66E-10	8.14E-09	1.71E-09	2.84E-10	1.06E-10	1.95E-07	1.72E-11	9.47E-07	4.80E-07	8.05E-08	3.01E-07	1.16E-06	3.77E-09	2.57E-09	2.10E-08	1.26E-08	0.00E+00	3.20E-06	1.94E-07	1.4E-04
Application	AGRI	Toddler	Indeno(1,2,3-cd)pyrene	1.01E-05	1.01E-04	1.88E-06	7.65E-11	3.19E-06	3.61E-09	2.03E-08	2.03E-08	8.83E-09	4.28E-07	9.00E-08	1.63E-08	6.07E-09	8.05E-06	7.11E-10	2.16E-04	8.12E-07	9.27E-07	1.58E-05	6.10E-05	2.16E-07	1.47E-07	8.66E-07	5.19E-07	0.00E+00	3.04E-04	1.84E-05	1.3E-02
Application	AGRI	Toddler	Phenanthrene	4.47E-06	4.47E-05	1.38E-04	3.40E-11	2.35E-07	2.13E-08	1.48E-07	1.48E-07	1.36E-08	1.20E-07	2.52E-08	4.74E-09	1.76E-09	3.58E-06	3.16E-10	2.71E-05	5.90E-06	1.43E-06	4.42E-06	1.70E-05	6.27E-08	4.26E-08	3.46E-07	2.08E-07	0.00E+00	6.01E-05	3.64E-06	2.6E-03
Application	AGRI	Toddler	Pyrene	1.93E-05	1.93E-04	8.73E-06	1.47E-10	8.93E-08	7.52E-09	3.74E-07	3.74E-07	4.64E-08	8.81E-08	1.85E-08	5.80E-09	2.16E-09	1.54E-05	1.36E-09	3.16E-05	1.50E-05	4.87E-06	3.26E-06	1.26E-05	7.68E-08	5.22E-08	1.66E-06	9.96E-07	0.00E+00	8.54E-05	5.18E-06	3.7E-03
Project	AGRI	Adolescent	Anthracene	4.69E-07	4.69E-06	1.02E-05	3.56E-12	3.46E-08	5.55E-10	1.55E-08	1.55E-08	1.17E-09	8.12E-09	1.71E-09	3.41E-10	1.27E-10	9.38E-08	5.63E-11	6.08E-06	8.67E-07	2.66E-07	7.23E-07	1.01E-06	6.94E-09	2.74E-09	1.09E-07	9.79E-08	0.00E+00	9.25E-06	1.55E-07	1.1E-04
Project	AGRI	Adolescent	Benzo(a)anthracene	2.27E-05	2.27E-04	1.02E-05	1.73E-10	8.95E-06	9.73E-08	1.52E-07	1.52E-07	3.57E-08	1.97E-06	4.15E-07	7.33E-08	2.73E-08	4.54E-06	2.73E-09	1.10E-03	8.50E-06	8.10E-06	1.76E-04	2.45E-04	1.49E-06	5.87E-07	3.63E-06	3.27E-06	0.00E+00	1.56E-03	2.60E-05	1.9E-02
Project	AGRI	Adolescent	Benzo(a)pyrene	6.28E-05	6.28E-04	1.69E-05	4.77E-10	2.03E-05	6.37E-07	2.81E-07	2.81E-07	6.30E-08	5.81E-06	1.22E-06	2.15E-07	8.01E-08	1.26E-05	7.54E-09	2.55E-03	1.58E-05	1.43E-05	5.17E-04	7.22E-04	4.37E-06	1.72E-06	1.00E-05	9.04E-06	0.00E+00	3.85E-03	6.45E-05	4.6E-02
Project	AGRI	Adolescent	Benzo(b)fluoranthene	1.01E-04	1.01E-03	2.78E-04	7.66E-10	1.61E-05	4.63E-07	3.83E-07	3.83E-07	1.92E-06	4.38E-06	9.23E-07	1.69E-07	6.29E-08	2.02E-05	1.21E-08	2.03E-03	2.14E-05	4.37E-04	3.90E-04	5.45E-04	3.43E-06	1.35E-06	1.61E-05	1.45E-05	0.00E+00	3.48E-03	5.83E-05	4.2E-02
Project	AGRI	Adolescent	Benzo(ghi) perylene	1.48E-06	1.48E-05	2.92E-07	1.13E-11	4.70E-07	3.20E-07	1.29E-09	1.29E-09	1.33E-07	6.59E-07	1.39E-07	2.35E-08	8.77E-09	2.96E-07	1.78E-10	9.49E-05	7.23E-08	3.02E-05	5.87E-05	8.19E-05	4.79E-07	1.89E-07	2.13E-07	1.92E-07	0.00E+00	2.67E-04	4.47E-06	3.2E-03
Project	AGRI	Adolescent	Benzo(k)fluoranthene	4.36E-06	4.36E-05	3.57E-07	3.32E-11	4.42E-07	2.11E-08	1.71E-08	1.71E-08	4.40E-09	1.56E-07	3.28E-08	6.11E-09	2.28E-09	8.72E-07	5.24E-10	5.76E-05	9.58E-07	9.99E-07	1.38E-05	1.93E-05	1.24E-07	4.89E-08	6.98E-07	6.28E-07	0.00E+00	9.51E-05	1.59E-06	1.1E-03
Project	AGRI	Adolescent	Chrysene	1.57E-06	1.57E-05	2.27E-07	1.19E-11	9.92E-08	1.20E-10	1.05E-08	1.05E-08	2.46E-09	2.08E-08	4.38E-09	9.66E-10	3.60E-10	3.13E-07	1.88E-10	1.32E-05	5.86E-07	5.58E-07	1.85E-06	2.59E-06	1.96E-08	7.73E-09	2.50E-07	2.25E-07	0.00E+00	1.96E-05	3.28E-07	2.3E-04
Project	AGRI	Adolescent	Fluoranthene	1.14E-07	1.14E-06	7.26E-07	8.66E-13	9.89E-09	5.46E-10	1.93E-09	1.93E-09	2.82E-10	4.11E-09	8.65E-10	1.62E-10	6.03E-11	2.28E-08	1.37E-11	1.48E-06	1.08E-07	6.41E-08	3.66E-07	5.11E-07	3.29E-09	1.30E-09	1.82E-08	1.64E-08	0.00E+00	2.60E-06	4.35E-08	3.1E-05
Project	AGRI	Adolescent	Fluorene	4.81E-09	4.81E-08	1.59E-06	3.66E-14	0.00E+00	4.22E-11	2.37E-10	2.37E-10	1.51E-11	1.61E-10	3.38E-11	5.61E-12	2.10E-12	9.62E-10	5.78E-13	3.35E-08	1.33E-08	3.43E-09	1.43E-08	2.00E-08	1.14E-10	4.51E-11	7.70E-10	6.93E-10	0.00E+00	8.70E-08	1.46E-09	1.0E-06
Project	AGRI	Adolescent	Indeno(1,2,3-cd)pyrene	1.80E-07	1.80E-06	3.38E-08	1.37E-12	5.72E-08	6.47E-11	3.64E-10	3.64E-10	1.58E-10	7.66E-09	1.61E-09	2.92E-10	1.09E-10	3.61E-08	2.16E-11	6.92E-06	2.04E-08	3.59E-08	6.82E-07	9.52E-07	5.93E-09	2.34E-09	2.88E-08	2.60E-08	0.00E+00	8.70E-06	1.46E-07	1.0E-04
Project	AGRI	Adolescent	Phenanthrene	5.98E-08	5.98E-07	1.85E-06	4.54E-13	3.15E-09	2.85E-10	1.97E-09	1.97E-09	1.82E-10	1.60E-09	3.37E-10	6.33E-11	2.36E-11	1.20E-08	7.18E-12	6.49E-07	1.10E-07	4.12E-08	1.42E-07	1.99E-07	1.29E-09	5.07E-10	8.61E-09	7.75E-09	0.00E+00	1.17E-06	1.96E-08	1.4E-05
Project	AGRI	Adolescent	Pyrene	2.80E-06	2.80E-05	1.27E-06	2.13E-11	1.30E-08	1.09E-09	5.43E-08	5.43E-08	6.74E-09	1.28E-08	2.69E-09	8.41E-10	3.13E-10	5.61E-07	3.37E-10	8.20E-06	3.04E-06	1.53E-06	1.14E-06	1.59E-06	1.71E-08	6.74E-09	4.48E-07	4.04E-07	0.00E+00	1.69E-05	2.84E-07	2.0E-04
Project	AGRI	Adult	Anthracene	4.69E-07	4.69E-06	1.02E-05	3.56E-12	3.46E-08	5.55E-10	1.55E-08	1.55E-08	1.17E-09	8.12E-09	1.71E-09	3.41E-10	1.27E-10	9.38E-08	5.63E-11	6.94E-06	7.12E-07	2.20E-07	7.31E-07	5.08E-07	7.23E-09	4.11E-09	1.21E-07	1.12E-07	0.00E+00	9.45E-06	1.34E-07	9.5E-05
Project	AGRI	Adult	Benzo(a)anthracene	2.27E-05	2.27E-04	1.02E-05	1.73E-10	8.95E-06	9.73E-08	1.52E-07	1.52E-07	3.57E-08	1.97E-06	4.15E-07	7.33E-08	2.73E-08	4.54E-06	2.73E-09	1.26E-03	6.98E-06	6.71E-06	1.78E-04	1.23E-04	1.55E-06	8.82E-07	4.04E-06	3.73E-06	0.00E+00	1.59E-03	2.25E-05	1.6E-02
Project	AGRI	Adult	Benzo(a)pyrene	6.28E-05	6.28E-04	1.69E-05	4.77E-10	2.03E-05	6.37E-07	2.81E-07	2.81E-07	6.30E-08	5.81E-06	1.22E-06	2.15E-07	8.01E-08	1.26E-05	7.54E-09	2.91E-03	1.29E-05	1.18E-05	5.23E-04	3.63E-04	4.55E-06	2.59E-06	1.12E-05	1.03E-05	0.00E+00	3.86E-03	5.46E-05	3.9E-02
Project	AGRI	Adult	Benzo(b)fluoranthene	1.01E-04	1.01E-03	2.78E-04	7.66E-10	1.61E-05	4.63E-07	3.83E-07	3.83E-07	1.92E-06	4.38E-06	9.23E-07	1.69E-07	6.29E-08	2.02E-05	1.21E-08	2.32E-03	1.76E-05	3.62E-04	3.95E-04	2.74E-04	3.58E-06	2.03E-06	1.79E-05	1.66E-05	0.00E+00	3.43E-03	4.85E-05	3.5E-02
Project	AGRI	Adult	Benzo(ghi) perylene	1.48E-06	1.48E-05	2.92E-07	1.13E-11	4.70E-07	3.20E-07	1.29E-09	1.29E-09	1.33E-07	6.59E-07	1.39E-07	2.35E-08	8.77E-09	2.96E-07	1.78E-10	1.08E-04	5.94E-08	2.50E-05	5.93E-05	4.12E-05	4.99E-07	2.83E-07	2.37E-07	2.19E-07	0.00E+00	2.36E-04	3.33E-06	2.4E-03
Project	AGRI	Adult	Benzo(k)fluoranthene	4.36E-06	4.36E-05	3.57E-07	3.32E-11	4.42E-07	2.11E-08	1.71E-08	1.71E-08	4.40E-09	1.56E-07	3.28E-08	6.11E-09	2.28E-09	8.72E-07	5.24E-10	6.57E-05	7.87E-07	8.27E-07	1.40E-05	9.73E-06	1.29E-07	7.35E-08	7.77E-07	7.17E-07	0.00E+00	9.36E-05	1.32E-06	9.5E-04
Project	AGRI	Adult	Chrysene	1.57E-06	1.57E-05	2.27E-07	1.19E-11	9.92E-08	1.20E-10	1.05E-08	1.05E-08	2.46E-09	2.08E-08	4.38E-09	9.66E-10	3.60E-10	3.13E-07	1.88E-10	1.50E-05	4.81E-07	4.63E-07	1.87E-06	1.30E-06	2.04E-08	1.16E-08	2.79E-07	2.57E-07	0.00E+00	2.00E-05	2.83E-07	2.0E-04
Project	AGRI	Adult	Fluoranthene	1.14E-07	1.14E-06	7.26E-07	8.66E-13	9.89E-09	5.46E-10	1.93E-09	1.93E-09	2.82E-10	4.11E-09	8.65E-10	1.62E-10	6.03E-11	2.28E-08	1.37E-11	1.69E-06	8.89E-08	5.31E-08	3.70E-07	2.57E-07	3.43E-09	1.95E-09	2.03E-08	1.87E-08	0.00E+00	2.53E-06	3.58E-08	2.6E-05
Project	AGRI	Adult	Fluorene	4.81E-09	4.81E-08	1.59E-06	3.66E-14	0.00E+00	4.22E-11	2.37E-10	2.37E-10	1.51E-11	1.61E-10	3.38E-11	5.61E-12	2.10E-12	9.62E-10	5.78E-13	3.82E-08	1.09E-08	2.84E-09	1.45E-08	1.00E-08	1.19E-10	6.78E-11	8.57E-10	7.91E-10	0.00E+00	7.92E-08	1.12E-09	8.0E-07
Project	AGRI	Adult	Indeno(1,2,3-cd)pyrene	1.80E-07	1.80E-06	3.38E-08	1.37E-12	5.72E-08	6.47E-11	3.64E-10	3.64E-10	1.58E-10	7.66E-09	1.61E-09	2.92E-10	1.09E-10	3.61E-08	2.16E-11	7.90E-06	1.67E-08	2.97E-08	6.90E-07	4.79E-07	6.18E-09	3.51E-09	3.21E-08	2.96E-08	0.00E+00	9.22E-06	1.30E-07	9.3E-05
Project	AGRI	Adult	Phenanthrene	5.98E-08	5.98E-07	1.85E-06	4.54E-13	3.15E-09	2.85E-10	1.97E-09	1.97E-09	1.82E-10	1.60E-09	3.37E-10	6.33E-11	2.36E-11	1.20E-08	7.18E-12	7.40E-07	9.08E-08	3.41E-08	1.44E-07	1.00E-07	1.34E-09	7.62E-10	9.58E-09	8.85E-09	0.00E+00	1.14E-06	1.61E-08	1.2E-05
Project	AGRI	Adult	Pyrene	2.80E-06	2.80E-05	1.27E-06	2.13E-11	1.30E-08	1.09E-09	5.43E-08	5.43E-08	6.74E-09	1.28E-08	2.69E-09	8.41E-10	3.13E-10	5.61E-07	3.37E-10	9.36E-06	2.50E-06	1.27E-06	1.15E-06	7.99E-07	1.78E-08	1.01E-08	4.99E-07	4.61E-07	0.00E+00	1.66E-05	2.35E-07	1.7E-04
Project	AGRI	Child	Anthracene	4.69E-07	4.69E-06	1.02E-05	3.56E-12	3.46E-08	5.55E-10	1.55E-08	1.55E-08	1.17E-09	8.12E-09	1.71E-09	3.41E-10	1.27E-10	9.38E-08	5.17E-11	4.97E-06	1.07E-06	1.89E-07	4.30E-07	1.06E-06	5.71E-09	2.68E-09	8.03E-08	6.19E-08	0.00E+00	7.96E-06	2.42E-07	1.7E-04
Project	AGRI	Child	Benzo(a)anthracene	2.27E-05	2.27E-04	1.02E-05	1.73E-10	8.95E-06	9.73E-08	1.52E-07	1.52E-07	3.57E-08	1.97E-06	4.15E-07	7.33E-08	2.73E-08	4.54E-06	2.50E-09	9.02E-04	1.05E-05	5.75E-06	1.05E-04	2.58E-04	1.23E-06	5.75E-07	2.68E-06	2.07E-06	0.00E+00	1.29E-03	3.93E-05	2.8E-02
Project	AGRI	Child	Benzo(a)pyrene	6.28E-05	6.28E-04	1.69E-05	4.77E-10	2.03E-05	6.37E-07	2.81E-07	2.81E-07	6.30E-08	5.81E-06	1.22E-06	2.15E-07	8.01E-08	1.26E-05	6.92E-09	2.08E-03	1.94E-05	1.01E-05	3.08E-04	7.61E-04	3.60E-06	1.69E-06	7.41E-06	5.71E-06	0.00E+00	3.21E-03	9.75E-05	7.0E-02
Project	AGRI	Child	Benzo(b)fluoranthene	1.01E-04	1.01E-03	2.78E-04	7.66E-10	1.61E-05	4.63E-07	3.83E-07	3.83E-07	1.92E-06	4.38E-06	9.23E-07	1.69E-07	6.29E-08	2.02E-05	1.11E-08	1.66E-03	2.64E-05	3.10E-04	2.32E-04	5.74E-04	2.82E-06	1.32E-06	1.19E-05	9.17E-06	0.00E+00	2.85E-03	8.65E-05	6.2E-02
Project	AGRI	Child	Benzo(ghi) perylene	1.48E-06	1.48E-05	2.92E-07	1.13E-11	4.70E-07	3.20E-07	1.29E-09	1.29E-09	1.33E-07	6.59E-07	1.39E-07	2.35E-08	8.77E-09	2.96E-07	1.63E-10	7.75E-05	8.91E-08	2.14E-05	3.49E-05	8.63E-05	3.94E-07	1.85E-07	1.57E-07	1.21E-07	0.00E+00	2.21E-04	6.73E-06	4.8E-03
Project	AGRI	Child	Benzo(k)fluoranthene	4.36E-06	4.36E-05	3.57E-07	3.32E-11	4.42E-07	2.11E-08	1.71E-08	1.71E-08	4.40E-09	1.56E-07	3.28E-08	6.11E-09	2.28E-09	8.72E-07	4.81E-10	4.70E-05	1.18E-06	7.08E-07	8.25E-06	2.04E-05	1.02E-07	4.79E-08	5.15E-07	3.97E-07	0.00E+00	7.95E-05	2.42E-06	1.7E-03
Project	AGRI	Child	Chrysene	1.57E-06	1.57E-05	2.27E-07	1.19E-11	9.92E-08	1.20E-10	1.05E-08	1.05E-08	2.46E-09	2.08E-08	4.38E-09	9.66E-10	3.60E-10	3.13E-07	1.73E-10	1.08E-05	7.22E-07	3.96E-07	1.10E-06	2.73E-06	1.61E-08	7.57E-09	1.85E-07	1.42E-07	0.00E+00	1.64E-05	4.97E-07	3.6E-04
Project	AGRI	Child	Fluoranthene	1.14E-07	1.14E-06	7.26E-07	8.66E-13	9.89E-09	5.46E-10	1.93E-09	1.93E-09	2.82E-10	4.11E-09	8.65E-10	1.62E-10	6.03E-11	2.28E-08	1.26E-11	1.21E-06	1.33E-07	4.55E-08	2.18E-07	5.38E-07	2.71E-09	1.27E-09	1.34E-08	1.04E-08	0.00E+00	2.20E-06	6.68E-08	4.8E-05
Project	AGRI	Child	Fluorene	4.81E-09	4.81E-08	1.59E-06	3.66E-14	0.00E+00	4.22E-11	2.37E-10	2.37E-10	1.51E-11	1.61E-10	3.38E-11	5.61E-12	2.10E-12	9.62E-10	5.30E-13	2.73E-08	1.63E-08	2.43E-09	8.51E-09	2.10E-08	9.38E-11	4.42E-11	5.68E-10	4.38E-10	0.00E+00	7.78E-08	2.36E-09	1.7E-06
Project	AGRI	Child	Indeno(1,2,3-cd)pyrene	1.80E-07	1.80E-06	3.38E-08	1.37E-12	5.72E-08	6.47E-11	3.64E-10	3.64E-10	1.58E-10	7.66E-09	1.61E-09	2.92E-10	1.09E-10	3.61E-08	1.99E-11	5.65E-06	2.51E-08	2.55E-08	4.06E-07	1.00E-06	4.88E-09	2.29E-09	2.13E-08	1.64E-08	0.00E+00	7.19E-06	2.19E-07	1.6E-04
Project	AGRI	Child	Phenanthrene	5.98E-08	5.98E-07	1.85E-06	4.54E-13	3.15E-09	2.85E-10	1.97E-09	1.97E-09	1.82E-10	1.60E-09	3.37E-10	6.33E-11	2.36E-11	1.20E-08	6.59E-12	5.30E-07	1.36E-07	2.92E-08	8.47E-08	2.09E-07	1.06E-09	4.97E-10	6.35E-09	4.90E-09	0.00E+00	1.01E-06	3.08E-08	2.2E-05
Project	AGRI	Child	Pyrene	2.80E-06	2.80E-05	1.27E-06	2.13E-11	1.30E-08	1.09E-09	5.43E-08	5.43E-08	6.74E-09	1.28E-08	2.69E-09	8.41E-10	3.13E-10	5.61E-07	3.09E-10	6.70E-06	3.75E-06	1.08E-06	6.77E-07	1.67E-06	1.41E-08	6.60E-09	3.31E-07	2.55E-07	0.00E+00	1.50E-05	4.57E-07	3.3E-04
Project	AGRI	Infant	Anthracene	4.69E-07	4.69E-06	1.02E-05	3.56E-12	3.46E-08	5.55E-10	1.55E-08	1.55E-08	1.17E-09	8.12E-09	1.71E-09	3.41E-10	1.27E-10	9.38E-08	7.49E-12	3.65E-06	7.74E-08	9.72E-08	0.00E+00	0.00E+00	0.00E+00	5.94E-10	4.35E-08	1.99E-08	4.02E-07	4.38E-06	5.34E-07	3.8E-04
Project	AGRI	Infant	Benzo(a)anthracene	2.27E-05	2.27E-04	1.02E-05	1.73E-10	8.95E-06	9.73E-08	1.52E-07	1.52E-07	3.57E-08	1.97E-06	4.15E-07	7.33E-08	2.73E-08	4.54E-06	3.62E-10	6.63E-04	7.59E-07	2.96E-06	0.00E+00	0.00E+00	0.00E+00	1.28E-07	1.45E-06	6.63E-07	1.07E-03	1.75E-03	2.13E-04	1.5E-01
Project	AGRI	Infant	Benzo(a)pyrene	6.28E-05	6.28E-04	1.69E-05	4.77E-10	2.03E-05	6.37E-07	2.81E-07	2.81E-07	6.30E-08	5.81E-06	1.22E-06	2.15E-07	8.01E-08	1.26E-05	1.00E-09	1.53E-03	1.41E-06	5.23E-06	0.00E+00	0.00E+00	0.00E+00	3.74E-07	4.02E-06	1.83E-06	4.65E-03	6.20E-03	7.56E-04	5.4E-01
Project	AGRI	Infant	Benzo(b)fluoranthene	1.01E-04	1.01E-03	2.78E-04	7.66E-10	1.61E-05	4.63E-07	3.83E-07	3.83E-07	1.92E-06	4.38E-06	9.23E-07	1.69E-07	6.29E-08	2.02E-05	1.61E-09	1.22E-03	1.91E-06	1.60E-04	0.00E+00	0.00E+00	0.00E+00	2.94E-07	6.45E-06	2.94E-06	5.34E-03	6.75E-03	8.24E-04	5.9E-01
Project	AGRI	Infant	Benzo(ghi) perylene	1.48E-06	1.48E-05	2.92E-07	1.13E-11	4.70E-07	3.20E-07	1.29E-09	1.29E-09	1.33E-07	6.59E-07	1.39E-07	2.35E-08	8.77E-09	2.96E-07	2.36E-11	5.69E-05	6.46E-09	1.11E-05	0.00E+00	0.00E+00	0.00E+00	4.10E-08	8.53E-08	3.89E-08	9.18E-03	9.25E-03	1.13E-03	8.1E-01
Project	AGRI	Infant	Benzo(k)fluoranthene	4.36E-06	4.36E-05	3.57E-07	3.32E-11	4.42E-07	2.11E-08	1.71E-08	1.71E-08	4.40E-09	1.56E-07	3.28E-08	6.11E-09	2.28E-09	8.72E-07	6.96E-11	3.45E-05	8.56E-08	3.65E-07	0.00E+00	0.00E+00	0.00E+00	1.06E-08	2.79E-07	1.27E-07	2.71E-04	3.07E-04	3.74E-05	2.7E-02
Project	AGRI	Infant	Chrysene	1.57E-06	1.57E-05	2.27E-07	1.19E-11	9.92E-08	1.20E-10	1.05E-08	1.05E-08	2.46E-09	2.08E-08	4.38E-09	9.66E-10	3.60E-10	3.13E-07	2.50E-11	7.90E-06	5.23E-08	2.04E-07	0.00E+00	0.00E+00	0.00E+00	1.68E-09	1.00E-07	4.57E-08	2.31E-05	3.17E-05	3.86E-06	2.8E-03
Project	AGRI	Infant	Fluoranthene	1.14E-07	1.14E-06	7.26E-07	8.66E-13	9.89E-09	5.46E-10	1.93E-09	1.93E-09	2.82E-10	4.11E-09	8.65E-10	1.62E-10	6.03E-11	2.28E-08	1.82E-12	8.91E-07	9.66E-09	2.34E-08	0.00E+00	0.00E+00	0.00E+00	2.82E-10	7.29E-09	3.33E-09	5.81E-07	1.54E-06	1.88E-07	1.3E-04
Project	AGRI	Infant	Fluorene	4.81E-09	4.81E-08	1.59E-06	3.66E-14	0.00E+00	4.22E-11	2.37E-10	2.37E-10	1.51E-11	1.61E-10	3.38E-11	5.61E-12	2.10E-12	9.62E-10	7.68E-14	2.01E-08	1.18E-09	1.26E-09	0.00E+00	0.00E+00	0.00E+00	9.81E-12	3.08E-10	1.41E-10	2.88E-09	2.68E-08	3.27E-09	2.3E-06
Project	AGRI	Infant	Indeno(1,2,3-cd)pyrene	1.80E-07	1.80E-06	3.38E-08	1.37E-12	5.72E-08	6.47E-11	3.64E-10	3.64E-10	1.58E-10	7.66E-09	1.61E-09	2.92E-10	1.09E-10	3.61E-08	2.88E-12	4.15E-06	1.82E-09	1.31E-08	0.00E+00	0.00E+00	0.00E+00	5.08E-10	1.15E-08	5.26E-09	8.42E-05	8.85E-05	1.08E-05	7.7E-03
Project	AGRI	Infant	Phenanthrene	5.98E-08	5.98E-07	1.85E-06	4.54E-13	3.15E-09	2.85E-10	1.97E-09	1.97E-09	1.82E-10	1.60E-09	3.37E-10	6.33E-11	2.36E-11	1.20E-08	9.54E-13	3.89E-07	9.86E-09	1.51E-08	0.00E+00	0.00E+00	0.00E+00	1.10E-10	3.44E-09	1.57E-09	8.29E-08	5.14E-07	6.27E-08	4.5E-05
Project	AGRI	Infant	Pyrene	2.80E-06	2.80E-05	1.27E-06	2.13E-11	1.30E-08	1.09E-09	5.43E-08	5.43E-08	6.74E-09	1.28E-08	2.69E-09	8.41E-10	3.13E-10	5.61E-07	4.47E-11	4.92E-06	2.72E-07	5.59E-07	0.00E+00	0.00E+00	0.00E+00	1.46E-09	1.79E-07	8.18E-08	3.03E-06	9.61E-06	1.17E-06	8.4E-04
Project	AGRI	Toddler	Anthracene	4.69E-07	4.69E-06	1.02E-05	3.56E-12	3.46E-08	5.55E-10	1.55E-08	1.55E-08	1.17E-09	8.12E-09	1.71E-09	3.41E-10	1.27E-10	3.75E-07	3.32E-11	3.39E-06	6.19E-07	1.23E-07	3.00E-07	1.16E-06	4.52E-09	3.07E-09	5.85E-08	3.51E-08	0.00E+00	6.07E-06	3.68E-07	2.6E-04
Project	AGRI	Toddler	Benzo(a)anthracene	2.27E-05	2.27E-04	1.02E-05	1.73E-10	8.95E-06	9.73E-08	1.52E-07	1.52E-07	3.57E-08	1.97E-06	4.15E-07	7.33E-08	2.73E-08	1.82E-05	1.60E-09	6.17E-04	6.07E-06	3.75E-06	7.30E-05	2.81E-04	9.71E-07	6.60E-07	1.95E-06	1.17E-06	0.00E+00	1.00E-03	6.08E-05	4.3E-02
Project	AGRI	Toddler	Benzo(a)pyrene	6.28E-05	6.28E-04	1.69E-05	4.77E-10	2.03E-05	6.37E-07	2.81E-07	2.81E-07	6.30E-08	5.81E-06	1.22E-06	2.15E-07	8.01E-08	5.02E-05	4.44E-09	1.42E-03	1.13E-05	6.61E-06	2.15E-04	8.28E-04	2.85E-06	1.94E-06	5.40E-06	3.24E-06	0.00E+00	2.55E-03	1.54E-04	1.1E-01
Project	AGRI	Toddler	Benzo(b)fluoranthene	1.01E-04	1.01E-03	2.78E-04	7.66E-10	1.61E-05	4.63E-07	3.83E-07	3.83E-07	1.92E-06	4.38E-06	9.23E-07	1.69E-07	6.29E-08	8.06E-05	7.12E-09	1.13E-03	1.53E-05	2.02E-04	1.62E-04	6.25E-04	2.24E-06	1.52E-06	8.66E-06	5.20E-06	0.00E+00	2.24E-03	1.36E-04	9.7E-02
Project	AGRI	Toddler	Benzo(ghi) perylene	1.48E-06	1.48E-05	2.92E-07	1.13E-11	4.70E-07	3.20E-07	1.29E-09	1.29E-09	1.33E-07	6.59E-07	1.39E-07	2.35E-08	8.77E-09	1.18E-06	1.05E-10	5.30E-05	5.17E-08	1.40E-05	2.44E-05	9.40E-05	3.12E-07	2.12E-07	1.15E-07	6.88E-08	0.00E+00	1.87E-04	1.13E-05	8.1E-03
Project	AGRI	Toddler	Benzo(k)fluoranthene	4.36E-06	4.36E-05	3.57E-07	3.32E-11	4.42E-07	2.11E-08	1.71E-08	1.71E-08	4.40E-09	1.56E-07	3.28E-08	6.11E-09	2.28E-09	3.49E-06	3.08E-10	3.21E-05	6.85E-07	4.62E-07	5.76E-06	2.22E-05	8.09E-08	5.50E-08	3.75E-07	2.25E-07	0.00E+00	6.55E-05	3.97E-06	2.8E-03
Project	AGRI	Toddler	Chrysene	1.57E-06	1.57E-05	2.27E-07	1.19E-11	9.92E-08	1.20E-10	1.05E-08	1.05E-08	2.46E-09	2.08E-08	4.38E-09	9.66E-10	3.60E-10	1.25E-06	1.11E-10	7.35E-06	4.18E-07	2.58E-07	7.70E-07	2.97E-06	1.28E-08	8.69E-09	1.35E-07	8.08E-08	0.00E+00	1.33E-05	8.03E-07	5.7E-04
Project	AGRI	Toddler	Fluoranthene	1.14E-07	1.14E-06	7.26E-07	8.66E-13	9.89E-09	5.46E-10	1.93E-09	1.93E-09	2.82E-10	4.11E-09	8.65E-10	1.62E-10	6.03E-11	9.12E-08	8.05E-12	8.29E-07	7.73E-08	2.96E-08	1.52E-07	5.86E-07	2.14E-09	1.46E-09	9.80E-09	5.88E-09	0.00E+00	1.78E-06	1.08E-07	7.7E-05

Table B1- 6 Summary of Predicted Human Exposures for Each Scenario, Site, Receptor and Chemical

								Environmental Concentrations									EDI														
								Plant	Plant	Plant	Berries	Root	Beef	Dairy	Chicken	Eggs	Soil	Dust	Plant	Berries	Root	Beef	Dairy	Chicken	Eggs	Dermal	Dermal	Breast Milk	Total	Total	RQ
				Soil	Surface Soil	Air	Dust	Deposition	Air	Soil	Soil	Soil					SIR	AIR	Plant	Berries	Root	Beef	Dairy	Chicken	Eggs	Hands	Other	Breast Milk	EDI	EDI	
Scenario	Site	Receptor	Chemical	mg/kg	mg/kg	ug/m^3	ug/m^3	mg/kg ww	mg/kg ww	mg/kg ww	mg/kg ww	mg/kg ww	mg/kg ww	mg/kg ww	mg/kg ww	mg/kg ww	ug/day	ug/day	ug/day	ug/day	ug/day	ug/day	ug/day	ug/day	ug/day	ug/day	ug/day	ug/day	ug/day	ug/kg-BW/day	Unitless
Project	AGRI	Toddler	Fluorene	4.81E-09	4.81E-08	1.59E-06	3.66E-14	0.00E+00	4.22E-11	2.37E-10	2.37E-10	1.51E-11	1.61E-10	3.38E-11	5.61E-12	2.10E-12	3.85E-09	3.40E-13	1.87E-08	9.47E-09	1.59E-09	5.94E-09	2.29E-08	7.43E-11	5.07E-11	4.14E-10	2.48E-10	0.00E+00	6.32E-08	3.83E-09	2.7E-06
Project	AGRI	Toddler	Indeno(1,2,3-cd)pyrene	1.80E-07	1.80E-06	3.38E-08	1.37E-12	5.72E-08	6.47E-11	3.64E-10	3.64E-10	1.58E-10	7.66E-09	1.61E-09	2.92E-10	1.09E-10	1.44E-07	1.27E-11	3.86E-06	1.45E-08	1.66E-08	2.83E-07	1.09E-06	3.86E-09	2.63E-09	1.55E-08	9.30E-09	0.00E+00	5.44E-06	3.30E-07	2.4E-04
Project	AGRI	Toddler	Phenanthrene	5.98E-08	5.98E-07	1.85E-06	4.54E-13	3.15E-09	2.85E-10	1.97E-09	1.97E-09	1.82E-10	1.60E-09	3.37E-10	6.33E-11	2.36E-11	4.78E-08	4.23E-12	3.62E-07	7.89E-08	1.91E-08	5.92E-08	2.28E-07	8.38E-10	5.70E-10	4.63E-09	2.78E-09	0.00E+00	8.04E-07	4.87E-08	3.5E-05
Project	AGRI	Toddler	Pyrene	2.80E-06	2.80E-05	1.27E-06	2.13E-11	1.30E-08	1.09E-09	5.43E-08	5.43E-08	6.74E-09	1.28E-08	2.69E-09	8.41E-10	3.13E-10	2.24E-06	1.98E-10	4.58E-06	2.17E-06	7.07E-07	4.73E-07	1.82E-06	1.11E-08	7.57E-09	2.41E-07	1.45E-07	0.00E+00	1.24E-05	7.52E-07	5.4E-04
CEA	AGRI	Adolescent	Anthracene	3.29E-06	3.29E-05	7.14E-05	2.50E-11	2.43E-07	3.90E-09	1.09E-07	1.09E-07	8.22E-09	5.70E-08	1.20E-08	2.40E-09	8.93E-10	6.59E-07	3.96E-10	4.27E-05	6.09E-06	1.87E-06	5.08E-06	7.08E-06	4.87E-08	1.92E-08	7.64E-07	6.88E-07	0.00E+00	6.50E-05	1.09E-06	7.8E-04
CEA	AGRI	Adolescent	Benzo(a)anthracene	3.63E-05	3.63E-04	1.62E-05	2.76E-10	1.43E-05	1.55E-07	2.42E-07	2.42E-07	5.70E-08	3.15E-06	6.63E-07	1.17E-07	4.36E-08	7.25E-06	4.36E-09	1.76E-03	1.36E-05	1.29E-05	2.80E-04	3.91E-04	2.38E-06	9.38E-07	5.80E-06	5.22E-06	0.00E+00	2.48E-03	4.16E-05	3.0E-02
CEA	AGRI	Adolescent	Benzo(a)pyrene	6.85E-05	6.85E-04	1.84E-05	5.20E-10	2.21E-05	6.95E-07	3.07E-07	3.07E-07	6.87E-08	6.34E-06	1.33E-06	2.35E-07	8.74E-08	1.37E-05	8.22E-09	2.78E-03	1.72E-05	1.56E-05	5.64E-04	7.87E-04	4.77E-06	1.88E-06	1.10E-05	9.86E-06	0.00E+00	4.20E-03	7.04E-05	5.0E-02
CEA	AGRI	Adolescent	Benzo(b)fluoranthene	1.01E-04	1.01E-03	2.80E-04	7.71E-10	1.62E-05	4.66E-07	3.86E-07	3.86E-07	1.94E-06	4.42E-06	9.30E-07	1.70E-07	6.34E-08	2.03E-05	1.22E-08	2.05E-03	2.16E-05	4.40E-04	3.93E-04	5.48E-04	3.46E-06	1.36E-06	1.62E-05	1.46E-05	0.00E+00	3.50E-03	5.87E-05	4.2E-02
CEA	AGRI	Adolescent	Benzo(ghi) perylene	4.15E-05	4.15E-04	8.17E-06	3.15E-10	1.31E-05	8.96E-06	3.62E-08	3.62E-08	3.73E-06	1.85E-05	3.89E-06	6.59E-07	2.46E-07	8.30E-06	4.98E-09	2.66E-03	2.03E-06	8.47E-04	1.64E-03	2.29E-03	1.34E-05	5.28E-06	5.97E-06	5.38E-06	0.00E+00	7.48E-03	1.25E-04	9.0E-02
CEA	AGRI	Adolescent	Benzo(k)fluoranthene	3.37E-05	3.37E-04	2.75E-06	2.56E-10	3.41E-06	1.63E-07	1.32E-07	1.32E-07	3.40E-08	1.20E-06	2.53E-07	4.72E-08	1.76E-08	6.74E-06	4.05E-09	4.45E-04	7.40E-06	7.71E-06	1.07E-04	1.49E-04	9.59E-07	3.78E-07	5.39E-06	4.85E-06	0.00E+00	7.34E-04	1.23E-05	8.8E-03
CEA	AGRI	Adolescent	Chrysene	6.24E-05	6.24E-04	9.06E-06	4.74E-10	3.95E-06	4.79E-09	4.17E-07	4.17E-07	9.81E-08	8.30E-07	1.75E-07	3.85E-08	1.43E-08	1.25E-05	7.49E-09	5.25E-04	2.33E-05	2.23E-05	7.39E-05	1.03E-04	7.82E-07	3.08E-07	9.98E-06	8.98E-06	0.00E+00	7.80E-04	1.31E-05	9.3E-03
CEA	AGRI	Adolescent	Fluoranthene	1.66E-05	1.66E-04	1.06E-04	1.26E-10	1.44E-06	7.96E-08	2.82E-07	2.82E-07	4.12E-08	5.99E-07	1.26E-07	2.36E-08	8.79E-09	3.32E-06	1.99E-09	2.16E-04	1.58E-05	9.34E-06	5.33E-05	7.44E-05	4.80E-07	1.89E-07	2.66E-06	2.39E-06	0.00E+00	3.78E-04	6.34E-06	4.5E-03
CEA	AGRI	Adolescent	Fluorene	4.08E-07	4.08E-06	1.34E-04	3.10E-12	0.00E+00	3.58E-09	2.01E-08	2.01E-08	1.28E-09	1.36E-08	2.87E-09	4.76E-10	1.78E-10	8.16E-08	4.90E-11	2.84E-06	1.12E-06	2.91E-07	1.21E-06	1.69E-06	9.67E-09	3.83E-09	6.53E-08	5.87E-08	0.00E+00	7.37E-06	1.24E-07	8.8E-05
CEA	AGRI	Adolescent	Indeno(1,2,3-cd)pyrene	1.60E-05	1.60E-04	3.00E-06	1.22E-10	5.09E-06	5.75E-09	3.23E-08	3.23E-08	1.41E-08	6.81E-07	1.43E-07	2.59E-08	9.66E-09	3.21E-06	1.92E-09	6.15E-04	1.81E-06	3.19E-06	6.06E-05	8.46E-05	5.27E-07	2.08E-07	2.56E-06	2.31E-06	0.00E+00	7.74E-04	1.30E-05	9.3E-03
CEA	AGRI	Adolescent	Phenanthrene	6.98E-06	6.98E-05	2.16E-04	5.30E-11	3.67E-07	3.33E-08	2.30E-07	2.30E-07	2.12E-08	1.87E-07	3.93E-08	7.39E-09	2.76E-09	1.40E-06	8.38E-10	7.57E-05	1.29E-05	4.81E-06	1.66E-05	2.32E-05	1.50E-07	5.92E-08	1.01E-06	9.05E-07	0.00E+00	1.37E-04	2.29E-06	1.6E-03
CEA	AGRI	Adolescent	Pyrene	2.20E-05	2.20E-04	9.93E-06	1.67E-10	1.01E-07	8.54E-09	4.25E-07	4.25E-07	5.28E-08	1.00E-07	2.11E-08	6.59E-09	2.45E-09	4.39E-06	2.64E-09	6.42E-05	2.38E-05	1.20E-05	8.91E-06	1.24E-05	1.34E-07	5.28E-08	3.51E-06	3.16E-06	0.00E+00	1.33E-04	2.22E-06	1.6E-03
CEA	AGRI	Adult	Anthracene	3.29E-06	3.29E-05	7.14E-05	2.50E-11	2.43E-07	3.90E-09	1.09E-07	1.09E-07	8.22E-09	5.70E-08	1.20E-08	2.40E-09	8.93E-10	6.59E-07	3.96E-10	4.88E-05	5.00E-06	1.55E-06	5.13E-06	3.57E-06	5.08E-08	2.88E-08	8.50E-07	7.85E-07	0.00E+00	6.64E-05	9.39E-07	6.7E-04
CEA	AGRI	Adult	Benzo(a)anthracene	3.63E-05	3.63E-04	1.62E-05	2.76E-10	1.43E-05	1.55E-07	2.42E-07	2.42E-07	5.70E-08	3.15E-06	6.63E-07	1.17E-07	4.36E-08	7.25E-06	4.36E-09	2.01E-03	1.11E-05	1.07E-05	2.84E-04	1.97E-04	2.48E-06	1.41E-06	6.46E-06	5.96E-06	0.00E+00	2.54E-03	3.59E-05	2.6E-02
CEA	AGRI	Adult	Benzo(a)pyrene	6.85E-05	6.85E-04	1.84E-05	5.20E-10	2.21E-05	6.95E-07	3.07E-07	3.07E-07	6.87E-08	6.34E-06	1.33E-06	2.35E-07	8.74E-08	1.37E-05	8.22E-09	3.17E-03	1.41E-05	1.29E-05	5.70E-04	3.96E-04	4.97E-06	2.82E-06	1.22E-05	1.13E-05	0.00E+00	4.21E-03	5.95E-05	4.3E-02
CEA	AGRI	Adult	Benzo(b)fluoranthene	1.01E-04	1.01E-03	2.80E-04	7.71E-10	1.62E-05	4.66E-07	3.86E-07	3.86E-07	1.94E-06	4.42E-06	9.30E-07	1.70E-07	6.34E-08	2.03E-05	1.22E-08	2.34E-03	1.77E-05	3.64E-04	3.97E-04	2.76E-04	3.60E-06	2.05E-06	1.81E-05	1.67E-05	0.00E+00	3.45E-03	4.88E-05	3.5E-02
CEA	AGRI	Adult	Benzo(ghi) perylene	4.15E-05	4.15E-04	8.17E-06	3.15E-10	1.31E-05	8.96E-06	3.62E-08	3.62E-08	3.73E-06	1.85E-05	3.89E-06	6.59E-07	2.46E-07	8.30E-06	4.98E-09	3.03E-03	1.66E-06	7.01E-04	1.66E-03	1.15E-03	1.40E-05	7.93E-06	6.64E-06	6.14E-06	0.00E+00	6.60E-03	9.33E-05	6.7E-02
CEA	AGRI	Adult	Benzo(k)fluoranthene	3.37E-05	3.37E-04	2.75E-06	2.56E-10	3.41E-06	1.63E-07	1.32E-07	1.32E-07	3.40E-08	1.20E-06	2.53E-07	4.72E-08	1.76E-08	6.74E-06	4.05E-09	5.08E-04	6.08E-06	6.39E-06	1.08E-04	7.51E-05	9.99E-07	5.68E-07	6.00E-06	5.54E-06	0.00E+00	7.23E-04	1.02E-05	7.3E-03
CEA	AGRI	Adult	Chrysene	6.24E-05	6.24E-04	9.06E-06	4.74E-10	3.95E-06	4.79E-09	4.17E-07	4.17E-07	9.81E-08	8.30E-07	1.75E-07	3.85E-08	1.43E-08	1.25E-05	7.49E-09	5.99E-04	1.92E-05	1.84E-05	7.47E-05	5.19E-05	8.15E-07	4.63E-07	1.11E-05	1.03E-05	0.00E+00	7.98E-04	1.13E-05	8.1E-03
CEA	AGRI	Adult	Fluoranthene	1.66E-05	1.66E-04	1.06E-04	1.26E-10	1.44E-06	7.96E-08	2.82E-07	2.82E-07	4.12E-08	5.99E-07	1.26E-07	2.36E-08	8.79E-09	3.32E-06	1.99E-09	2.47E-04	1.30E-05	7.74E-06	5.39E-05	3.75E-05	5.00E-07	2.84E-07	2.96E-06	2.73E-06	0.00E+00	3.69E-04	5.22E-06	3.7E-03
CEA	AGRI	Adult	Fluorene	4.08E-07	4.08E-06	1.34E-04	3.10E-12	0.00E+00	3.58E-09	2.01E-08	2.01E-08	1.28E-09	1.36E-08	2.87E-09	4.76E-10	1.78E-10	8.16E-08	4.90E-11	3.24E-06	9.23E-07	2.41E-07	1.23E-06	8.51E-07	1.01E-08	5.75E-09	7.26E-08	6.71E-08	0.00E+00	6.72E-06	9.50E-08	6.8E-05
CEA	AGRI	Adult	Indeno(1,2,3-cd)pyrene	1.60E-05	1.60E-04	3.00E-06	1.22E-10	5.09E-06	5.75E-09	3.23E-08	3.23E-08	1.41E-08	6.81E-07	1.43E-07	2.59E-08	9.66E-09	3.21E-06	1.92E-09	7.02E-04	1.49E-06	2.64E-06	6.13E-05	4.26E-05	5.49E-07	3.12E-07	2.85E-06	2.64E-06	0.00E+00	8.20E-04	1.16E-05	8.3E-03
CEA	AGRI	Adult	Phenanthrene	6.98E-06	6.98E-05	2.16E-04	5.30E-11	3.67E-07	3.33E-08	2.30E-07	2.30E-07	2.12E-08	1.87E-07	3.93E-08	7.39E-09	2.76E-09	1.40E-06	8.38E-10	8.64E-05	1.06E-05	3.98E-06	1.68E-05	1.17E-05	1.57E-07	8.90E-08	1.12E-06	1.03E-06	0.00E+00	1.33E-04	1.89E-06	1.3E-03
CEA	AGRI	Adult	Pyrene	2.20E-05	2.20E-04	9.93E-06	1.67E-10	1.01E-07	8.54E-09	4.25E-07	4.25E-07	5.28E-08	1.00E-07	2.11E-08	6.59E-09	2.45E-09	4.39E-06	2.64E-09	7.33E-05	1.96E-05	9.92E-06	9.01E-06	6.26E-06	1.39E-07	7.93E-08	3.91E-06	3.61E-06	0.00E+00	1.30E-04	1.84E-06	1.3E-03
CEA	AGRI	Child	Anthracene	3.29E-06	3.29E-05	7.14E-05	2.50E-11	2.43E-07	3.90E-09	1.09E-07	1.09E-07	8.22E-09	5.70E-08	1.20E-08	2.40E-09	8.93E-10	6.59E-07	3.63E-10	3.49E-05	7.50E-06	1.32E-06	3.02E-06	7.47E-06	4.01E-08	1.88E-08	5.64E-07	4.35E-07	0.00E+00	5.59E-05	1.70E-06	1.2E-03
CEA	AGRI	Child	Benzo(a)anthracene	3.63E-05	3.63E-04	1.62E-05	2.76E-10	1.43E-05	1.55E-07	2.42E-07	2.42E-07	5.70E-08	3.15E-06	6.63E-07	1.17E-07	4.36E-08	7.25E-06	4.00E-09	1.44E-03	1.67E-05	9.18E-06	1.67E-04	4.13E-04	1.96E-06	9.18E-07	4.28E-06	3.30E-06	0.00E+00	2.06E-03	6.27E-05	4.5E-02
CEA	AGRI	Child	Benzo(a)pyrene	6.85E-05	6.85E-04	1.84E-05	5.20E-10	2.21E-05	6.95E-07	3.07E-07	3.07E-07	6.87E-08	6.34E-06	1.33E-06	2.35E-07	8.74E-08	1.37E-05	7.55E-09	2.27E-03	2.12E-05	1.11E-05	3.36E-04	8.30E-04	3.92E-06	1.84E-06	8.08E-06	6.23E-06	0.00E+00	3.50E-03	1.06E-04	7.6E-02
CEA	AGRI	Child	Benzo(b)fluoranthene	1.01E-04	1.01E-03	2.80E-04	7.71E-10	1.62E-05	4.66E-07	3.86E-07	3.86E-07	1.94E-06	4.42E-06	9.30E-07	1.70E-07	6.34E-08	2.03E-05	1.12E-08	1.67E-03	2.66E-05	3.12E-04	2.34E-04	5.78E-04	2.84E-06	1.33E-06	1.20E-05	9.23E-06	0.00E+00	2.87E-03	8.71E-05	6.2E-02
CEA	AGRI	Child	Benzo(ghi) perylene	4.15E-05	4.15E-04	8.17E-06	3.15E-10	1.31E-05	8.96E-06	3.62E-08	3.62E-08	3.73E-06	1.85E-05	3.89E-06	6.59E-07	2.46E-07	8.30E-06	4.57E-09	2.17E-03	2.50E-06	6.01E-04	9.78E-04	2.42E-03	1.10E-05	5.17E-06	4.40E-06	3.40E-06	0.00E+00	6.20E-03	1.88E-04	1.3E-01
CEA	AGRI	Child	Benzo(k)fluoranthene	3.37E-05	3.37E-04	2.75E-06	2.56E-10	3.41E-06	1.63E-07	1.32E-07	1.32E-07	3.40E-08	1.20E-06	2.53E-07	4.72E-08	1.76E-08	6.74E-06	3.71E-09	3.63E-04	9.12E-06	5.47E-06	6.37E-05	1.57E-04	7.89E-07	3.70E-07	3.98E-06	3.07E-06	0.00E+00	6.14E-04	1.87E-05	1.3E-02
CEA	AGRI	Child	Chrysene	6.24E-05	6.24E-04	9.06E-06	4.74E-10	3.95E-06	4.79E-09	4.17E-07	4.17E-07	9.81E-08	8.30E-07	1.75E-07	3.85E-08	1.43E-08	1.25E-05	6.88E-09	4.29E-04	2.88E-05	1.58E-05	4.40E-05	1.09E-04	6.44E-07	3.02E-07	7.36E-06	5.68E-06	0.00E+00	6.52E-04	1.98E-05	1.4E-02
CEA	AGRI	Child	Fluoranthene	1.66E-05	1.66E-04	1.06E-04	1.26E-10	1.44E-06	7.96E-08	2.82E-07	2.82E-07	4.12E-08	5.99E-07	1.26E-07	2.36E-08	8.79E-09	3.32E-06	1.83E-09	1.77E-04	1.94E-05	6.63E-06	3.18E-05	7.85E-05	3.95E-07	1.85E-07	1.96E-06	1.51E-06	0.00E+00	3.20E-04	9.74E-06	7.0E-03
CEA	AGRI	Child	Fluorene	4.08E-07	4.08E-06	1.34E-04	3.10E-12	0.00E+00	3.58E-09	2.01E-08	2.01E-08	1.28E-09	1.36E-08	2.87E-09	4.76E-10	1.78E-10	8.16E-08	4.50E-11	2.32E-06	1.38E-06	2.06E-07	7.22E-07	1.78E-06	7.96E-09	3.75E-09	4.81E-08	3.71E-08	0.00E+00	6.59E-06	2.00E-07	1.4E-04
CEA	AGRI	Child	Indeno(1,2,3-cd)pyrene	1.60E-05	1.60E-04	3.00E-06	1.22E-10	5.09E-06	5.75E-09	3.23E-08	3.23E-08	1.41E-08	6.81E-07	1.43E-07	2.59E-08	9.66E-09	3.21E-06	1.77E-09	5.02E-04	2.23E-06	2.26E-06	3.61E-05	8.92E-05	4.34E-07	2.03E-07	1.89E-06	1.46E-06	0.00E+00	6.39E-04	1.94E-05	1.4E-02
CEA	AGRI	Child	Phenanthrene	6.98E-06	6.98E-05	2.16E-04	5.30E-11	3.67E-07	3.33E-08	2.30E-07	2.30E-07	2.12E-08	1.87E-07	3.93E-08	7.39E-09	2.76E-09	1.40E-06	7.69E-10	6.18E-05	1.59E-05	3.41E-06	9.89E-06	2.44E-05	1.24E-07	5.80E-08	7.41E-07	5.72E-07	0.00E+00	1.18E-04	3.60E-06	2.6E-03
CEA	AGRI	Child	Pyrene	2.20E-05	2.20E-04	9.93E-06	1.67E-10	1.01E-07	8.54E-09	4.25E-07	4.25E-07	5.28E-08	1.00E-07	2.11E-08	6.59E-09	2.45E-09	4.39E-06	2.42E-09	5.25E-05	2.93E-05	8.49E-06	5.30E-06	1.31E-05	1.10E-07	5.17E-08	2.59E-06	2.00E-06	0.00E+00	1.18E-04	3.58E-06	2.6E-03
CEA	AGRI	Infant	Anthracene	3.29E-06	3.29E-05	7.14E-05	2.50E-11	2.43E-07	3.90E-09	1.09E-07	1.09E-07	8.22E-09	5.70E-08	1.20E-08	2.40E-09	8.93E-10	6.59E-07	5.26E-11	2.56E-05	5.43E-07	6.83E-07	0.00E+00	0.00E+00	0.00E+00	4.17E-09	3.06E-07	1.39E-07	9.26E-07	2.89E-05	3.52E-06	2.5E-03
CEA	AGRI	Infant	Benzo(a)anthracene	3.63E-05	3.63E-04	1.62E-05	2.76E-10	1.43E-05	1.55E-07	2.42E-07	2.42E-07	5.70E-08	3.15E-06	6.63E-07	1.17E-07	4.36E-08	7.25E-06	5.79E-10	1.06E-03	1.21E-06	4.73E-06	0.00E+00	0.00E+00	0.00E+00	2.04E-07	2.32E-06	1.06E-06	1.13E-03	2.21E-03	2.69E-04	1.9E-01
CEA	AGRI	Infant	Benzo(a)pyrene	6.85E-05	6.85E-04	1.84E-05	5.20E-10	2.21E-05	6.95E-07	3.07E-07	3.07E-07	6.87E-08	6.34E-06	1.33E-06	2.35E-07	8.74E-08	1.37E-05	1.09E-09	1.67E-03	1.53E-06	5.70E-06	0.00E+00	0.00E+00	0.00E+00	4.08E-07	4.38E-06	2.00E-06	4.69E-03	6.39E-03	7.79E-04	5.6E-01
CEA	AGRI	Infant	Benzo(b)fluoranthene	1.01E-04	1.01E-03	2.80E-04	7.71E-10	1.62E-05	4.66E-07	3.86E-07	3.86E-07	1.94E-06	4.42E-06	9.30E-07	1.70E-07	6.34E-08	2.03E-05	1.62E-09	1.23E-03	1.93E-06	1.61E-04	0.00E+00	0.00E+00	0.00E+00	2.96E-07	6.49E-06	2.96E-06	5.35E-03	6.77E-03	8.25E-04	5.9E-01
CEA	AGRI	Infant	Benzo(ghi) perylene	4.15E-05	4.15E-04	8.17E-06	3.15E-10	1.31E-05	8.96E-06	3.62E-08	3.62E-08	3.73E-06	1.85E-05	3.89E-06	6.59E-07	2.46E-07	8.30E-06	6.62E-10	1.59E-03	1.81E-07	3.10E-04	0.00E+00	0.00E+00	0.00E+00	1.15E-06	2.39E-06	1.09E-06	1.73E-02	1.92E-02	2.35E-03	**1.7E+00**
CEA	AGRI	Infant	Benzo(k)fluoranthene	3.37E-05	3.37E-04	2.75E-06	2.56E-10	3.41E-06	1.63E-07	1.32E-07	1.32E-07	3.40E-08	1.20E-06	2.53E-07	4.72E-08	1.76E-08	6.74E-06	5.38E-10	2.67E-04	6.61E-07	2.82E-06	0.00E+00	0.00E+00	0.00E+00	8.21E-08	2.16E-06	9.84E-07	3.51E-04	6.32E-04	7.70E-05	5.5E-02
CEA	AGRI	Infant	Chrysene	6.24E-05	6.24E-04	9.06E-06	4.74E-10	3.95E-06	4.79E-09	4.17E-07	4.17E-07	9.81E-08	8.30E-07	1.75E-07	3.85E-08	1.43E-08	1.25E-05	9.96E-10	3.15E-04	2.08E-06	8.14E-06	0.00E+00	0.00E+00	0.00E+00	6.70E-08	3.99E-06	1.82E-06	5.72E-05	4.01E-04	4.89E-05	3.5E-02
CEA	AGRI	Infant	Fluoranthene	1.66E-05	1.66E-04	1.06E-04	1.26E-10	1.44E-06	7.96E-08	2.82E-07	2.82E-07	4.12E-08	5.99E-07	1.26E-07	2.36E-08	8.79E-09	3.32E-06	2.65E-10	1.30E-04	1.41E-06	3.42E-06	0.00E+00	0.00E+00	0.00E+00	4.11E-08	1.06E-06	4.85E-07	3.59E-06	1.43E-04	1.75E-05	1.2E-02
CEA	AGRI	Infant	Fluorene	4.08E-07	4.08E-06	1.34E-04	3.10E-12	0.00E+00	3.58E-09	2.01E-08	2.01E-08	1.28E-09	1.36E-08	2.87E-09	4.76E-10	1.78E-10	8.16E-08	6.51E-12	1.70E-06	1.00E-07	1.06E-07	0.00E+00	0.00E+00	0.00E+00	8.31E-10	2.61E-08	1.19E-08	1.16E-08	2.04E-06	2.49E-07	1.8E-04
CEA	AGRI	Infant	Indeno(1,2,3-cd)pyrene	1.60E-05	1.60E-04	3.00E-06	1.22E-10	5.09E-06	5.75E-09	3.23E-08	3.23E-08	1.41E-08	6.81E-07	1.43E-07	2.59E-08	9.66E-09	3.21E-06	2.56E-10	3.69E-04	1.62E-07	1.17E-06	0.00E+00	0.00E+00	0.00E+00	4.51E-08	1.03E-06	4.68E-07	3.95E-04	7.70E-04	9.40E-05	6.7E-02
CEA	AGRI	Infant	Phenanthrene	6.98E-06	6.98E-05	2.16E-04	5.30E-11	3.67E-07	3.33E-08	2.30E-07	2.30E-07	2.12E-08	1.87E-07	3.93E-08	7.39E-09	2.76E-09	1.40E-06	1.11E-10	4.54E-05	1.15E-06	1.76E-06	0.00E+00	0.00E+00	0.00E+00	1.29E-08	4.02E-07	1.83E-07	4.28E-07	5.08E-05	6.19E-06	4.4E-03
CEA	AGRI	Infant	Pyrene	2.20E-05	2.20E-04	9.93E-06	1.67E-10	1.01E-07	8.54E-09	4.25E-07	4.25E-07	5.28E-08	1.00E-07	2.11E-08	6.59E-09	2.45E-09	4.39E-06	3.50E-10	3.85E-05	2.13E-06	4.38E-06	0.00E+00	0.00E+00	0.00E+00	1.15E-08	1.40E-06	6.41E-07	3.91E-06	5.54E-05	6.76E-06	4.8E-03
CEA	AGRI	Toddler	Anthracene	3.29E-06	3.29E-05	7.14E-05	2.50E-11	2.43E-07	3.90E-09	1.09E-07	1.09E-07	8.22E-09	5.70E-08	1.20E-08	2.40E-09	8.93E-10	2.64E-06	2.33E-10	2.38E-05	4.35E-06	8.63E-07	2.11E-06	8.13E-06	3.17E-08	2.16E-08	4.11E-07	2.46E-07	0.00E+00	4.26E-05	2.58E-06	1.8E-03
CEA	AGRI	Toddler	Benzo(a)anthracene	3.63E-05	3.63E-04	1.62E-05	2.76E-10	1.43E-05	1.55E-07	2.42E-07	2.42E-07	5.70E-08	3.15E-06	6.63E-07	1.17E-07	4.36E-08	2.90E-05	2.56E-09	9.85E-04	9.69E-06	5.99E-06	1.17E-04	4.49E-04	1.55E-06	1.05E-06	3.12E-06	1.87E-06	0.00E+00	1.60E-03	9.71E-05	6.9E-02
CEA	AGRI	Toddler	Benzo(a)pyrene	6.85E-05	6.85E-04	1.84E-05	5.20E-10	2.21E-05	6.95E-07	3.07E-07	3.07E-07	6.87E-08	6.34E-06	1.33E-06	2.35E-07	8.74E-08	5.48E-05	4.84E-09	1.55E-03	1.23E-05	7.21E-06	2.34E-04	9.03E-04	3.11E-06	2.11E-06	5.89E-06	3.53E-06	0.00E+00	2.78E-03	1.68E-04	1.2E-01
CEA	AGRI	Toddler	Benzo(b)fluoranthene	1.01E-04	1.01E-03	2.80E-04	7.71E-10	1.62E-05	4.66E-07	3.86E-07	3.86E-07	1.94E-06	4.42E-06	9.30E-07	1.70E-07	6.34E-08	8.12E-05	7.17E-09	1.14E-03	1.54E-05	2.03E-04	1.63E-04	6.29E-04	2.25E-06	1.53E-06	8.73E-06	5.24E-06	0.00E+00	2.25E-03	1.37E-04	9.8E-02
CEA	AGRI	Toddler	Benzo(ghi) perylene	4.15E-05	4.15E-04	8.17E-06	3.15E-10	1.31E-05	8.96E-06	3.62E-08	3.62E-08	3.73E-06	1.85E-05	3.89E-06	6.59E-07	2.46E-07	3.32E-05	2.93E-09	1.48E-03	1.45E-06	3.92E-04	6.83E-04	2.63E-03	8.73E-06	5.93E-06	3.21E-06	1.93E-06	0.00E+00	5.24E-03	3.18E-04	2.3E-01
CEA	AGRI	Toddler	Benzo(k)fluoranthene	3.37E-05	3.37E-04	2.75E-06	2.56E-10	3.41E-06	1.63E-07	1.32E-07	1.32E-07	3.40E-08	1.20E-06	2.53E-07	4.72E-08	1.76E-08	2.70E-05	2.38E-09	2.48E-04	5.29E-06	3.57E-06	4.45E-05	1.71E-04	6.25E-07	4.25E-07	2.90E-06	1.74E-06	0.00E+00	5.05E-04	3.06E-05	2.2E-02
CEA	AGRI	Toddler	Chrysene	6.24E-05	6.24E-04	9.06E-06	4.74E-10	3.95E-06	4.79E-09	4.17E-07	4.17E-07	9.81E-08	8.30E-07	1.75E-07	3.85E-08	1.43E-08	4.99E-05	4.41E-09	2.93E-04	1.67E-05	1.03E-05	3.07E-05	1.18E-04	5.10E-07	3.46E-07	5.37E-06	3.22E-06	0.00E+00	5.28E-04	3.20E-05	2.3E-02
CEA	AGRI	Toddler	Fluoranthene	1.66E-05	1.66E-04	1.06E-04	1.26E-10	1.44E-06	7.96E-08	2.82E-07	2.82E-07	4.12E-08	5.99E-07	1.26E-07	2.36E-08	8.79E-09	1.33E-05	1.17E-09	1.21E-04	1.13E-05	4.32E-06	2.22E-05	8.54E-05	3.13E-07	2.12E-07	1.43E-06	8.57E-07	0.00E+00	2.60E-04	1.58E-05	1.1E-02
CEA	AGRI	Toddler	Fluorene	4.08E-07	4.08E-06	1.34E-04	3.10E-12	0.00E+00	3.58E-09	2.01E-08	2.01E-08	1.28E-09	1.36E-08	2.87E-09	4.76E-10	1.78E-10	3.26E-07	2.88E-11	1.58E-06	8.03E-07	1.35E-07	5.04E-07	1.94E-06	6.30E-09	4.30E-09	3.51E-08	2.10E-08	0.00E+00	5.36E-06	3.25E-07	2.3E-04
CEA	AGRI	Toddler	Indeno(1,2,3-cd)pyrene	1.60E-05	1.60E-04	3.00E-06	1.22E-10	5.09E-06	5.75E-09	3.23E-08	3.23E-08	1.41E-08	6.81E-07	1.43E-07	2.59E-08	9.66E-09	1.28E-05	1.13E-09	3.43E-04	1.29E-06	1.48E-06	2.52E-05	9.71E-05	3.43E-07	2.33E-07	1.38E-06	8.27E-07	0.00E+00	4.84E-04	2.93E-05	2.1E-02
CEA	AGRI	Toddler	Phenanthrene	6.98E-06	6.98E-05	2.16E-04	5.30E-11	3.67E-07	3.33E-08	2.30E-07	2.30E-07	2.12E-08	1.87E-07	3.93E-08	7.39E-09	2.76E-09	5.58E-06	4.93E-10	4.23E-05	9.21E-06	2.22E-06	6.91E-06	2.66E-05	9.79E-08	6.66E-08	5.40E-07	3.24E-07	0.00E+00	9.38E-05	5.69E-06	4.1E-03
CEA	AGRI	Toddler	Pyrene	2.20E-05	2.20E-04	9.93E-06	1.67E-10	1.01E-07	8.54E-09	4.25E-07	4.25E-07	5.28E-08	1.00E-07	2.11E-08	6.59E-09	2.45E-09	1.76E-05	1.55E-09	3.59E-05	1.70E-05	5.54E-06	3.70E-06	1.43E-05	8.72E-08	5.93E-08	1.89E-06	1.13E-06	0.00E+00	9.71E-05	5.89E-06	4.2E-03

Table B1- 7 Summary of Exposure Equations used in the Human Health Risk Assessment Exposure Model

Variable	Parameter	Formulas / Values	Units	Data Reference
Soil Concentration (Cs)	Cs	Cs = (Ds * (1 - Exp(-Kt * t))) / Kt	mg/kg	Calculated soil concentration that results from the deposition over time
	Where:			
	Ds	(Dpd + Dwp) / (Z * BD)	mg/kg of soil/year	Deposition to soil
	Dpd	(ConcAir * (1 - Fv) * Vd * 31536000) + (ConcAir * Fv * Vd * 31536000)	mg/m2/year	Calculation of the dry deposition rates for the chemical
	Dwp	(ConcAir * (1 - Fv) * Vw * 31536000) + (ConcAir * Fv * Vw * 31536000)	mg/m2/year	Calculation of the wet deposition rates for the chemical
	BD	1500	kg/m3	Bulk density
	t	40	years	Deposition
	Kt	Kv + Ks	yr^{-1}	Sum of abiotic/biotic degradation with calculated loss due to volatilization
	Ks	0.693 / (Half life)	yr^{-1}	Loss due to abiotic and biotic degradation
	Kv	0.693 / (Half life)	yr^{-1}	Loss due to volatilization
	Kv Half_life	1.58E-08 * ((Koc * S) / VP)	days	Swan et al. (1979)
	S	Solubility	mg/L	
	Vd, Vw	Depostion velocity	m/s	
	Vp	Vapour pressure	mmHg	
	Z	Soil Depth	meters	
	Z	Surface Soil Depth	meters	
	Fv	Fraction of Chemical in Vapour Phase	%	
Air Concentrations	Cair	Predicted Exposure Point Concentrations	µg/m3	Raw data
Dust Concentration (Cd)	Cd	Cd = Dust level * ConcSoil * 1000	ug/m3	
	Where:			
	Dust level	0.76	ug/m3	Health Canada 2004
Plant Concentration	Cplantdep	Cplantdep = (Pd * WPF * (1-WC)) * Apportionment	mg/kg ww	
	Where:			
	Pd	Pd = ((Dpd + (0.6 * Dwp)) * Rp * (1 - Exp(-Kp * Tp))) / (Yp * Kp)	mg/kg dw	Calculation of the plant concentration (mg/kg dry weight) from atmospheric deposition
	Y	2.88	unitless	Empirical Constant
	Yp	2.24	kg DW/m2	Yield
	Kp	18	yr-1	Plant surface loss coefficient
	Tp	0.16	years	Period of exposure - years
	Rp	0.39	unitless	Edible portion of plant
	Dpd	(ConcAir * (1 - Fv) * Vd * 31536000)	mg/m2/year	particulate dry deposition rates
	Dwp	(ConcAir * (1 - Fv) * Vw * 31536000)	mg/m2/year	particulate wet deposition rates
	WC	Water Content	%	
	WPF	Washing and Peeling Factor = 85%	%	
	Soil	0.2	meters	
	Surface Soil	0.02	meters	
	Apportionment	Chemical Apportionment	%	
Plant Concentration	Cplantair	Cplantair = (Pv * WPF * (1-WC)) * Apportionment	mg/kg ww	
	Where:			
	Pv	Pv = (ConcAir * (Bv / RF) * Fv * VGag) / Pa		Calculation of the estimated plant concentration (mg/kg) for air to plant transfer
	Bv	(1.19 * Bvol) / ((1 - WC) * Pforage)		Mass based air to plant bio transfer factor

Table B1- 7 Summary of Exposure Equations used in the Human Health Risk Assessment Exposure Model

Variable	Parameter	Formulas / Values	Units	Data Reference
	RF	Metals = 1, PAHs/VOCs = 100		Reduction factor
	Fv	Fraction of Chemical in Vapour Phase	%	
	Vgag	Metals = 1, PAHs or VOCs = 0.01		Garden/Traditional plants
	Pa	1200	g/m3	Density of air
	Bvol	10 ^ (1.065 * Log(Kow) - Log(H / (R * t)) - 1.654)	Unitless	Volumetric air to plant bio transfer factor
	Pforage	770	g/L	Density of forage (US EPA OSW 2005)
	t	288	Kelvin	Ambient Temperature
	R	8.20E-05	atm-m3/mol-K	Ideal gas constant
	WC	Water Content	%	
	WPF	Washing and Peeling Factor = 85%	%	
	Apportionment	Chemical Apportionment	%	
Plant Concentration	Cplantsoil	Cplantsoil = (Pr * WPF * (1-WC)) * Apportionment	mg/kg ww	
	Where:			
	Pr	Pr = Exp(Constant + slope * Ln(ConcSoil))	mg/kg	Calculation of plant concentration (mg/kg) from soil to plant transfer based on regression model
	or Pr	Pr = ConcSoil * BCF	mg/kg	Calculation of plant concentration (mg/kg) from soil to plant transfer based on BCF model
	Constant	Y- Intercept of regression model	mg/kg	
	Slope	Slope of regression model	kg-soil/kg-plant	
	WC	Water Content	%	
	WPF	Washing and Peeling Factor = 85	%	
	BCF	Bioconcentration factor	kg-soil/kg-plant	
	Apportionment	Chemical Apportionment	%	
Berry Concentration	Cberry	Cberry = (Pb * WPF * (1-WC)) * Apportionment	mg/kg ww	
	Where:			
	Pb	Pb = Exp(Constant + slope * Ln(ConcSoil))	mg/kg	Calculation of berry concentration (mg/kg) from soil to plant transfer based on regression model
	or Pb	Pb = ConcSoil * BCF	mg/kg	Calculation of berry concentration (mg/kg) from soil to plant transfer based on BCF model
	Where:			
	Constant	Y- Intercept of regression model	mg/kg	
	Slope	Slope of regression model	kg-soil/kg-plant	
	BCF	Bioconcentration factor	kg-soil/kg-plant	
	WC	Water Content	%	
	WPF	Washing and Peeling Factor = 85%	%	
	Apportionment	Chemical Apportionment	%	
Root Concentration	Croot	Croot = (Pr * WPF * (1-WC)) * Apportionment	mg/kg ww	
	Where:			
	Pr	Pr = Exp(Constant + slope * Ln(ConcSoil))	mg/kg	Calculation of root concentration (mg/kg) from soil to plant transfer based on regression model
	or Pr	Pr = ConcSoil * BCF	mg/kg	Calculation of root concentration (mg/kg) from soil to plant transfer based on BCF model
	Constant	Y- Intercept of regression model	mg/kg	
	Slope	Slope of regression model	kg-soil/kg-plant	
	BCF	Bioconcentration factor	kg-soil/kg-plant	
	WC	Water Content	%	
	WPF	Washing and Peeling Factor = 85%	%	
	Apportionment	Chemical Apportionment	%	
Beef Concentration	Cbeef	Cbeef = [beef] * Apportionment	mg/kg ww	
Dairy Concentration	Cdairy	Cdairy = [dairy] * Apportionment	mg/kg ww	

Table B1- 7 Summary of Exposure Equations used in the Human Health Risk Assessment Exposure Model

Variable	Parameter	Formulas / Values	Units	Data Reference
Chicken Concentration	Cchicken	Cchicken = [chicken] * Apportionment	mg/kg ww	
Egg Concentration	Cegg	Cegg = [egg] * Apportionment	mg/kg ww	
Soil EDI	EDI	[Soil] * (Exposure variable (SIR))	ug/day	
Dust EDI	EDI	[Dust] * (Exposure variable (AIR))	ug/day	
Plant EDI	EDI	SUM [Plant] * (Exposure variable (PLANT))	ug/day	
Berries EDI	EDI	[Berries] * (Exposure variable (BERRIES))	ug/day	
Root/Cattail EDI	EDI	[Root/Cattail] * (Exposure variable (ROOT))	ug/day	
Fish EDI	EDI	[Fish] * (Exposure variable (FISH))	ug/day	
Beef EDI	EDI	[Beef] * (Exposure variable (BEEF))	ug/day	
Dairy EDI	EDI	[Dairy] * (Exposure variable (DAIRY))	ug/day	
Chicken EDI	EDI	[Chicken] * (Exposure variable (CHICKEN))	ug/day	
Eggs EDI	EDI	[Eggs] * (Exposure variable (EGGS))	ug/day	
Dermal Hands EDI	EDI	[Surface soil] * (Exposure variables (SAH * SLH * RAF)	ug/day	
Dermal Other EDI	EDI	[Surface soil] * (Exposure variables (SAO * SLO * RAF)	ug/day	
Breast Milk EDI	EDI	[Adult EDI] * BW_{Adu} * BTF_BM / 1000	ug/day	
Total EDI	EDI	EDI (Soil + DW + Dust + Plant + Berries + Root + Fish + Game + Dermal + BM)	ug/day	
Total EDI	EDI	Total EDI / Exposure Variable (BW)	ug/kg/day	

Table B1-8 Human Oral Exposure Limits

Chemical	Exposure Limit Type	Oral Exposure Limit [ug/kg/day]	Reference / Comment
Anthracene	RsD	1.4E-03	Using B(a)P IPM limit, US EPA (1994)
Benzo(a)anthracene	RsD	1.4E-03	Using B(a)P IPM limit, US EPA (1994)
Benzo(a)pyrene	RsD	1.4E-03	Using B(a)P IPM limit, US EPA (1994)
Benzo(a)pyreneWMM	RsD	3.4E-03	Using B(a)P IPM limit, US EPA (1994)
Benzo(b)fluoranthene	RsD	1.4E-03	Using B(a)P IPM limit, US EPA (1994)
Benzo(ghi) perylene	RsD	1.4E-03	Using B(a)P IPM limit, US EPA (1994)
Benzo(k)fluoranthene	RsD	1.4E-03	Using B(a)P IPM limit, US EPA (1994)
Chrysene	RsD	1.4E-03	Using B(a)P IPM limit, US EPA (1994)
Fluoranthene	RsD	1.4E-03	Using B(a)P IPM limit, US EPA (1994)
Fluorene	RsD	1.4E-03	Using B(a)P IPM limit, US EPA (1994)
Indeno(1,2,3-cd)pyrene	RsD	1.4E-03	Using B(a)P IPM limit, US EPA (1994)
Phenanthrene	RsD	1.4E-03	Using B(a)P IPM limit, US EPA (1994)
Pyrene	RsD	1.4E-03	Using B(a)P IPM limit, US EPA (1994)

Table B1- 9 Human Receptor Exposure Variables

Type	Receptor	Variable	Abbreviation	Value	Units	Reference/Comment
AGRI	Adolescent	AIR	AGRI_AIR_Adolescent	1.58E+01	m^3/d	HC (2004)
AGRI	Adult	AIR	AGRI_AIR_Adult	1.58E+01	m^3/d	HC (2004)
AGRI	Child	AIR	AGRI_AIR_Child	1.45E+01	m^3/d	HC (2004)
AGRI	Infant	AIR	AGRI_AIR_Infant	2.10E+00	m^3/d	HC (2004)
AGRI	Toddler	AIR	AGRI_AIR_Toddler	9.30E+00	m^3/d	HC (2004)
AGRI	Adolescent	Beef	AGRI_Beef_Adolescent	8.90E+01	g/d	HC (1994); Sum of consumption rates for steak, roast and stewing beef, ground
AGRI	Adult	Beef	AGRI_Beef_Adult	9.00E+01	g/d	HC (1994); Sum of consumption rates for steak, roast and stewing beef, ground
AGRI	Child	Beef	AGRI_Beef_Child	5.30E+01	g/d	HC (1994); Sum of consumption rates for steak, roast and stewing beef, ground
AGRI	Infant	Beef	AGRI_Beef_Infant	0.00E+00	g/d	HC (1994); Sum of consumption rates for steak, roast and stewing beef, ground
AGRI	Toddler	Beef	AGRI_Beef_Toddler	3.70E+01	g/d	HC (1994); Sum of consumption rates for steak, roast and stewing beef, ground
AGRI	Adolescent	Berries	AGRI_Berries_Adolescent	5.60E+01	g/d	HC (1994); Sum of consumption rates for apples a& applesauce, cherries, straw
AGRI	Adult	Berries	AGRI_Berries_Adult	4.60E+01	g/d	HC (1994); Sum of consumption rates for apples a& applesauce, cherries, straw
AGRI	Child	Berries	AGRI_Berries_Child	6.90E+01	g/d	HC (1994); Sum of consumption rates for apples a& applesauce, cherries, straw
AGRI	Infant	Berries	AGRI_Berries_Infant	5.00E+00	g/d	HC (1994); Sum of consumption rates for apples a& applesauce, cherries, straw
AGRI	Toddler	Berries	AGRI_Berries_Toddler	4.00E+01	g/d	HC (1994); Sum of consumption rates for apples a& applesauce, cherries, straw
AGRI	Adolescent	Bird	AGRI_Bird_Adolescent	2.00E+01	g/d	Assumed 100% of poulty consumption rate
AGRI	Adult	Bird	AGRI_Bird_Adult	2.10E+01	g/d	Assumed 100% of poulty consumption rate
AGRI	Child	Bird	AGRI_Bird_Child	1.70E+01	g/d	Assumed 100% of poulty consumption rate
AGRI	Infant	Bird	AGRI_Bird_Infant	0.00E+00	g/d	Assumed 100% of poulty consumption rate
AGRI	Toddler	Bird	AGRI_Bird_Toddler	1.30E+01	g/d	Assumed 100% of poulty consumption rate
AGRI	Adolescent	BW	AGRI_BW_Adolescent	5.97E+01	kg	HC (2004)
AGRI	Adult	BW	AGRI_BW_Adult	7.07E+01	kg	HC (2004)
AGRI	Child	BW	AGRI_BW_Child	3.29E+01	kg	HC (2004)
AGRI	Infant	BW	AGRI_BW_Infant	8.20E+00	kg	HC (2004)
AGRI	Toddler	BW	AGRI_BW_Toddler	1.65E+01	kg	HC (2004)
AGRI	Adolescent	Chicken	AGRI_Chicken_Adolescent	2.03E+01	g/d	HC (1994); poultry, chicken and turkey
AGRI	Adult	Chicken	AGRI_Chicken_Adult	2.12E+01	g/d	HC (1994); poultry, chicken and turkey
AGRI	Child	Chicken	AGRI_Chicken_Child	1.67E+01	g/d	HC (1994); poultry, chicken and turkey
AGRI	Infant	Chicken	AGRI_Chicken_Infant	0.00E+00	g/d	HC (1994); poultry, chicken and turkey
AGRI	Toddler	Chicken	AGRI_Chicken_Toddler	1.32E+01	g/d	HC (1994); poultry, chicken and turkey
AGRI	Adolescent	Dairy	AGRI_Dairy_Adolescent	5.90E+02	g/d	HC (1994); Sum of consumption rates for whole, evapourated, 2% & skim milk,
AGRI	Adult	Dairy	AGRI_Dairy_Adult	2.97E+02	g/d	HC (1994); Sum of consumption rates for whole, evapourated, 2% & skim milk,
AGRI	Child	Dairy	AGRI_Dairy_Child	6.22E+02	g/d	HC (1994); Sum of consumption rates for whole, evapourated, 2% & skim milk,
AGRI	Infant	Dairy	AGRI_Dairy_Infant	0.00E+00	g/d	Assumed infant exposed to breast milk only
AGRI	Toddler	Dairy	AGRI_Dairy_Toddler	6.77E+02	g/d	HC (1994); Sum of consumption rates for whole, evapourated, 2% & skim milk,
AGRI	Adolescent	Deer	AGRI_Deer_Adolescent	8.90E+01	g/d	Assumed 100% of beef consumption rate
AGRI	Adult	Deer	AGRI_Deer_Adult	9.00E+01	g/d	Assumed 100% of beef consumption rate
AGRI	Child	Deer	AGRI_Deer_Child	5.30E+01	g/d	Assumed 100% of beef consumption rate
AGRI	Infant	Deer	AGRI_Deer_Infant	0.00E+00	g/d	Assumed 100% of beef consumption rate
AGRI	Toddler	Deer	AGRI_Deer_Toddler	3.70E+01	g/d	Assumed 100% of beef consumption rate
AGRI	Adolescent	Eggs	AGRI_Eggs_Adolescent	2.15E+01	g/d	HC (1994); eggs
AGRI	Adult	Eggs	AGRI_Eggs_Adult	3.23E+01	g/d	HC (1994); eggs
AGRI	Child	Eggs	AGRI_Eggs_Child	2.11E+01	g/d	HC (1994); eggs
AGRI	Infant	Eggs	AGRI_Eggs_Infant	4.67E+00	g/d	HC (1994); eggs
AGRI	Toddler	Eggs	AGRI_Eggs_Toddler	2.42E+01	g/d	HC (1994); eggs
AGRI	Adolescent	Fish	AGRI_Fish_Adolescent	2.20E+01	g/d	HC (2007); consumption rate for general population of "eaters only"
AGRI	Adult	Fish	AGRI_Fish_Adult	2.20E+01	g/d	HC (2007); consumption rate for general population of "eaters only"

Table B1- 9 Human Receptor Exposure Variables

Type	Receptor	Variable	Abbreviation	Value	Units	Reference/Comment
AGRI	Child	Fish	AGRI_Fish_Child	1.40E+01	g/d	HC (2007); consumption rate for general population of "eaters only"
AGRI	Infant	Fish	AGRI_Fish_Infant	0.00E+00	g/d	HC (2007); consumption rate for general population of "eaters only"
AGRI	Toddler	Fish	AGRI_Fish_Toddler	1.00E+01	g/d	HC (2007); consumption rate for general population of "eaters only"
AGRI	Adolescent	LAF	AGRI_LAF_Adolescent	1.07E-01	yr-lifestage/yr-total	HC (2004)
AGRI	Adult	LAF	AGRI_LAF_Adult	7.47E-01	yr-lifestage/yr-total	HC (2004)
AGRI	Child	LAF	AGRI_LAF_Child	9.33E-02	yr-lifestage/yr-total	HC (2004)
AGRI	Infant	LAF	AGRI_LAF_Infant	6.67E-03	yr-lifestage/yr-total	HC (2004)
AGRI	Toddler	LAF	AGRI_LAF_Toddler	4.67E-02	yr-lifestage/yr-total	HC (2004)
AGRI	Adolescent	Plant	AGRI_Plant_Adolescent	1.20E+02	g/d	HC (2004)
AGRI	Adult	Plant	AGRI_Plant_Adult	1.37E+02	g/d	HC (2004)
AGRI	Child	Plant	AGRI_Plant_Child	9.80E+01	g/d	HC (2004)
AGRI	Infant	Plant	AGRI_Plant_Infant	7.20E+01	g/d	HC (2004)
AGRI	Toddler	Plant	AGRI_Plant_Toddler	6.70E+01	g/d	HC (2004)
AGRI	Adolescent	Root	AGRI_Root_Adolescent	2.27E+02	g/d	HC (2004)
AGRI	Adult	Root	AGRI_Root_Adult	1.88E+02	g/d	HC (2004)
AGRI	Child	Root	AGRI_Root_Child	1.61E+02	g/d	HC (2004)
AGRI	Infant	Root	AGRI_Root_Infant	8.30E+01	g/d	HC (2004)
AGRI	Toddler	Root	AGRI_Root_Toddler	1.05E+02	g/d	HC (2004)
AGRI	Adolescent	SAH	AGRI_SAH_Adolescent	8.00E+02	cm^2	HC (2004); hands
AGRI	Adult	SAH	AGRI_SAH_Adult	8.90E+02	cm^2	HC (2004); hands
AGRI	Child	SAH	AGRI_SAH_Child	5.90E+02	cm^2	HC (2004); hands
AGRI	Infant	SAH	AGRI_SAH_Infant	3.20E+02	cm^2	HC (2004); hands
AGRI	Toddler	SAH	AGRI_SAH_Toddler	4.30E+02	cm^2	HC (2004); hands
AGRI	Adolescent	SAO	AGRI_SAO_Adolescent	7.20E+03	cm^2	HC (2004); arms and legs
AGRI	Adult	SAO	AGRI_SAO_Adult	8.22E+03	cm^2	HC (2004); arms and legs
AGRI	Child	SAO	AGRI_SAO_Child	4.55E+03	cm^2	HC (2004); arms and legs
AGRI	Infant	SAO	AGRI_SAO_Infant	1.46E+03	cm^2	HC (2004); arms and legs
AGRI	Toddler	SAO	AGRI_SAO_Toddler	2.58E+03	cm^2	HC (2004); arms and legs
AGRI	Adolescent	SIR	AGRI_SIR_Adolescent	2.00E-02	g/d	HC (2004)
AGRI	Adult	SIR	AGRI_SIR_Adult	2.00E-02	g/d	HC (2004)
AGRI	Child	SIR	AGRI_SIR_Child	2.00E-02	g/d	HC (2004)
AGRI	Infant	SIR	AGRI_SIR_Infant	2.00E-02	g/d	HC (2004)
AGRI	Toddler	SIR	AGRI_SIR_Toddler	8.00E-02	g/d	HC (2004)
AGRI	Adolescent	SLH	AGRI_SLH_Adolescent	1.00E-04	g/cm^2/event	HC (2004); skin loading (hands)
AGRI	Adult	SLH	AGRI_SLH_Adult	1.00E-04	g/cm^2/event	HC (2004); skin loading (hands)
AGRI	Child	SLH	AGRI_SLH_Child	1.00E-04	g/cm^2/event	HC (2004); skin loading (hands)
AGRI	Infant	SLH	AGRI_SLH_Infant	1.00E-04	g/cm^2/event	HC (2004); skin loading (hands)
AGRI	Toddler	SLH	AGRI_SLH_Toddler	1.00E-04	g/cm^2/event	HC (2004); skin loading (hands)
AGRI	Adolescent	SLO	AGRI_SLO_Adolescent	1.00E-05	g/cm^2/event	HC (2004); skin loading (other)
AGRI	Adult	SLO	AGRI_SLO_Adult	1.00E-05	g/cm^2/event	HC (2004); skin loading (other)
AGRI	Child	SLO	AGRI_SLO_Child	1.00E-05	g/cm^2/event	HC (2004); skin loading (other)
AGRI	Infant	SLO	AGRI_SLO_Infant	1.00E-05	g/cm^2/event	HC (2004); skin loading (other)
AGRI	Toddler	SLO	AGRI_SLO_Toddler	1.00E-05	g/cm^2/event	HC (2004); skin loading (other)

Table B1-10 Vapour Pressure [mmHg]

Chemical	Value	VP[atm]	VP[Pa]	VP[kPa]	Reference
Anthracene	2.70E-06	3.55E-09	3.60E-04	3.60E-07	US EPA 2005
Benzo(a)anthracene	1.10E-07	1.45E-10	1.47E-05	1.47E-08	US EPA 2005
Benzo(a)pyrene	5.50E-09	7.24E-12	7.34E-07	7.34E-10	US EPA 2005
Benzo(b)fluoranthene	5.00E-07	6.58E-10	6.67E-05	6.67E-08	US EPA 2005
Benzo(ghi) perylene	9.98E-11	1.31E-13	1.33E-08	1.33E-11	Mackay et al 1992
Benzo(k)fluoranthene	2.00E-09	2.63E-12	2.66E-07	2.66E-10	US EPA 2005
Chrysene	6.20E-09	8.16E-12	8.27E-07	8.27E-10	US EPA 2005
Fluoranthene	7.83E-06	1.03E-08	1.04E-03	1.04E-06	US EPA 2005
Fluorene	6.30E-04	8.29E-07	8.40E-02	8.40E-05	US EPA 2005
Indeno(1,2,3-cd)pyrene	1.00E-10	1.32E-13	1.34E-08	1.34E-11	US EPA 2005
Phenanthrene	1.10E-04	1.45E-07	1.47E-02	1.47E-05	US EPA 2005
Pyrene	4.60E-06	6.05E-09	6.13E-04	6.13E-07	US EPA 2005

Table B1-11 Solubility [mg/L] or [ppm]

Chemical	Value	S[kg/m3]	Reference
Anthracene	4.30E-02	4.30E-05	US EPA 2005
Benzo(a)anthracene	9.40E-03	9.40E-06	US EPA 2005
Benzo(a)pyrene	1.60E-03	1.60E-06	US EPA 2005
Benzo(b)fluoranthene	1.50E-03	1.50E-06	US EPA 2005
Benzo(ghi) perylene	2.60E-04	2.60E-07	Mackay et al 1992
Benzo(k)fluoranthene	8.00E-04	8.00E-07	US EPA 2005
Chrysene	6.30E-03	6.30E-06	US EPA 2005
Fluoranthene	2.10E-01	2.10E-04	US EPA 2005
Fluorene	2.00E+00	2.00E-03	US EPA 2005
Indeno(1,2,3-cd)pyrene	2.20E-05	2.20E-08	US EPA 2005
Phenanthrene	1.10E+00	1.10E-03	US EPA 2005
Pyrene	1.40E+00	1.40E-03	US EPA 2005

Table B1-12 Koc [(mg/g) / (mg/mL)] or [L/kg]			
Chemical	**Value**	**Log(Koc)**	**Reference**
Anthracene	2.35E+04	4.37E+00	US EPA 2005
Benzo(a)anthracene	3.58E+05	5.55E+00	US EPA 2005
Benzo(a)pyrene	9.69E+05	5.99E+00	US EPA 2005
Benzo(b)fluoranthene	1.05E+06	6.02E+00	US EPA 2005
Benzo(ghi) perylene	1.58E+06	6.20E+00	Mackay et al 1992
Benzo(k)fluoranthene	9.92E+05	6.00E+00	US EPA 2005
Chrysene	4.01E+05	5.60E+00	US EPA 2005
Fluoranthene	4.91E+04	4.69E+00	US EPA 2005
Fluorene	7.71E+03	3.89E+00	US EPA 2005
Indeno(1,2,3-cd)pyrene	3.08E+06	6.49E+00	US EPA 2005
Phenanthrene	2.65E+04	4.42E+00	US EPA 2005
Pyrene	6.80E+04	4.83E+00	US EPA 2005

Table B1-13 Kow

Chemical	Value	Log(Kow)	Reference
Anthracene	3.16E+04	4.50E+00	US EPA 2005
Benzo(a)anthracene	5.01E+05	5.70E+00	US EPA 2005
Benzo(a)pyrene	1.00E+06	6.00E+00	US EPA 2005
Benzo(b)fluoranthene	1.33E+06	6.12E+00	US EPA 2005
Benzo(ghi) perylene	1.70E+07	7.23E+00	Mackay et al 1992
Benzo(k)fluoranthene	1.26E+06	6.10E+00	US EPA 2005
Chrysene	5.01E+05	5.70E+00	US EPA 2005
Fluoranthene	1.00E+05	5.00E+00	US EPA 2005
Fluorene	1.58E+04	4.20E+00	US EPA 2005
Indeno(1,2,3-cd)pyrene	3.98E+06	6.60E+00	US EPA 2005
Phenanthrene	3.16E+04	4.50E+00	US EPA 2005
Pyrene	7.94E+04	4.90E+00	US EPA 2005

Table B1-14 Fraction of Chemical in the Vapour Phase [%]

Chemical	Value	Reference
Anthracene	99.80%	US EPA 2005
Benzo(a)anthracene	48.30%	US EPA 2005
Benzo(a)pyrene	29.40%	US EPA 2005
Benzo(b)fluoranthene	96.60%	US EPA 2005
Benzo(ghi) perylene	5.50%	Assumed = dibenzo(a,h)anthracene
Benzo(k)fluoranthene	27.30%	US EPA 2005
Chrysene	74.40%	US EPA 2005
Fluoranthene	99.20%	US EPA 2005
Fluorene	100.00%	US EPA 2005
Indeno(1,2,3-cd)pyrene	0.50%	US EPA 2005
Phenanthrene	99.90%	US EPA 2005
Pyrene	99.40%	US EPA 2005

Table B1-15 Plant (i.e. garden produce) Adjustment Factor [Unitless]

Chemical	Value	Log(Kow)
Anthracene	0.01	4.50
Benzo(a)anthracene	0.01	5.70
Benzo(a)pyrene	0.01	6.00
Benzo(b)fluoranthene	0.01	6.12
Benzo(ghi) perylene	0.01	7.23
Benzo(k)fluoranthene	0.01	6.10
Chrysene	0.01	5.70
Fluoranthene	0.01	5.00
Fluorene	0.01	4.20
Indeno(1,2,3-cd)pyrene	0.01	6.60
Phenanthrene	0.01	4.50
Pyrene	0.01	4.90

Table B1-16 Deposition Velocities [m/s]

Chemical	Wet	Dry	Reference Wet	Reference Dry
Anthracene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
Benzo(a)anthracene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
Benzo(a)pyrene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
Benzo(b)fluoranthene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
Benzo(ghi) perylene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
Benzo(k)fluoranthene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
Chrysene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
Fluoranthene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
Fluorene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
Indeno(1,2,3-cd)pyrene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
Phenanthrene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000
Pyrene	4.00E-03	1.50E-02	MacKay 1991	Extrapolation from Wesley and Hicks 2000

Table B1-17 Henry's Constant [atm m3 / mol]

Chemical	Value	H [Pa m3/mol]	H' [Unitless]	Reference
Anthracene	6.50E-05	6.59E+00	2.67E-03	US EPA 2005
Benzo(a)anthracene	3.40E-06	3.45E-01	1.40E-04	US EPA 2005
Benzo(a)pyrene	1.10E-06	1.11E-01	4.49E-05	US EPA 2005
Benzo(b)fluoranthene	1.11E-04	1.12E+01	4.53E-03	US EPA 2005
Benzo(ghi) perylene	1.44E-07	1.46E-02	5.91E-06	Mackay et al 1992
Benzo(k)fluoranthene	8.30E-07	8.41E-02	3.40E-05	US EPA 2005
Chrysene	9.50E-05	9.63E+00	3.90E-03	US EPA 2005
Fluoranthene	1.60E-05	1.62E+00	6.56E-04	US EPA 2005
Fluorene	6.40E-05	6.48E+00	2.62E-03	US EPA 2005
Indeno(1,2,3-cd)pyrene	1.60E-06	1.62E-01	6.56E-05	US EPA 2005
Phenanthrene	2.30E-05	2.33E+00	9.43E-04	US EPA 2005
Pyrene	1.10E-05	1.11E+00	4.49E-04	US EPA 2005

Table B1-18 Soil Loss Constant (ks) [yr-1]

Chemical	Value	Half-life [Days]	Reference
Anthracene	5.50E-01	4.60E+02	US EPA 2005
Benzo(a)anthracene	3.70E-01	6.84E+02	US EPA 2005
Benzo(a)pyrene	4.80E-01	5.27E+02	US EPA 2005
Benzo(b)fluoranthene	4.10E-01	6.17E+02	US EPA 2005
Benzo(ghi) perylene	3.89E-01	6.50E+02	Mackay et al 1992
Benzo(k)fluoranthene	1.20E-01	2.11E+03	US EPA 2005
Chrysene	2.51E-01	1.01E+03	US EPA 2005
Fluoranthene	5.70E-01	4.44E+02	US EPA 2005
Fluorene	4.22E+00	6.00E+01	US EPA 2005
Indeno(1,2,3-cd)pyrene	3.50E-01	7.23E+02	US EPA 2005
Phenanthrene	1.26E+00	2.01E+02	US EPA 2005
Pyrene	1.30E-01	1.95E+03	US EPA 2005

Table B1-19 Relative Dermal Absorption Factors (RAFDermal) [%]

Chemical	Value	Reference
Anthracene	29.0%	HC 2004
Benzo(a)anthracene	20.0%	HC 2004
Benzo(a)pyrene	20.0%	HC 2004
Benzo(b)fluoranthene	20.0%	HC 2004
Benzo(ghi) perylene	18.0%	HC 2004
Benzo(k)fluoranthene	20.0%	HC 2004
Chrysene	20.0%	HC 2004
Fluoranthene	20.0%	HC 2004
Fluorene	20.0%	HC 2004
Indeno(1,2,3-cd)pyrene	20.0%	HC 2004
Phenanthrene	18.0%	HC 2004
Pyrene	20.0%	HC 2004

Table B1-20 Soil to Pore Water Partition Coefficient (Kd) [L/kg]

Chemical	Value	Reference
Anthracene	4.50E+03	US EPA 2005
Benzo(a)anthracene	6.00E+04	US EPA 2005
Benzo(a)pyrene	1.60E+05	US EPA 2005
Benzo(b)fluoranthene	1.05E+04	US EPA 2005
Benzo(ghi) perylene	1.58E+04	Calculated; US EPA 2005
Benzo(k)fluoranthene	1.90E+05	US EPA 2005
Chrysene	6.00E+04	US EPA 2005
Fluoranthene	1.10E+04	US EPA 2005
Fluorene	2.10E+03	US EPA 2005
Indeno(1,2,3-cd)pyrene	5.30E+05	US EPA 2005
Phenanthrene	3.70E+03	US EPA 2005
Pyrene	9.50E+03	US EPA 2005
Calculated Kd = Koc x foc		
foc(g/g) =	0.5%	AENV 2007

Table B1-21 Chemical Group

Chemical	Group
Anthracene	PAH
Benzo(a)anthracene	PAH
Benzo(a)pyrene	PAH
Benzo(b)fluoranthene	PAH
Benzo(ghi) perylene	PAH
Benzo(k)fluoranthene	PAH
Chrysene	PAH
Fluoranthene	PAH
Fluorene	PAH
Indeno(1,2,3-cd)pyrene	PAH
Phenanthrene	PAH
Pyrene	PAH

Table B1-22 Breast Milk Bio-transfer Factors [(ug/kg-milk) / (ug/day-intake)]

Chemical	Value	Comment
Anthracene	6.32E-03	McKone 1992
Benzo(a)anthracene	1.00E-01	McKone 1992
Benzo(a)pyrene	2.00E-01	McKone 1992
Benzo(b)fluoranthene	2.66E-01	McKone 1992
Benzo(ghi) perylene	3.40E+00	McKone 1992
Benzo(k)fluoranthene	2.52E-01	McKone 1992
Chrysene	1.00E-01	McKone 1992
Fluoranthene	2.00E-02	McKone 1992
Fluorene	3.17E-03	McKone 1992
Indeno(1,2,3-cd)pyrene	7.96E-01	McKone 1992
Phenanthrene	6.32E-03	McKone 1992
Pyrene	1.59E-02	McKone 1992

Table B1-23 Toxic Equivalency Factors for Carcinogenic PAHs [Unitless]

Chemical	Value	Comment
Anthracene	5.00E-04	Larsen and Larsen 1998
Benzo(a)anthracene	5.00E-03	Larsen and Larsen 1998
Benzo(a)pyrene	1.00E+00	Larsen and Larsen 1998
Benzo(a)pyreneWMM	0.00E+00	
Benzo(b)fluoranthene	1.00E-01	Larsen and Larsen 1998
Benzo(ghi) perylene	2.00E-02	Larsen and Larsen 1998
Benzo(k)fluoranthene	5.00E-02	Larsen and Larsen 1998
Chrysene	3.00E-02	Larsen and Larsen 1998
Fluoranthene	5.00E-02	Larsen and Larsen 1998
Fluorene	5.00E-04	Larsen and Larsen 1998
Indeno(1,2,3-cd)pyrene	5.00E-04	Larsen and Larsen 1998
Phenanthrene	5.00E-04	Larsen and Larsen 1998
Pyrene	1.00E-03	Larsen and Larsen 1998

Table B1-24 Water Content in Wildlife Food [%]

Receptor	Value	Reference
Berries	60%	Site-specific
Bird	68%	Suter et al. 2000
Fish	75%	Suter et al. 2000
Deer	68%	Suter et al. 2000
Plant	60%	Site-specific
Root	85%	US EPA OSW 2005

Table B-25 Equation Variables for Plant Concentration due to Direct Deposition

Variable	Value	Units	Reference
Empirical Constant - (y)	2.88	Unitless	US EPA 2005
Yield or Standing Biomass for Garden Produce (Yp)	2.26	kg DW/m^2	US EPA 2005
Plant Surface Loss Coefficient - (kp)	18	yr^{-1}	US EPA 2005
Period of Garden Exposure - (Tp)	0.16	yr	US EPA 2005
Fraction of COPC in Vapour Phase	NA	Chemical Specific	
Deposition Velocity	NA	Chemical Specific	

Table B-26 Time Period of Deposition [years]

Variable	Value	Comment
Time	25	Life of facility

Table B-27 Soil Properties

Variable	Value	Units	
Surface Soil Mixing Depth = Depth1	0.02	m	US EPA 2005
Soil Mixing Depth for Plants = Depth2	0.2	m	US EPA 2005
Soil Bulk Density	1500	kg/m3	US EPA 2005

Table B-28 Gas Constants

Variable	Value	Units
Universal Gas Constant (R)	8.21E-05	atm m^3 / mol
Temperature (T)	288	Kelvin
R x T	2.36E-02	Kelvin atm m3 / mol

Table B-29 Food Preperation

Variable	Value	Units
Washing and peeling factor (WPF)	85%	%

Table B1-30 Regression Models or Bio-concentration Factors for the Human Health Risk Assessment Exposure Model [DW Basis] A

Media	Chemical	Abbreviation	Constant	Slope	UF	Reference/Commnet
Berries	Anthracene	Berries_Anthracene			9.71E-02	US EPA 2005
Berries	Benzo(a)anthracene	Berries_Benzo(a)anthracene			1.97E-02	US EPA 2005
Berries	Benzo(a)pyrene	Berries_Benzo(a)pyrene			1.32E-02	US EPA 2005
Berries	Benzo(b)fluoranthene	Berries_Benzo(b)fluoranthene			1.12E-02	US EPA 2005
Berries	Benzo(ghi) perylene	Berries_Benzo(ghi) perylene			2.56E-03	US EPA 2005
Berries	Benzo(k)fluoranthene	Berries_Benzo(k)fluoranthene			1.15E-02	US EPA 2005
Berries	Chrysene	Berries_Chrysene			1.97E-02	US EPA 2005
Berries	Fluoranthene	Berries_Fluoranthene			4.99E-02	US EPA 2005
Berries	Fluorene	Berries_Fluorene			1.45E-01	US EPA 2005
Berries	Indeno(1,2,3-cd)pyrene	Berries_Indeno(1,2,3-cd)pyrene			5.93E-03	US EPA 2005
Berries	Phenanthrene	Berries_Phenanthrene			9.71E-02	US EPA 2005
Berries	Pyrene	Berries_Pyrene			5.70E-02	US EPA 2005
Plant	Anthracene	Plant_Anthracene			9.71E-02	US EPA 2005
Plant	Benzo(a)anthracene	Plant_Benzo(a)anthracene			1.97E-02	US EPA 2005
Plant	Benzo(a)pyrene	Plant_Benzo(a)pyrene			1.32E-02	US EPA 2005
Plant	Benzo(b)fluoranthene	Plant_Benzo(b)fluoranthene			1.12E-02	US EPA 2005
Plant	Benzo(ghi) perylene	Plant_Benzo(ghi) perylene			2.56E-03	US EPA 2005
Plant	Benzo(k)fluoranthene	Plant_Benzo(k)fluoranthene			1.15E-02	US EPA 2005
Plant	Chrysene	Plant_Chrysene			1.97E-02	US EPA 2005
Plant	Fluoranthene	Plant_Fluoranthene			4.99E-02	US EPA 2005
Plant	Fluorene	Plant_Fluorene			1.45E-01	US EPA 2005
Plant	Indeno(1,2,3-cd)pyrene	Plant_Indeno(1,2,3-cd)pyrene			5.93E-03	US EPA 2005
Plant	Phenanthrene	Plant_Phenanthrene			9.71E-02	US EPA 2005
Plant	Pyrene	Plant_Pyrene			5.70E-02	US EPA 2005
Root	Anthracene	Root_Anthracene			1.96E-02	US EPA 2005
Root	Benzo(a)anthracene	Root_Benzo(a)anthracene			1.23E-02	US EPA 2005
Root	Benzo(a)pyrene	Root_Benzo(a)pyrene			7.87E-03	US EPA 2005
Root	Benzo(b)fluoranthene	Root_Benzo(b)fluoranthene			1.50E-01	US EPA 2005
Root	Benzo(ghi) perylene	Root_Benzo(ghi) perylene			7.05E-01	US EPA 2005
Root	Benzo(k)fluoranthene	Root_Benzo(k)fluoranthene			7.91E-03	US EPA 2005
Root	Chrysene	Root_Chrysene			1.23E-02	US EPA 2005
Root	Fluoranthene	Root_Fluoranthene			1.94E-02	US EPA 2005
Root	Fluorene	Root_Fluorene			2.46E-02	US EPA 2005
Root	Indeno(1,2,3-cd)pyrene	Root_Indeno(1,2,3-cd)pyrene			6.88E-03	US EPA 2005
Root	Phenanthrene	Root_Phenanthrene			2.38E-02	US EPA 2005
Root	Pyrene	Root_Pyrene			1.88E-02	US EPA 2005

Notes:

(A) All BCFs are in dry weight

Predicted Linear Uptake Factors:

UF Soil - Plant [dry weight] = logBCF = 1.588 - 0.578log(Kow); Travis and Arms 1988

Table B1-31 Chemical Apportionments

Chemical	Media	Abbreviation	Percent Chemical Form	Comment
Beef	Anthracene	Anthracene_Beef	100%	
Beef	Benzo(a)anthracene	Benzo(a)anthracene_Beef	100%	
Beef	Benzo(a)pyrene	Benzo(a)pyrene_Beef	100%	
Beef	Benzo(b)fluoranthene	Benzo(b)fluoranthene_Beef	100%	
Beef	Benzo(ghi) perylene	Benzo(ghi) perylene_Beef	100%	
Beef	Benzo(k)fluoranthene	Benzo(k)fluoranthene_Beef	100%	
Beef	Chrysene	Chrysene_Beef	100%	
Beef	Fluoranthene	Fluoranthene_Beef	100%	
Beef	Fluorene	Fluorene_Beef	100%	
Beef	Indeno(1,2,3-cd)pyrene	Indeno(1,2,3-cd)pyrene_Beef	100%	
Beef	Phenanthrene	Phenanthrene_Beef	100%	
Beef	Pyrene	Pyrene_Beef	100%	
Berries	Anthracene	Anthracene_Berries	100%	
Berries	Benzo(a)anthracene	Benzo(a)anthracene_Berries	100%	
Berries	Benzo(a)pyrene	Benzo(a)pyrene_Berries	100%	
Berries	Benzo(b)fluoranthene	Benzo(b)fluoranthene_Berries	100%	
Berries	Benzo(ghi) perylene	Benzo(ghi) perylene_Berries	100%	
Berries	Benzo(k)fluoranthene	Benzo(k)fluoranthene_Berries	100%	
Berries	Chrysene	Chrysene_Berries	100%	
Berries	Fluoranthene	Fluoranthene_Berries	100%	
Berries	Fluorene	Fluorene_Berries	100%	
Berries	Indeno(1,2,3-cd)pyrene	Indeno(1,2,3-cd)pyrene_Berries	100%	
Berries	Phenanthrene	Phenanthrene_Berries	100%	
Berries	Pyrene	Pyrene_Berries	100%	
Chicken	Anthracene	Anthracene_Chicken	100%	
Chicken	Benzo(a)anthracene	Benzo(a)anthracene_Chicken	100%	
Chicken	Benzo(a)pyrene	Benzo(a)pyrene_Chicken	100%	
Chicken	Benzo(b)fluoranthene	Benzo(b)fluoranthene_Chicken	100%	
Chicken	Benzo(ghi) perylene	Benzo(ghi) perylene_Chicken	100%	
Chicken	Benzo(k)fluoranthene	Benzo(k)fluoranthene_Chicken	100%	
Chicken	Chrysene	Chrysene_Chicken	100%	
Chicken	Fluoranthene	Fluoranthene_Chicken	100%	
Chicken	Fluorene	Fluorene_Chicken	100%	
Chicken	Indeno(1,2,3-cd)pyrene	Indeno(1,2,3-cd)pyrene_Chicken	100%	
Chicken	Phenanthrene	Phenanthrene_Chicken	100%	
Chicken	Pyrene	Pyrene_Chicken	100%	
Dairy	Anthracene	Anthracene_Dairy	100%	
Dairy	Benzo(a)anthracene	Benzo(a)anthracene_Dairy	100%	
Dairy	Benzo(a)pyrene	Benzo(a)pyrene_Dairy	100%	
Dairy	Benzo(b)fluoranthene	Benzo(b)fluoranthene_Dairy	100%	
Dairy	Benzo(ghi) perylene	Benzo(ghi) perylene_Dairy	100%	
Dairy	Benzo(k)fluoranthene	Benzo(k)fluoranthene_Dairy	100%	
Dairy	Chrysene	Chrysene_Dairy	100%	
Dairy	Fluoranthene	Fluoranthene_Dairy	100%	
Dairy	Fluorene	Fluorene_Dairy	100%	
Dairy	Indeno(1,2,3-cd)pyrene	Indeno(1,2,3-cd)pyrene_Dairy	100%	
Dairy	Phenanthrene	Phenanthrene_Dairy	100%	
Dairy	Pyrene	Pyrene_Dairy	100%	
Eggs	Anthracene	Anthracene_Eggs	100%	
Eggs	Benzo(a)anthracene	Benzo(a)anthracene_Eggs	100%	
Eggs	Benzo(a)pyrene	Benzo(a)pyrene_Eggs	100%	
Eggs	Benzo(b)fluoranthene	Benzo(b)fluoranthene_Eggs	100%	
Eggs	Benzo(ghi) perylene	Benzo(ghi) perylene_Eggs	100%	

Table B1-31 Chemical Apportionments

Chemical	Media	Abbreviation	Percent Chemical Form	Comment
Eggs	Benzo(k)fluoranthene	Benzo(k)fluoranthene_Eggs	100%	
Eggs	Chrysene	Chrysene_Eggs	100%	
Eggs	Fluoranthene	Fluoranthene_Eggs	100%	
Eggs	Fluorene	Fluorene_Eggs	100%	
Eggs	Indeno(1,2,3-cd)pyrene	Indeno(1,2,3-cd)pyrene_Eggs	100%	
Eggs	Phenanthrene	Phenanthrene_Eggs	100%	
Eggs	Pyrene	Pyrene_Eggs	100%	
Plant	Anthracene	Anthracene_Plant	100%	
Plant	Benzo(a)anthracene	Benzo(a)anthracene_Plant	100%	
Plant	Benzo(a)pyrene	Benzo(a)pyrene_Plant	100%	
Plant	Benzo(b)fluoranthene	Benzo(b)fluoranthene_Plant	100%	
Plant	Benzo(ghi) perylene	Benzo(ghi) perylene_Plant	100%	
Plant	Benzo(k)fluoranthene	Benzo(k)fluoranthene_Plant	100%	
Plant	Chrysene	Chrysene_Plant	100%	
Plant	Fluoranthene	Fluoranthene_Plant	100%	
Plant	Fluorene	Fluorene_Plant	100%	
Plant	Indeno(1,2,3-cd)pyrene	Indeno(1,2,3-cd)pyrene_Plant	100%	
Plant	Phenanthrene	Phenanthrene_Plant	100%	
Plant	Pyrene	Pyrene_Plant	100%	
Root	Anthracene	Anthracene_Root	100%	
Root	Benzo(a)anthracene	Benzo(a)anthracene_Root	100%	
Root	Benzo(a)pyrene	Benzo(a)pyrene_Root	100%	
Root	Benzo(b)fluoranthene	Benzo(b)fluoranthene_Root	100%	
Root	Benzo(ghi) perylene	Benzo(ghi) perylene_Root	100%	
Root	Benzo(k)fluoranthene	Benzo(k)fluoranthene_Root	100%	
Root	Chrysene	Chrysene_Root	100%	
Root	Fluoranthene	Fluoranthene_Root	100%	
Root	Fluorene	Fluorene_Root	100%	
Root	Indeno(1,2,3-cd)pyrene	Indeno(1,2,3-cd)pyrene_Root	100%	
Root	Phenanthrene	Phenanthrene_Root	100%	
Root	Pyrene	Pyrene_Root	100%	

Table B1-32 Fat Content [%]

Receptor	%	Reference/Comment
Beef	19%	US EPA 2005
Chicken	14%	US EPA 2005
Dairy	4%	US EPA 2005
Eggs	8%	US EPA 2005

References - HHRA

Health Canada. 1994. Human Health Risk Assessment for Priority Substances. Canadian Environmental Protection Act.

Health Canada. 2004. Federal Contaminated Site Risk Assessment in Canada. Part I and II. Environmental Health Assessment Services Safe Environments Program. Ottawa, Ontario. September 2004. ISBN 0 662-38244-7 and ISBN 0-662-38245-5.

Larsen, J.C. and P.B. Larsen. 1998. Chemical carcinogens: In: R.E. Hester and R.M. Harrison (eds) Air Pollution and Health (pp. 33-56). Cambridge, UK: The Royal Society of Chemistry.

Mackay, D., Ying Siu, W., and Ching Ma, K. 1992. Illustrated Handbook of Physical-Chemical Properties and Environmental Fate for Organic Chemicals. Vol I-III. Lewis Publishers. Chelsea, Michigan.

McKone, T.E. 1992. CalTOX, a Multimedia Total-exposure Model for Hazardous-wastes Sites. Part III: The Multiple-pathway Exposure Model. Office of the Science Advisor, Department of Toxic Substances Control, California Environmental Protection Agency, Sacramento, California.

OMOE. 1997. Scientific Criteria Document for Multimedia Standards Development - Polycyclic ARESItic Hydrocarbons (PAH). Part 1: Hazard Identification and Dose-response Assessment. Ontario Ministry of Environment and Energy, Standards Development Branch. February 1997.

Swan, R.L., McCall, P. J., and Unger, S.M. 1979. “Volatility of Pesticides from Soil Surfaces”. Unpublished, undated manuscript received as personal communication from Dow Chemical USA, Midland, Mich. Cited In. Lyman, W.J., Reehl, W.F., and Rosenblat

Travis, C.C., and Arms, A.D. 1988. Bioconcentration of organics in beef, milk and vegetation. Environ Sci Technol 22:271-274.

U.S. EPA 1994. Benzo[a]pyrene (BaP) (CASRN 50-32-8). Carcinogenicity Assessment. Integrated Risk Information System (IRIS) database on-line search. United States Environmental Protection Agency. Cincinnati, OH. Available at: http://www.epa.gov/iris/subst/0136.htm. Accessed July 2008.

U.S. EPA (United States Environmental Protection Agency). 2005. Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities, Volume I Peer Review Draft. (US) United States Environmental Protection Agency Region 6. Multimedia Planning and Permitting Division. Center for Combustion Science and Engineering. Office of Solid Waste

Wania, F. and Mackay, D. 2000. A comparison of overall persistence values and atmospheric travel distances calculated by various multi-media fate models. July, 2000. WECC Report 2/2000.

Wesley, M.L. and Hicks, B.B. 2000. A review of the current status of knowledge on dry deposition. Atmospheric Environment 34:2261-2282.

Appendix B2: Ecological Tissue Model

Table B2-1 Summary of predicted exposures and tissue concentrations for each ecological receptor, scenario, location and chemical

									Environmental Concentrations					EDI								
Case	Site	Receptor	Chemical	Soil mg/kg	Surface Soil mg/kg	Surface Water mg/L	Air ug/m^3	Deposition mg/m^2/yr	Browse Deposition mg/kg dw	Browse Air mg/kg dw	Browse Soil mg/kg dw	Aquatic Plant Aquatic mg/kg dw	Invert Soil mg/kg dw	Soil EDI mg/day	Browse EDI mg/day	Aquatic Plant EDI mg/day	Invert EDI mg/day	Water EDI mg/day	Air EDI mg/day	Total EDI mg/day	Total EDI mg/kg-BW/day	Tissue Concentration mg/kg ww
Application	MAX	Beef	Anthracene	0.00E+00	0.00E+00	0.00E+00	5.21E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.81E-06	2.81E-06	4.95E-09	9.49E-10
Application	MAX	Beef	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	1.49E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.01E-07	8.01E-07	1.41E-09	3.20E-10
Application	MAX	Beef	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	1.77E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.57E-07	9.57E-07	1.69E-09	3.59E-10
Application	MAX	Beef	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.79E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E-05	1.50E-05	2.65E-08	5.45E-09
Application	MAX	Beef	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	7.07E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.81E-07	3.81E-07	6.72E-10	7.26E-11
Application	MAX	Beef	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.65E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.91E-08	8.91E-08	1.57E-10	3.25E-11
Application	MAX	Beef	Chrysene	0.00E+00	0.00E+00	0.00E+00	5.27E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.84E-07	2.84E-07	5.01E-10	1.14E-10
Application	MAX	Beef	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	6.29E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.39E-06	3.39E-06	5.98E-09	1.33E-09
Application	MAX	Beef	Fluorene	0.00E+00	0.00E+00	0.00E+00	8.04E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.34E-06	4.34E-06	7.65E-09	1.27E-09
Application	MAX	Beef	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	1.88E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-07	1.02E-07	1.79E-10	2.99E-11
Application	MAX	Beef	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	1.38E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.45E-06	7.45E-06	1.31E-08	2.52E-09
Application	MAX	Beef	Pyrene	0.00E+00	0.00E+00	0.00E+00	8.73E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.71E-07	4.71E-07	8.31E-10	1.81E-10
Application	MAX	Chicken	Anthracene	0.00E+00	0.00E+00	0.00E+00	5.21E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.31E-08	4.31E-08	1.72E-08	1.07E-11
Application	MAX	Chicken	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	1.49E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-08	1.23E-08	4.92E-09	3.62E-12
Application	MAX	Chicken	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	1.77E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E-08	1.47E-08	5.87E-09	4.06E-12
Application	MAX	Chicken	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.79E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.31E-07	2.31E-07	9.24E-08	6.16E-11
Application	MAX	Chicken	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	7.07E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.85E-09	5.85E-09	2.34E-09	8.21E-13
Application	MAX	Chicken	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.65E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.37E-09	1.37E-09	5.47E-10	3.67E-13
Application	MAX	Chicken	Chrysene	0.00E+00	0.00E+00	0.00E+00	5.27E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.36E-09	4.36E-09	1.75E-09	1.28E-12
Application	MAX	Chicken	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	6.29E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.20E-08	5.20E-08	2.08E-08	1.50E-11
Application	MAX	Chicken	Fluorene	0.00E+00	0.00E+00	0.00E+00	8.04E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.66E-08	6.66E-08	2.66E-08	1.44E-11
Application	MAX	Chicken	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	1.88E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.56E-09	1.56E-09	6.24E-10	3.38E-13
Application	MAX	Chicken	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	1.38E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-07	1.14E-07	4.57E-08	2.85E-11
Application	MAX	Chicken	Pyrene	0.00E+00	0.00E+00	0.00E+00	8.73E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.23E-09	7.23E-09	2.89E-09	2.05E-12
Application	MAX	Dairy	Anthracene	0.00E+00	0.00E+00	0.00E+00	5.21E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.81E-06	2.81E-06	4.95E-09	2.00E-10
Application	MAX	Dairy	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	1.49E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.01E-07	8.01E-07	1.41E-09	6.73E-11
Application	MAX	Dairy	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	1.77E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.57E-07	9.57E-07	1.69E-09	7.56E-11
Application	MAX	Dairy	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.79E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E-05	1.50E-05	2.65E-08	1.15E-09
Application	MAX	Dairy	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	7.07E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.81E-07	3.81E-07	6.72E-10	1.53E-11
Application	MAX	Dairy	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.65E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.91E-08	8.91E-08	1.57E-10	6.84E-12
Application	MAX	Dairy	Chrysene	0.00E+00	0.00E+00	0.00E+00	5.27E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.84E-07	2.84E-07	5.01E-10	2.39E-11
Application	MAX	Dairy	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	6.29E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.39E-06	3.39E-06	5.98E-09	2.80E-10
Application	MAX	Dairy	Fluorene	0.00E+00	0.00E+00	0.00E+00	8.04E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.34E-06	4.34E-06	7.65E-09	2.67E-10
Application	MAX	Dairy	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	1.88E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-07	1.02E-07	1.79E-10	6.29E-12
Application	MAX	Dairy	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	1.38E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.45E-06	7.45E-06	1.31E-08	5.30E-10
Application	MAX	Dairy	Pyrene	0.00E+00	0.00E+00	0.00E+00	8.73E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.71E-07	4.71E-07	8.31E-10	3.81E-11
Application	MAX	Eggs	Anthracene	0.00E+00	0.00E+00	0.00E+00	5.21E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.06E-08	3.06E-08	1.91E-08	4.35E-12
Application	MAX	Eggs	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	1.49E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.72E-09	8.72E-09	5.45E-09	1.47E-12
Application	MAX	Eggs	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	1.77E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E-08	1.04E-08	6.51E-09	1.65E-12
Application	MAX	Eggs	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.79E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.64E-07	1.64E-07	1.02E-07	2.50E-11
Application	MAX	Eggs	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	7.07E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.15E-09	4.15E-09	2.59E-09	3.33E-13
Application	MAX	Eggs	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.65E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.70E-10	9.70E-10	6.06E-10	1.49E-13
Application	MAX	Eggs	Chrysene	0.00E+00	0.00E+00	0.00E+00	5.27E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E-09	3.10E-09	1.93E-09	5.20E-13
Application	MAX	Eggs	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	6.29E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.69E-08	3.69E-08	2.31E-08	6.10E-12
Application	MAX	Eggs	Fluorene	0.00E+00	0.00E+00	0.00E+00	8.04E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.72E-08	4.72E-08	2.95E-08	5.82E-12
Application	MAX	Eggs	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	1.88E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-09	1.11E-09	6.91E-10	1.37E-13
Application	MAX	Eggs	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	1.38E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.11E-08	8.11E-08	5.07E-08	1.15E-11
Application	MAX	Eggs	Pyrene	0.00E+00	0.00E+00	0.00E+00	8.73E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.13E-09	5.13E-09	3.21E-09	8.30E-13
Application	MAX	Moose	Anthracene	0.00E+00	0.00E+00	0.00E+00	5.21E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.35E-06	2.35E-06	5.22E-09	7.95E-10
Application	MAX	Moose	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	1.49E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.70E-07	6.70E-07	1.49E-09	2.68E-10
Application	MAX	Moose	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	1.77E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.01E-07	8.01E-07	1.78E-09	3.01E-10
Application	MAX	Moose	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.79E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-05	1.26E-05	2.80E-08	4.56E-09
Application	MAX	Moose	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	7.07E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.19E-07	3.19E-07	7.09E-10	6.08E-11
Application	MAX	Moose	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.65E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.46E-08	7.46E-08	1.66E-10	2.72E-11
Application	MAX	Moose	Chrysene	0.00E+00	0.00E+00	0.00E+00	5.27E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.38E-07	2.38E-07	5.29E-10	9.50E-11
Application	MAX	Moose	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	6.29E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.84E-06	2.84E-06	6.31E-09	1.11E-09
Application	MAX	Moose	Fluorene	0.00E+00	0.00E+00	0.00E+00	8.04E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.63E-06	3.63E-06	8.06E-09	1.06E-09
Application	MAX	Moose	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	1.88E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.51E-08	8.51E-08	1.89E-10	2.50E-11
Application	MAX	Moose	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	1.38E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.24E-06	6.24E-06	1.39E-08	2.11E-09
Application	MAX	Moose	Pyrene	0.00E+00	0.00E+00	0.00E+00	8.73E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.94E-07	3.94E-07	8.76E-10	1.52E-10
Application	MAX	Ruffed_grouse	Anthracene	0.00E+00	0.00E+00	0.00E+00	5.21E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.62E-08	1.62E-08	2.31E-08	4.04E-12
Application	MAX	Ruffed_grouse	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	1.49E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.62E-09	4.62E-09	6.59E-09	1.36E-12
Application	MAX	Ruffed_grouse	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	1.77E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.52E-09	5.52E-09	7.87E-09	1.53E-12
Application	MAX	Ruffed_grouse	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.79E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.69E-08	8.69E-08	1.24E-07	2.32E-11
Application	MAX	Ruffed_grouse	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	7.07E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.20E-09	2.20E-09	3.13E-09	3.09E-13
Application	MAX	Ruffed_grouse	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.65E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.14E-10	5.14E-10	7.33E-10	1.38E-13
Application	MAX	Ruffed_grouse	Chrysene	0.00E+00	0.00E+00	0.00E+00	5.27E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.64E-09	1.64E-09	2.34E-09	4.83E-13
Application	MAX	Ruffed_grouse	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	6.29E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.96E-08	1.96E-08	2.79E-08	5.66E-12
Application	MAX	Ruffed_grouse	Fluorene	0.00E+00	0.00E+00	0.00E+00	8.04E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E-08	2.50E-08	3.57E-08	5.40E-12
Application	MAX	Ruffed_grouse	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	1.88E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.87E-10	5.87E-10	8.36E-10	1.27E-13
Application	MAX	Ruffed_grouse	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	1.38E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.30E-08	4.30E-08	6.13E-08	1.07E-11
Application	MAX	Ruffed_grouse	Pyrene	0.00E+00	0.00E+00	0.00E+00	8.73E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.72E-09	2.72E-09	3.87E-09	7.70E-13
Application	MAX	Snowshoe_hare	Anthracene	0.00E+00	0.00E+00	0.00E+00	5.21E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.91E-08	2.91E-08	1.94E-08	9.84E-12
Application	MAX	Snowshoe_hare	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	1.49E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.30E-09	8.30E-09	5.53E-09	3.31E-12
Application	MAX	Snowshoe_hare	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	1.77E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.91E-09	9.91E-09	6.61E-09	3.72E-12
Application	MAX	Snowshoe_hare	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.79E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.56E-07	1.56E-07	1.04E-07	5.64E-11
Application	MAX	Snowshoe_hare	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	7.07E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.95E-09	3.95E-09	2.63E-09	7.52E-13
Application	MAX	Snowshoe_hare	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.65E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.23E-10	9.23E-10	6.15E-10	3.37E-13
Application	MAX	Snowshoe_hare	Chrysene	0.00E+00	0.00E+00	0.00E+00	5.27E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.95E-09	2.95E-09	1.96E-09	1.18E-12
Application	MAX	Snowshoe_hare	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	6.29E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.51E-08	3.51E-08	2.34E-08	1.38E-11
Application	MAX	Snowshoe_hare	Fluorene	0.00E+00	0.00E+00	0.00E+00	8.04E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.49E-08	4.49E-08	2.99E-08	1.31E-11
Application	MAX	Snowshoe_hare	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	1.88E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-09	1.05E-09	7.02E-10	3.09E-13
Application	MAX	Snowshoe_hare	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	1.38E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.72E-08	7.72E-08	5.14E-08	2.61E-11
Application	MAX	Snowshoe_hare	Pyrene	0.00E+00	0.00E+00	0.00E+00	8.73E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.88E-09	4.88E-09	3.25E-09	1.88E-12
Base	MAX	Beef	Anthracene	0.00E+00	0.00E+00	0.00E+00	3.54E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.91E-06	1.91E-06	3.37E-09	6.46E-10
Base	MAX	Beef	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	4.73E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.55E-07	2.55E-07	4.50E-10	1.02E-10
Base	MAX	Beef	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	9.34E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.04E-08	5.04E-08	8.88E-11	1.89E-11

Table B2-1 Summary of predicted exposures and tissue concentrations for each ecological receptor, scenario, location and chemical

									Environmental Concentrations					EDI								
Case	Site	Receptor	Chemical	Soil mg/kg	Surface Soil mg/kg	Surface Water mg/L	Air ug/m^3	Deposition mg/m^2/yr	Browse Deposition mg/kg dw	Browse Air mg/kg dw	Browse Soil mg/kg dw	Aquatic Plant Aquatic mg/kg dw	Invert Soil mg/kg dw	Soil EDI mg/day	Browse EDI mg/day	Aquatic Plant EDI mg/day	Invert EDI mg/day	Water EDI mg/day	Air EDI mg/day	Total EDI mg/day	Total EDI mg/kg-BW/day	Tissue Concentration mg/kg ww
Base	MAX	Beef	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.40E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.57E-08	7.57E-08	1.34E-10	2.74E-11
Base	MAX	Beef	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	6.77E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.65E-07	3.65E-07	6.44E-10	6.96E-11
Base	MAX	Beef	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.29E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.98E-08	6.98E-08	1.23E-10	2.55E-11
Base	MAX	Beef	Chrysene	0.00E+00	0.00E+00	0.00E+00	5.07E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.74E-07	2.74E-07	4.82E-10	1.09E-10
Base	MAX	Beef	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	6.23E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.36E-06	3.36E-06	5.93E-09	1.32E-09
Base	MAX	Beef	Fluorene	0.00E+00	0.00E+00	0.00E+00	7.91E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.27E-06	4.27E-06	7.53E-09	1.25E-09
Base	MAX	Beef	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	1.85E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.98E-08	9.98E-08	1.76E-10	2.93E-11
Base	MAX	Beef	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	1.36E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.35E-06	7.35E-06	1.30E-08	2.48E-09
Base	MAX	Beef	Pyrene	0.00E+00	0.00E+00	0.00E+00	7.47E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.03E-07	4.03E-07	7.10E-10	1.55E-10
Base	MAX	Chicken	Anthracene	0.00E+00	0.00E+00	0.00E+00	3.54E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.93E-08	2.93E-08	1.17E-08	7.30E-12
Base	MAX	Chicken	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	4.73E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.92E-09	3.92E-09	1.57E-09	1.15E-12
Base	MAX	Chicken	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	9.34E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.73E-10	7.73E-10	3.09E-10	2.14E-13
Base	MAX	Chicken	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.40E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-09	1.16E-09	4.65E-10	3.10E-13
Base	MAX	Chicken	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	6.77E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.61E-09	5.61E-09	2.24E-09	7.87E-13
Base	MAX	Chicken	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.29E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-09	1.07E-09	4.29E-10	2.88E-13
Base	MAX	Chicken	Chrysene	0.00E+00	0.00E+00	0.00E+00	5.07E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.20E-09	4.20E-09	1.68E-09	1.24E-12
Base	MAX	Chicken	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	6.23E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.16E-08	5.16E-08	2.06E-08	1.49E-11
Base	MAX	Chicken	Fluorene	0.00E+00	0.00E+00	0.00E+00	7.91E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.55E-08	6.55E-08	2.62E-08	1.41E-11
Base	MAX	Chicken	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	1.85E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E-09	1.53E-09	6.13E-10	3.32E-13
Base	MAX	Chicken	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	1.36E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.13E-07	1.13E-07	4.51E-08	2.81E-11
Base	MAX	Chicken	Pyrene	0.00E+00	0.00E+00	0.00E+00	7.47E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.18E-09	6.18E-09	2.47E-09	1.75E-12
Base	MAX	Dairy	Anthracene	0.00E+00	0.00E+00	0.00E+00	3.54E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.91E-06	1.91E-06	3.37E-09	1.36E-10
Base	MAX	Dairy	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	4.73E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.55E-07	2.55E-07	4.50E-10	2.14E-11
Base	MAX	Dairy	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	9.34E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.04E-08	5.04E-08	8.88E-11	3.98E-12
Base	MAX	Dairy	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.40E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.57E-08	7.57E-08	1.34E-10	5.77E-12
Base	MAX	Dairy	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	6.77E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.65E-07	3.65E-07	6.44E-10	1.47E-11
Base	MAX	Dairy	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.29E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.98E-08	6.98E-08	1.23E-10	5.36E-12
Base	MAX	Dairy	Chrysene	0.00E+00	0.00E+00	0.00E+00	5.07E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.74E-07	2.74E-07	4.82E-10	2.30E-11
Base	MAX	Dairy	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	6.23E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.36E-06	3.36E-06	5.93E-09	2.78E-10
Base	MAX	Dairy	Fluorene	0.00E+00	0.00E+00	0.00E+00	7.91E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.27E-06	4.27E-06	7.53E-09	2.63E-10
Base	MAX	Dairy	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	1.85E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.98E-08	9.98E-08	1.76E-10	6.18E-12
Base	MAX	Dairy	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	1.36E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.35E-06	7.35E-06	1.30E-08	5.23E-10
Base	MAX	Dairy	Pyrene	0.00E+00	0.00E+00	0.00E+00	7.47E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.03E-07	4.03E-07	7.10E-10	3.26E-11
Base	MAX	Eggs	Anthracene	0.00E+00	0.00E+00	0.00E+00	3.54E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.08E-08	2.08E-08	1.30E-08	2.96E-12
Base	MAX	Eggs	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	4.73E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.78E-09	2.78E-09	1.74E-09	4.67E-13
Base	MAX	Eggs	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	9.34E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.48E-10	5.48E-10	3.43E-10	8.67E-14
Base	MAX	Eggs	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.40E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.24E-10	8.24E-10	5.15E-10	1.26E-13
Base	MAX	Eggs	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	6.77E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.98E-09	3.98E-09	2.49E-09	3.19E-13
Base	MAX	Eggs	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.29E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.60E-10	7.60E-10	4.75E-10	1.17E-13
Base	MAX	Eggs	Chrysene	0.00E+00	0.00E+00	0.00E+00	5.07E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.98E-09	2.98E-09	1.86E-09	5.01E-13
Base	MAX	Eggs	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	6.23E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.66E-08	3.66E-08	2.29E-08	6.04E-12
Base	MAX	Eggs	Fluorene	0.00E+00	0.00E+00	0.00E+00	7.91E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.65E-08	4.65E-08	2.90E-08	5.73E-12
Base	MAX	Eggs	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	1.85E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.09E-09	1.09E-09	6.79E-10	1.34E-13
Base	MAX	Eggs	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	1.36E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.00E-08	8.00E-08	5.00E-08	1.14E-11
Base	MAX	Eggs	Pyrene	0.00E+00	0.00E+00	0.00E+00	7.47E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.38E-09	4.38E-09	2.74E-09	7.10E-13
Base	MAX	Moose	Anthracene	0.00E+00	0.00E+00	0.00E+00	3.54E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.60E-06	1.60E-06	3.55E-09	5.40E-10
Base	MAX	Moose	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	4.73E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.13E-07	2.13E-07	4.74E-10	8.52E-11
Base	MAX	Moose	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	9.34E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.22E-08	4.22E-08	9.37E-11	1.58E-11
Base	MAX	Moose	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.40E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.34E-08	6.34E-08	1.41E-10	2.29E-11
Base	MAX	Moose	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	6.77E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.06E-07	3.06E-07	6.80E-10	5.83E-11
Base	MAX	Moose	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.29E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.85E-08	5.85E-08	1.30E-10	2.13E-11
Base	MAX	Moose	Chrysene	0.00E+00	0.00E+00	0.00E+00	5.07E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.29E-07	2.29E-07	5.09E-10	9.14E-11
Base	MAX	Moose	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	6.23E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.81E-06	2.81E-06	6.25E-09	1.10E-09
Base	MAX	Moose	Fluorene	0.00E+00	0.00E+00	0.00E+00	7.91E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.57E-06	3.57E-06	7.94E-09	1.05E-09
Base	MAX	Moose	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	1.85E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.35E-08	8.35E-08	1.86E-10	2.46E-11
Base	MAX	Moose	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	1.36E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.15E-06	6.15E-06	1.37E-08	2.08E-09
Base	MAX	Moose	Pyrene	0.00E+00	0.00E+00	0.00E+00	7.47E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.37E-07	3.37E-07	7.49E-10	1.30E-10
Base	MAX	Ruffed_grouse	Anthracene	0.00E+00	0.00E+00	0.00E+00	3.54E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-08	1.10E-08	1.57E-08	2.75E-12
Base	MAX	Ruffed_grouse	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	4.73E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E-09	1.47E-09	2.10E-09	4.33E-13
Base	MAX	Ruffed_grouse	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	9.34E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.91E-10	2.91E-10	4.14E-10	8.05E-14
Base	MAX	Ruffed_grouse	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.40E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.37E-10	4.37E-10	6.23E-10	1.17E-13
Base	MAX	Ruffed_grouse	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	6.77E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.11E-09	2.11E-09	3.00E-09	2.96E-13
Base	MAX	Ruffed_grouse	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.29E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.03E-10	4.03E-10	5.74E-10	1.08E-13
Base	MAX	Ruffed_grouse	Chrysene	0.00E+00	0.00E+00	0.00E+00	5.07E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.58E-09	1.58E-09	2.25E-09	4.65E-13
Base	MAX	Ruffed_grouse	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	6.23E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.94E-08	1.94E-08	2.76E-08	5.61E-12
Base	MAX	Ruffed_grouse	Fluorene	0.00E+00	0.00E+00	0.00E+00	7.91E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.46E-08	2.46E-08	3.51E-08	5.32E-12
Base	MAX	Ruffed_grouse	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	1.85E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.76E-10	5.76E-10	8.21E-10	1.25E-13
Base	MAX	Ruffed_grouse	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	1.36E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.24E-08	4.24E-08	6.04E-08	1.06E-11
Base	MAX	Ruffed_grouse	Pyrene	0.00E+00	0.00E+00	0.00E+00	7.47E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.32E-09	2.32E-09	3.31E-09	6.58E-13
Base	MAX	Snowshoe_hare	Anthracene	0.00E+00	0.00E+00	0.00E+00	3.54E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.98E-08	1.98E-08	1.32E-08	6.69E-12
Base	MAX	Snowshoe_hare	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	4.73E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.64E-09	2.64E-09	1.76E-09	1.05E-12
Base	MAX	Snowshoe_hare	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	9.34E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.22E-10	5.22E-10	3.48E-10	1.96E-13
Base	MAX	Snowshoe_hare	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.40E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.84E-10	7.84E-10	5.23E-10	2.84E-13
Base	MAX	Snowshoe_hare	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	6.77E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.79E-09	3.79E-09	2.52E-09	7.21E-13
Base	MAX	Snowshoe_hare	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.29E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.23E-10	7.23E-10	4.82E-10	2.64E-13
Base	MAX	Snowshoe_hare	Chrysene	0.00E+00	0.00E+00	0.00E+00	5.07E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.83E-09	2.83E-09	1.89E-09	1.13E-12
Base	MAX	Snowshoe_hare	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	6.23E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.48E-08	3.48E-08	2.32E-08	1.37E-11
Base	MAX	Snowshoe_hare	Fluorene	0.00E+00	0.00E+00	0.00E+00	7.91E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.42E-08	4.42E-08	2.95E-08	1.29E-11
Base	MAX	Snowshoe_hare	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	1.85E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E-09	1.03E-09	6.89E-10	3.04E-13
Base	MAX	Snowshoe_hare	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	1.36E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E-08	7.61E-08	5.08E-08	2.57E-11
Base	MAX	Snowshoe_hare	Pyrene	0.00E+00	0.00E+00	0.00E+00	7.47E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.17E-09	4.17E-09	2.78E-09	1.60E-12
CEA	MAX	Beef	Anthracene	0.00E+00	0.00E+00	0.00E+00	7.14E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.85E-06	3.85E-06	6.79E-09	1.30E-09
CEA	MAX	Beef	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	1.62E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.76E-07	8.76E-07	1.54E-09	3.50E-10
CEA	MAX	Beef	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	1.84E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.93E-07	9.93E-07	1.75E-09	3.73E-10
CEA	MAX	Beef	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.51E-05	1.51E-05	2.66E-08	5.46E-09
CEA	MAX	Beef	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	8.17E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.41E-07	4.41E-07	7.77E-10	8.39E-11
CEA	MAX	Beef	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.75E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.49E-07	1.49E-07	2.62E-10	5.42E-11

Table B2-1 Summary of predicted exposures and tissue concentrations for each ecological receptor, scenario, location and chemical

									Environmental Concentrations					EDI									
Case	Site	Receptor	Chemical	Soil mg/kg	Surface Soil mg/kg	Surface Water mg/L	Air ug/m^3	Deposition mg/m^2/yr	Browse Deposition mg/kg dw	Browse Air mg/kg dw	Browse Soil mg/kg dw	Aquatic Plant Aquatic mg/kg dw	Invert Soil mg/kg dw	Soil EDI mg/day	Browse EDI mg/day	Aquatic Plant EDI mg/day	Invert EDI mg/day	Water EDI mg/day	Air EDI mg/day	Total EDI mg/day	Total EDI mg/kg-BW/day	Tissue Concentration mg/kg ww
CEA	MAX	Beef	Chrysene	0.00E+00	0.00E+00	0.00E+00	9.06E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.89E-07	4.89E-07	8.62E-10	1.95E-10
CEA	MAX	Beef	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.06E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.71E-06	5.71E-06	1.01E-08	2.24E-09
CEA	MAX	Beef	Fluorene	0.00E+00	0.00E+00	0.00E+00	1.34E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.25E-06	7.25E-06	1.28E-08	2.12E-09
CEA	MAX	Beef	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	3.00E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.62E-07	1.62E-07	2.85E-10	4.76E-11
CEA	MAX	Beef	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	2.16E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-05	1.16E-05	2.05E-08	3.93E-09
CEA	MAX	Beef	Pyrene	0.00E+00	0.00E+00	0.00E+00	9.93E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.35E-07	5.35E-07	9.44E-10	2.06E-10
CEA	MAX	Chicken	Anthracene	0.00E+00	0.00E+00	0.00E+00	7.14E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.91E-08	5.91E-08	2.36E-08	1.47E-11
CEA	MAX	Chicken	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	1.62E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.34E-08	1.34E-08	5.38E-09	3.96E-12
CEA	MAX	Chicken	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	1.84E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.52E-08	1.52E-08	6.10E-09	4.22E-12
CEA	MAX	Chicken	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.32E-07	2.32E-07	9.26E-08	6.18E-11
CEA	MAX	Chicken	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	8.17E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.76E-09	6.76E-09	2.71E-09	9.49E-13
CEA	MAX	Chicken	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.75E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.28E-09	2.28E-09	9.12E-10	6.13E-13
CEA	MAX	Chicken	Chrysene	0.00E+00	0.00E+00	0.00E+00	9.06E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.50E-09	7.50E-09	3.00E-09	2.21E-12
CEA	MAX	Chicken	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.06E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.76E-08	8.76E-08	3.50E-08	2.53E-11
CEA	MAX	Chicken	Fluorene	0.00E+00	0.00E+00	0.00E+00	1.34E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-07	1.11E-07	4.45E-08	2.40E-11
CEA	MAX	Chicken	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	3.00E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.48E-09	2.48E-09	9.94E-10	5.38E-13
CEA	MAX	Chicken	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	2.16E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.79E-07	1.79E-07	7.14E-08	4.45E-11
CEA	MAX	Chicken	Pyrene	0.00E+00	0.00E+00	0.00E+00	9.93E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.22E-09	8.22E-09	3.29E-09	2.33E-12
CEA	MAX	Dairy	Anthracene	0.00E+00	0.00E+00	0.00E+00	7.14E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.85E-06	3.85E-06	6.79E-09	2.74E-10
CEA	MAX	Dairy	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	1.62E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.76E-07	8.76E-07	1.54E-09	7.36E-11
CEA	MAX	Dairy	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	1.84E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.93E-07	9.93E-07	1.75E-09	7.85E-11
CEA	MAX	Dairy	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.51E-05	1.51E-05	2.66E-08	1.15E-09
CEA	MAX	Dairy	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	8.17E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.41E-07	4.41E-07	7.77E-10	1.77E-11
CEA	MAX	Dairy	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.75E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.49E-07	1.49E-07	2.62E-10	1.14E-11
CEA	MAX	Dairy	Chrysene	0.00E+00	0.00E+00	0.00E+00	9.06E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.89E-07	4.89E-07	8.62E-10	4.11E-11
CEA	MAX	Dairy	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.06E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.71E-06	5.71E-06	1.01E-08	4.71E-10
CEA	MAX	Dairy	Fluorene	0.00E+00	0.00E+00	0.00E+00	1.34E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.25E-06	7.25E-06	1.28E-08	4.47E-10
CEA	MAX	Dairy	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	3.00E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.62E-07	1.62E-07	2.85E-10	1.00E-11
CEA	MAX	Dairy	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	2.16E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-05	1.16E-05	2.05E-08	8.28E-10
CEA	MAX	Dairy	Pyrene	0.00E+00	0.00E+00	0.00E+00	9.93E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.35E-07	5.35E-07	9.44E-10	4.33E-11
CEA	MAX	Eggs	Anthracene	0.00E+00	0.00E+00	0.00E+00	7.14E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.19E-08	4.19E-08	2.62E-08	5.97E-12
CEA	MAX	Eggs	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	1.62E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.54E-09	9.54E-09	5.96E-09	1.60E-12
CEA	MAX	Eggs	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	1.84E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.08E-08	1.08E-08	6.75E-09	1.71E-12
CEA	MAX	Eggs	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.64E-07	1.64E-07	1.03E-07	2.50E-11
CEA	MAX	Eggs	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	8.17E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.80E-09	4.80E-09	3.00E-09	3.85E-13
CEA	MAX	Eggs	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.75E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.62E-09	1.62E-09	1.01E-09	2.48E-13
CEA	MAX	Eggs	Chrysene	0.00E+00	0.00E+00	0.00E+00	9.06E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-09	5.32E-09	3.33E-09	8.95E-13
CEA	MAX	Eggs	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.06E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.21E-08	6.21E-08	3.88E-08	1.03E-11
CEA	MAX	Eggs	Fluorene	0.00E+00	0.00E+00	0.00E+00	1.34E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.90E-08	7.90E-08	4.93E-08	9.73E-12
CEA	MAX	Eggs	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	3.00E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.76E-09	1.76E-09	1.10E-09	2.18E-13
CEA	MAX	Eggs	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	2.16E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.27E-07	1.27E-07	7.91E-08	1.80E-11
CEA	MAX	Eggs	Pyrene	0.00E+00	0.00E+00	0.00E+00	9.93E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.83E-09	5.83E-09	3.64E-09	9.43E-13
CEA	MAX	Moose	Anthracene	0.00E+00	0.00E+00	0.00E+00	7.14E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.22E-06	3.22E-06	7.16E-09	1.09E-09
CEA	MAX	Moose	Anthracene	0.00E+00	0.00E+00	0.00E+00	7.14E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.22E-06	3.22E-06	7.16E-09	1.09E-09
CEA	MAX	Moose	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	1.62E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.33E-07	7.33E-07	1.63E-09	2.93E-10
CEA	MAX	Moose	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	1.84E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.31E-07	8.31E-07	1.85E-09	3.12E-10
CEA	MAX	Moose	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-05	1.26E-05	2.81E-08	4.57E-09
CEA	MAX	Moose	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	8.17E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.69E-07	3.69E-07	8.20E-10	7.02E-11
CEA	MAX	Moose	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.75E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E-07	1.24E-07	2.76E-10	4.53E-11
CEA	MAX	Moose	Chrysene	0.00E+00	0.00E+00	0.00E+00	9.06E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.09E-07	4.09E-07	9.09E-10	1.63E-10
CEA	MAX	Moose	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.06E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.78E-06	4.78E-06	1.06E-08	1.87E-09
CEA	MAX	Moose	Fluorene	0.00E+00	0.00E+00	0.00E+00	1.34E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.07E-06	6.07E-06	1.35E-08	1.78E-09
CEA	MAX	Moose	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	3.00E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.35E-07	1.35E-07	3.01E-10	3.98E-11
CEA	MAX	Moose	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	2.16E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.73E-06	9.73E-06	2.16E-08	3.29E-09
CEA	MAX	Moose	Pyrene	0.00E+00	0.00E+00	0.00E+00	9.93E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.48E-07	4.48E-07	9.96E-10	1.72E-10
CEA	MAX	Ruffed_grouse	Anthracene	0.00E+00	0.00E+00	0.00E+00	7.14E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.22E-08	2.22E-08	3.17E-08	5.54E-12
CEA	MAX	Ruffed_grouse	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	1.62E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.06E-09	5.06E-09	7.20E-09	1.49E-12
CEA	MAX	Ruffed_grouse	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	1.84E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.73E-09	5.73E-09	8.16E-09	1.59E-12
CEA	MAX	Ruffed_grouse	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.71E-08	8.71E-08	1.24E-07	2.32E-11
CEA	MAX	Ruffed_grouse	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	8.17E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.54E-09	2.54E-09	3.62E-09	3.57E-13
CEA	MAX	Ruffed_grouse	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.75E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.58E-10	8.58E-10	1.22E-09	2.30E-13
CEA	MAX	Ruffed_grouse	Chrysene	0.00E+00	0.00E+00	0.00E+00	9.06E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.82E-09	2.82E-09	4.02E-09	8.30E-13
CEA	MAX	Ruffed_grouse	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.06E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.29E-08	3.29E-08	4.69E-08	9.53E-12
CEA	MAX	Ruffed_grouse	Fluorene	0.00E+00	0.00E+00	0.00E+00	1.34E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.19E-08	4.19E-08	5.96E-08	9.03E-12
CEA	MAX	Ruffed_grouse	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	3.00E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.34E-10	9.34E-10	1.33E-09	2.02E-13
CEA	MAX	Ruffed_grouse	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	2.16E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.71E-08	6.71E-08	9.56E-08	1.67E-11
CEA	MAX	Ruffed_grouse	Pyrene	0.00E+00	0.00E+00	0.00E+00	9.93E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.09E-09	3.09E-09	4.40E-09	8.75E-13
CEA	MAX	Snowshoe_hare	Anthracene	0.00E+00	0.00E+00	0.00E+00	7.14E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.99E-08	3.99E-08	2.66E-08	1.35E-11
CEA	MAX	Snowshoe_hare	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	1.62E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.07E-09	9.07E-09	6.05E-09	3.62E-12
CEA	MAX	Snowshoe_hare	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	1.84E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E-08	1.03E-08	6.86E-09	3.86E-12
CEA	MAX	Snowshoe_hare	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.80E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.56E-07	1.56E-07	1.04E-07	5.66E-11
CEA	MAX	Snowshoe_hare	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	8.17E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.56E-09	4.56E-09	3.04E-09	8.69E-13
CEA	MAX	Snowshoe_hare	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.75E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.54E-09	1.54E-09	1.03E-09	5.61E-13
CEA	MAX	Snowshoe_hare	Chrysene	0.00E+00	0.00E+00	0.00E+00	9.06E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.06E-09	5.06E-09	3.38E-09	2.02E-12
CEA	MAX	Snowshoe_hare	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	1.06E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.91E-08	5.91E-08	3.94E-08	2.32E-11
CEA	MAX	Snowshoe_hare	Fluorene	0.00E+00	0.00E+00	0.00E+00	1.34E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.51E-08	7.51E-08	5.01E-08	2.20E-11
CEA	MAX	Snowshoe_hare	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	3.00E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.68E-09	1.68E-09	1.12E-09	4.93E-13
CEA	MAX	Snowshoe_hare	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	2.16E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-07	1.20E-07	8.03E-08	4.07E-11
CEA	MAX	Snowshoe_hare	Pyrene	0.00E+00	0.00E+00	0.00E+00	9.93E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.55E-09	5.55E-09	3.70E-09	2.13E-12
Project	MAX	Beef	Anthracene	0.00E+00	0.00E+00	0.00E+00	1.02E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.48E-07	5.48E-07	9.67E-10	1.85E-10
Project	MAX	Beef	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	1.02E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.48E-07	5.48E-07	9.67E-10	2.19E-10
Project	MAX	Beef	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	1.69E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.10E-07	9.10E-07	1.61E-09	3.42E-10
Project	MAX	Beef	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E-05	1.50E-05	2.64E-08	5.42E-09
Project	MAX	Beef	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	2.92E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.57E-08	1.57E-08	2.77E-11	3.00E-12
Project	MAX	Beef	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	3.57E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.92E-08	1.92E-08	3.39E-11	7.02E-12
Project	MAX	Beef	Chrysene	0.00E+00	0.00E+00	0.00E+00	2.27E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-08	1.23E-08	2.16E-11	4.90E-12
Project	MAX	Beef	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	7.26E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.92E-08	3.92E-08	6.91E-11	1.54E-11

Table B2-1 Summary of predicted exposures and tissue concentrations for each ecological receptor, scenario, location and chemical

									Environmental Concentrations					EDI								
Case	Site	Receptor	Chemical	Soil mg/kg	Surface Soil mg/kg	Surface Water mg/L	Air ug/m^3	Deposition mg/m^2/yr	Browse Deposition mg/kg dw	Browse Air mg/kg dw	Browse Soil mg/kg dw	Aquatic Plant Aquatic mg/kg dw	Invert Soil mg/kg dw	Soil EDI mg/day	Browse EDI mg/day	Aquatic Plant EDI mg/day	Invert EDI mg/day	Water EDI mg/day	Air EDI mg/day	Total EDI mg/day	Total EDI mg/kg-BW/day	Tissue Concentration mg/kg ww
Project	MAX	Beef	Fluorene	0.00E+00	0.00E+00	0.00E+00	1.59E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.56E-08	8.56E-08	1.51E-10	2.50E-11
Project	MAX	Beef	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	3.38E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.82E-09	1.82E-09	3.21E-12	5.35E-13
Project	MAX	Beef	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	1.85E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.96E-08	9.96E-08	1.76E-10	3.37E-11
Project	MAX	Beef	Pyrene	0.00E+00	0.00E+00	0.00E+00	1.27E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.84E-08	6.84E-08	1.21E-10	2.63E-11
Project	MAX	Chicken	Anthracene	0.00E+00	0.00E+00	0.00E+00	1.02E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E-09	8.42E-09	3.37E-09	2.10E-12
Project	MAX	Chicken	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	1.02E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.42E-09	8.42E-09	3.37E-09	2.48E-12
Project	MAX	Chicken	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	1.69E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.40E-08	1.40E-08	5.59E-09	3.87E-12
Project	MAX	Chicken	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.30E-07	2.30E-07	9.20E-08	6.13E-11
Project	MAX	Chicken	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	2.92E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.42E-10	2.42E-10	9.66E-11	3.39E-14
Project	MAX	Chicken	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	3.57E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.95E-10	2.95E-10	1.18E-10	7.94E-14
Project	MAX	Chicken	Chrysene	0.00E+00	0.00E+00	0.00E+00	2.27E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.88E-10	1.88E-10	7.53E-11	5.54E-14
Project	MAX	Chicken	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	7.26E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.01E-10	6.01E-10	2.40E-10	1.74E-13
Project	MAX	Chicken	Fluorene	0.00E+00	0.00E+00	0.00E+00	1.59E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-09	1.31E-09	5.25E-10	2.83E-13
Project	MAX	Chicken	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	3.38E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.79E-11	2.79E-11	1.12E-11	6.05E-15
Project	MAX	Chicken	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	1.85E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E-09	1.53E-09	6.12E-10	3.81E-13
Project	MAX	Chicken	Pyrene	0.00E+00	0.00E+00	0.00E+00	1.27E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-09	1.05E-09	4.20E-10	2.97E-13
Project	MAX	Dairy	Anthracene	0.00E+00	0.00E+00	0.00E+00	1.02E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.48E-07	5.48E-07	9.67E-10	3.90E-11
Project	MAX	Dairy	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	1.02E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.48E-07	5.48E-07	9.67E-10	4.61E-11
Project	MAX	Dairy	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	1.69E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.10E-07	9.10E-07	1.61E-09	7.20E-11
Project	MAX	Dairy	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E-05	1.50E-05	2.64E-08	1.14E-09
Project	MAX	Dairy	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	2.92E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.57E-08	1.57E-08	2.77E-11	6.31E-13
Project	MAX	Dairy	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	3.57E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.92E-08	1.92E-08	3.39E-11	1.48E-12
Project	MAX	Dairy	Chrysene	0.00E+00	0.00E+00	0.00E+00	2.27E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-08	1.23E-08	2.16E-11	1.03E-12
Project	MAX	Dairy	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	7.26E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.92E-08	3.92E-08	6.91E-11	3.23E-12
Project	MAX	Dairy	Fluorene	0.00E+00	0.00E+00	0.00E+00	1.59E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.56E-08	8.56E-08	1.51E-10	5.27E-12
Project	MAX	Dairy	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	3.38E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.82E-09	1.82E-09	3.21E-12	1.13E-13
Project	MAX	Dairy	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	1.85E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.96E-08	9.96E-08	1.76E-10	7.09E-12
Project	MAX	Dairy	Pyrene	0.00E+00	0.00E+00	0.00E+00	1.27E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.84E-08	6.84E-08	1.21E-10	5.53E-12
Project	MAX	Eggs	Anthracene	0.00E+00	0.00E+00	0.00E+00	1.02E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.97E-09	5.97E-09	3.73E-09	8.50E-13
Project	MAX	Eggs	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	1.02E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.97E-09	5.97E-09	3.73E-09	1.00E-12
Project	MAX	Eggs	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	1.69E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.91E-09	9.91E-09	6.19E-09	1.57E-12
Project	MAX	Eggs	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E-07	1.63E-07	1.02E-07	2.49E-11
Project	MAX	Eggs	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	2.92E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.71E-10	1.71E-10	1.07E-10	1.37E-14
Project	MAX	Eggs	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	3.57E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.09E-10	2.09E-10	1.31E-10	3.22E-14
Project	MAX	Eggs	Chrysene	0.00E+00	0.00E+00	0.00E+00	2.27E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.34E-10	1.34E-10	8.35E-11	2.24E-14
Project	MAX	Eggs	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	7.26E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.26E-10	4.26E-10	2.66E-10	7.04E-14
Project	MAX	Eggs	Fluorene	0.00E+00	0.00E+00	0.00E+00	1.59E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.31E-10	9.31E-10	5.82E-10	1.15E-13
Project	MAX	Eggs	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	3.38E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.98E-11	1.98E-11	1.24E-11	2.45E-15
Project	MAX	Eggs	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	1.85E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.08E-09	1.08E-09	6.78E-10	1.54E-13
Project	MAX	Eggs	Pyrene	0.00E+00	0.00E+00	0.00E+00	1.27E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.44E-10	7.44E-10	4.65E-10	1.20E-13
Project	MAX	Moose	Anthracene	0.00E+00	0.00E+00	0.00E+00	1.02E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.59E-07	4.59E-07	1.02E-09	1.55E-10
Project	MAX	Moose	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	1.02E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.59E-07	4.59E-07	1.02E-09	1.83E-10
Project	MAX	Moose	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	1.69E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.62E-07	7.62E-07	1.69E-09	2.86E-10
Project	MAX	Moose	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.25E-05	1.25E-05	2.79E-08	4.54E-09
Project	MAX	Moose	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	2.92E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.32E-08	1.32E-08	2.93E-11	2.51E-12
Project	MAX	Moose	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	3.57E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E-08	1.61E-08	3.58E-11	5.87E-12
Project	MAX	Moose	Chrysene	0.00E+00	0.00E+00	0.00E+00	2.27E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E-08	1.03E-08	2.28E-11	4.10E-12
Project	MAX	Moose	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	7.26E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.28E-08	3.28E-08	7.28E-11	1.29E-11
Project	MAX	Moose	Fluorene	0.00E+00	0.00E+00	0.00E+00	1.59E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.16E-08	7.16E-08	1.59E-10	2.10E-11
Project	MAX	Moose	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	3.38E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.52E-09	1.52E-09	3.39E-12	4.48E-13
Project	MAX	Moose	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	1.85E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.34E-08	8.34E-08	1.85E-10	2.82E-11
Project	MAX	Moose	Pyrene	0.00E+00	0.00E+00	0.00E+00	1.27E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.72E-08	5.72E-08	1.27E-10	2.20E-11
Project	MAX	Ruffed_grouse	Anthracene	0.00E+00	0.00E+00	0.00E+00	1.02E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.17E-09	3.17E-09	4.51E-09	7.89E-13
Project	MAX	Ruffed_grouse	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	1.02E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.17E-09	3.17E-09	4.51E-09	9.31E-13
Project	MAX	Ruffed_grouse	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	1.69E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.25E-09	5.25E-09	7.48E-09	1.45E-12
Project	MAX	Ruffed_grouse	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.65E-08	8.65E-08	1.23E-07	2.31E-11
Project	MAX	Ruffed_grouse	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	2.92E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.08E-11	9.08E-11	1.29E-10	1.27E-14
Project	MAX	Ruffed_grouse	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	3.57E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-10	1.11E-10	1.58E-10	2.98E-14
Project	MAX	Ruffed_grouse	Chrysene	0.00E+00	0.00E+00	0.00E+00	2.27E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.08E-11	7.08E-11	1.01E-10	2.08E-14
Project	MAX	Ruffed_grouse	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	7.26E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.26E-10	2.26E-10	3.22E-10	6.54E-14
Project	MAX	Ruffed_grouse	Fluorene	0.00E+00	0.00E+00	0.00E+00	1.59E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.94E-10	4.94E-10	7.04E-10	1.07E-13
Project	MAX	Ruffed_grouse	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	3.38E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-11	1.05E-11	1.50E-11	2.28E-15
Project	MAX	Ruffed_grouse	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	1.85E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.75E-10	5.75E-10	8.19E-10	1.43E-13
Project	MAX	Ruffed_grouse	Pyrene	0.00E+00	0.00E+00	0.00E+00	1.27E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.95E-10	3.95E-10	5.62E-10	1.12E-13
Project	MAX	Snowshoe_hare	Anthracene	0.00E+00	0.00E+00	0.00E+00	1.02E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.68E-09	5.68E-09	3.79E-09	1.92E-12
Project	MAX	Snowshoe_hare	Benzo(a)anthracene	0.00E+00	0.00E+00	0.00E+00	1.02E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.68E-09	5.68E-09	3.79E-09	2.27E-12
Project	MAX	Snowshoe_hare	Benzo(a)pyrene	0.00E+00	0.00E+00	0.00E+00	1.69E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.43E-09	9.43E-09	6.29E-09	3.54E-12
Project	MAX	Snowshoe_hare	Benzo(b)fluoranthene	0.00E+00	0.00E+00	0.00E+00	2.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.55E-07	1.55E-07	1.03E-07	5.62E-11
Project	MAX	Snowshoe_hare	Benzo(ghi) perylene	0.00E+00	0.00E+00	0.00E+00	2.92E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E-10	1.63E-10	1.09E-10	3.10E-14
Project	MAX	Snowshoe_hare	Benzo(k)fluoranthene	0.00E+00	0.00E+00	0.00E+00	3.57E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.99E-10	1.99E-10	1.33E-10	7.27E-14
Project	MAX	Snowshoe_hare	Chrysene	0.00E+00	0.00E+00	0.00E+00	2.27E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.27E-10	1.27E-10	8.47E-11	5.07E-14
Project	MAX	Snowshoe_hare	Fluoranthene	0.00E+00	0.00E+00	0.00E+00	7.26E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.06E-10	4.06E-10	2.70E-10	1.59E-13
Project	MAX	Snowshoe_hare	Fluorene	0.00E+00	0.00E+00	0.00E+00	1.59E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.86E-10	8.86E-10	5.91E-10	2.59E-13
Project	MAX	Snowshoe_hare	Indeno(1,2,3-cd)pyrene	0.00E+00	0.00E+00	0.00E+00	3.38E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-11	1.89E-11	1.26E-11	5.54E-15
Project	MAX	Snowshoe_hare	Phenanthrene	0.00E+00	0.00E+00	0.00E+00	1.85E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E-09	1.03E-09	6.88E-10	3.49E-13
Project	MAX	Snowshoe_hare	Pyrene	0.00E+00	0.00E+00	0.00E+00	1.27E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.08E-10	7.08E-10	4.72E-10	2.72E-13

Table B2-2 Summary of Exposure Equations used to predict tissue concentrations

Variable	Parameter	Formulas / Values	Units	Data Reference
Soil Concentration	Cs	Measured exposure point concentrations	mg/kg	Raw data
Soil Concentration	Cs-predicted	Cs = (Ds * (1 - Exp(-Kt * tD))) / Kt	mg/kg	Calculation of the soil concentration that results from the deposition over time
	Where:			
	Ds	(Dpd + Dwp) / (Z * BD)	mg/kg of soil/year	Deposition to soil
	Dd	(Cair * (1 - Fv) * Vd * 31536000) + (Cair * Fv * Vd * 31536000)	mg/m^2/year	Calculation of the dry deposition rates for the chemical
	Dw	(Cair * (1 - Fv) * Vw * 31536000) + (Cair * Fv * Vw * 31536000)	mg/m^2/year	Calculation of the wet deposition rates for the chemical
	Z$_1$	0.02	meters	Surface Soil Depth
	Z$_2$	0.2	meters	Soil Depth
	BD	1500	kg/m^3	Bulk density
	Cair	chemical-specific	mg/m^3	Chemical concentration in air
	Fv	chemical-specific	%	Fraction of chemical in vapour phase
	Vd, Vw	chemical-specific	m/s	Wet or dry depostion velocity
	Kt	Kv + Ks	yr^{-1}	Sum of abiotic/biotic degradation with calculated loss due to volatilization
	Kv	0.693 / (t$_{1/2}$ / 365 days)	yr^{-1}	Loss due to volatilization
	Ks	chemical-specific	yr^{-1}	Loss due to abiotic and biotic degradation
	t$_{1/2}$	1.58E-08 * ((Koc * S) / VP)	days	Soil half-life
	Koc	chemical-specific	L/kg	Organic carbon partition coefficient
	S	chemical-specific	mg/L	Solubility
	Vp	chemical-specific	mmHg	Vapour pressure
	tD	75	years	Time of deposition
Surface Water Concentrations	Csw-predicted	Csw = [Cs *((BD/(Pw + (Kd * BD) + (H * Pa))]/DF	mg/L	Calculation of the water concentration for small dugout
	Where:			
	BD	1500	kg/m^3	Bulk density
	Cs	chemical-specific	mg/kg	concentration in soil
	Pw	0.168	unitless	moisture filled porosity for fine soils
	Pa	0.302	unitless	vapour filled porosity for fine soils
	Kd	chemical-specific	L/kg	soil to water partition coefficient
	BD	1400	kg/m3	soil bulk density
	DF	10	unitless	Dilution factor
Air Concentrations	Cair	Predicted or measured exposure point concentrations	µg/m^3	Raw data
Deposition	Deposition	Predicted exposure point concentrations	mg/m^2/year	Raw data
Browse Concentration (direct deposition)	Pd	Pd = ((Dd + (0.6 * Dw)) * Rp * (1 - Exp(-Kp * Tp))) / (Yp * Kp)	mg/kg dw	Calculation of the plant concentration (in dry weight) from atmospheric deposition
	Where:			
	Dd	(Cair * (1 - Fv) * Vd * 31536000)	mg/m^2/year	Calculation of the particulate dry deposition rate for the chemical
	Dw	(Cair * (1 - Fv) * Vw * 31536000)	mg/m^2/year	Calculation of the particulate wet deposition rate for the chemical
	Cair	chemical-specific	mg/m^3	Chemical concentration in air
	Fv	chemical-specific	%	Fraction of chemical in vapour phase
	Vd, Vw	chemical-specific	m/s	Wet or dry depostion velocity
	Rp	0.5	unitless	Intercept fraction of edible portion of plant
	Kp	18	yr-1	Plant surface loss coefficient
	Tp	0.12	years	Growing season or length of plant exposure per year
	Yp	0.24	kg DW/m^2	Yield or standing crop biomass or productivity
Browse Concentration (vapour uptake)	Pv	Pv = (Cair * (Bv / RF) * Fv) / Pa	mg/kg dw	Calculation of the plant concentration (in dry weight) for air to plant transfer
	Where:			
	Cair	chemical-specific	mg/m^3	Chemical concentration in air
	Bv	(1.19 * Bvol) / ((1 - WC) * Pforage)	[µg/g DW plant] / [µg/g air]	Mass based air to plant bio transfer factor
	Bvol	10 ^ (1.065 * log Kow - log (H / (R * T)) - 1.654)	unitless	Volumetric air to plant bio transfer factor
	WC	59	%	Water or moisture content of plant
	Pforage	770	g/L	Density of forage
	log Kow	chemical-specific	unitless	Log of octanol-water partition coefficient
	H	chemical-specific	atm m^3/mol	Henry's Law constant
	R	0.000082	atm m^3/mol K	Ideal gas constant
	T	288	Kelvin	Ambient temperature
	RF	Metals = 1 ; PAHs / VOCs = 100	unitless	Reduction factor
	Fv	chemical-specific	%	Fraction of chemical in vapour phase
	Pa	1200	g/m^3	Density of air

Table B2-2 Summary of Exposure Equations used to predict tissue concentrations

Variable	Parameter	Formulas / Values	Units	Data Reference
Browse Concentration (root uptake)	Pr	Pr = Cs * BCF	mg/kg dw	Caculation of plant concentration (in dry weight) from soil to plant transfer based on BCF model
	Where:			
	Cs	chemical-specific	mg/kg	Chemical concentration in soil
	BCF	10 ^ (1.588 - 0.578 * log Kow)	kg-soil/kg-plant DW	Bioconcentration factor for aboveground plants
	log Kow	chemical-specific	unitless	Log of octanol-water partition coefficient
Total Plant Concentration	Ptotal	Ptotal = Pd + Pv + Pr	mg/kg dw	Total aboveground plant concentration
	Pd	chemical-specific	mg/kg dw	Plant concentration due to direct deposition
	Pv	chemical-specific	mg/kg dw	Plant concentration due to vapour uptake
	Pr	chemical-specific	mg/kg dw	Plant concentration due to root uptake
Aquatic Plant Concentration	Paq	Paq = Csw * BCF	mg/kg dw	Calculation of aquatic plant concentration (in dry weight) from water to plant transfer based on BCF model
	Where:			
	Csw	chemical-specific	mg/L	Chemical concentration in surface water
	BCF	chemical-specific	L-water/kg-plant DW	Bioconcentration factor
Invertebrate Concentration	Cinvert	Pi = Cs * BCF	mg/kg dw	Calculation of terrestrial invertbrate concentration (mg/kg) from soil to worm transfer based on BCF model
	Where:			
	Cs	chemical-specific	mg/kg	Chemical concentration in soil
	BCF	chemical-specific	kg-soil/kg-invertebrate	Bioconcentration factor
Food Ingestion Rate	FIR_i	$FIR_i = (FMR * P_i) / ME_i$	kg-food/day	Calculation of the estimated food ingestion rate for the ' i ' dietary item
	Where:			
	FMR	a * BW ^ b	kcal/day	Free-living metabolic rate
	a	species-specific	unitless	slope of FMR
	BW	species-specific	g	Body weight
	b	species-specific	unitless	y-intercept of FMR
	P_i	species-specific	%	Portion of diet consisting of the ' i ' dietary item
	ME_i	$AE_i * GE_i$	kcal/kg	Metabolizable energy of the ' i ' dietary item
	AE_i	specific to the dietary item	%	Assimilation efficiency of the ' i ' dietary item
	GE_i	specific to the dietary item	kcal/kg DW	Gross energy of the ' i ' dietary item
Total Food Ingestion Rate	FIRtotal	FIRtotal = FIRinvert + FIRbrowse + FIRaq	kg-food/day	Calculation of the total estimated food ingestion rate for all dietary items
	Where:			
	FIRinvert	species-specific	kg-food/day	Estimated food ingestion rate of invertebrates
	FIRbrowse	species-specific	kg-food/day	Estimated food ingestion rate of browse
	FIRaq	species-specific	kg-food/day	Estimated food ingestion rate of aquatic plants
Soil Ingestion Rate	SIR	SIR = Psoil * FIRtotal	kg-soil/day	Calculation of the estimated soil ingestion rate
	Where:			
	Psoil	species-specific	%	Percent of soil in diet
	FIRtotal	species-specific	kg-food/day	Estimated total food ingestion rate for all dietary items
Soil EDI	EDIsoil	EDIsoil = Cs * SIR	mg/day	Calculation of the estimated daily intake of chemical though ingestion of soil
	Where:			
	Cs	chemical-specific	mg/kg	Chemical concentration in soil
	SIR	species-specific	kg-soil/day	Soil ingestion rate
Browse EDI	EDIbrowse	$EDIbrowse = Ptotal * FIR_i$	mg/day	Calculation of the estimated daily intake of chemical though consumption of browse
	Where:			
	Ptotal	chemical-specific	mg/kg DW	Total aboveground plant concentration
	FIR_i	species-specific	kcal/day	Food ingestion rate for browse
Aquatic Plant EDI	EDI	[AquaticPlant] * Diet%AquaticPlant * (NFMR/ME)	mg/day	
Invertebrate EDI	EDI	[Invertebrate] * Diet%Invertebrate * (NFMR/ME)	mg/day	
Drinking Water (DW) EDI	EDI	[SW] * (Exposure variable (WIR))	mg/day	
Air EDI	EDI	[Air]/1000 * (Exposure variable (AIR))	mg/day	
Total EDI	EDI	EDI (Soil + DW + Plant + Berries + Root + Prey + Air)	mg/day	
Tissue Concentration	[Tissue]	Total EDI * BTF	mg/kg-WW	

Table B2-3 Wildlife receptor exposure variables

Receptor	Variable	Abbreviation	Value	Units	Reference
Beef	AIR	AIR_Beef	5.4E+01	m^3/day	Allometric equation for mammals 3-20; US EPA 1993
Chicken	AIR	AIR_Chicken	8.3E-01	m^3/day	Allometric equation for birds 3-19; US EPA 1993
Dairy	AIR	AIR_Dairy	5.4E+01	m^3/day	Allometric equation for mammals 3-20; US EPA 1993
Eggs	AIR	AIR_Eggs	5.9E-01	m^3/day	Allometric equation for birds 3-19; US EPA 1993
Moose	AIR	AIR_Moose	4.5E+01	m^3/day	Allometric equation for mammals 3-20; US EPA 1993
Ruffed_Grouse	AIR	AIR_Ruffed_Grouse	3.1E-01	m^3/day	Allometric equation for birds 3-19; US EPA 1993
Snowshoe_hare	AIR	AIR_Snowshoe_hare	5.6E-01	m^3/day	Allometric equation for mammals 3-20; US EPA 1993
Beef	BW	BW_Beef	5.7E+02	kg-WW	AAFRD 2000
Chicken	BW	BW_Chicken	2.5E+00	kg-WW	Weight of a broiler hen (a roaster ways 3.2 kg live weight); ACP 2008
Dairy	BW	BW_Dairy	5.7E+02	kg-WW	AAFRD 2000
Eggs	BW	BW_Eggs	1.6E+00	kg-WW	Weight of laying hens on a regular laying diet; PIC 2008
Moose	BW	BW_Moose	4.50E+02	kg-WW	ASRD 2002a
Ruffed_Grouse	BW	BW_Ruffed_Grouse	7.02E-01	kg-WW	US EPA 1993
Snowshoe_hare	BW	BW_Snowshoe_hare	1.50E+00	kg-WW	ASRD 2002b
Beef	Per_SedIR	Per_SedIR_Beef	0.0%	% of Diet	Assumed
Chicken	Per_SedIR	Per_SedIR_Chicken	0.0%	% of Diet	Assumed
Dairy	Per_SedIR	Per_SedIR_Dairy	0.0%	% of Diet	Assumed
Eggs	Per_SedIR	Per_SedIR_Eggs	0.0%	% of Diet	Assumed
Moose	Per_SedIR	Per_SedIR_Moose	2.0%	% of Diet	Actually <2%; (Suter et al. 2000)
Ruffed_Grouse	Per_SedIR	Per_SedIR_Ruffed_Grouse	9.3%	% of Diet	Assumed similar to wild turkey; (Suter et al. 2000)
Snowshoe_hare	Per_SedIR	Per_SedIR_Snowshoe_hare	2.8%	% of Diet	Assumed similar to cotton rat; (Suter et al. 2000)
Beef	Per_SIR	Per_SIR_Beef	4.0%	% of Diet	US EPA OSW 2005
Chicken	Per_SIR	Per_SIR_Chicken	10.0%	% of Diet	US EPA OSW 2005
Dairy	Per_SIR	Per_SIR_Dairy	4.0%	% of Diet	US EPA OSW 2005
Eggs	Per_SIR	Per_SIR_Eggs	10.0%	% of Diet	US EPA OSW 2005
Moose	Per_SIR	Per_SIR_Moose	2.0%	% of Diet	Actually <2%; Suter et al. 2000
Ruffed_Grouse	Per_SIR	Per_SIR_Ruffed_Grouse	9.3%	% of Diet	Assumed similar to wild turkey; Suter et al. 2000
Snowshoe_hare	Per_SIR	Per_SIR_Snowshoe_hare	2.8%	% of Diet	Assumed similar to cotton rat; Suter et al. 2000
Beef	SedIR	SedIR_Beef	0.00E+00	kg-sed/day	Calculated; See estimation of Soil / Sediment Ingestion Rate
Chicken	SedIR	SedIR_Chicken	0.00E+00	kg-sed/day	Calculated; See estimation of Soil / Sediment Ingestion Rate
Dairy	SedIR	SedIR_Dairy	0.00E+00	kg-sed/day	Calculated; See estimation of Soil / Sediment Ingestion Rate
Eggs	SedIR	SedIR_Eggs	0.00E+00	kg-sed/day	Calculated; See estimation of Soil / Sediment Ingestion Rate
Moose	SedIR	SedIR_Moose	2.59E-01	kg-sed/day	Calculated; See estimation of Soil / Sediment Ingestion Rate
Ruffed_Grouse	SedIR	SedIR_Ruffed_Grouse	1.94E-02	kg-sed/day	Calculated; See estimation of Soil / Sediment Ingestion Rate
Snowshoe_hare	SedIR	SedIR_Snowshoe_hare	8.78E-03	kg-sed/day	Calculated; See estimation of Soil / Sediment Ingestion Rate
Beef	SIR	SIR_Beef	5.2E-01	kg-soil/day	Calculated; See estimation of Soil / Sediment Ingestion Rate
Chicken	SIR	SIR_Chicken	7.1E-02	kg-soil/day	Calculated; See estimation of Soil / Sediment Ingestion Rate
Dairy	SIR	SIR_Dairy	5.2E-01	kg-soil/day	Calculated; See estimation of Soil / Sediment Ingestion Rate
Eggs	SIR	SIR_Eggs	4.6E-02	kg-soil/day	Calculated; See estimation of Soil / Sediment Ingestion Rate
Moose	SIR	SIR_Moose	2.59E-01	kg-soil/day	Calculated; See estimation of Soil / Sediment Ingestion Rate
Ruffed_Grouse	SIR	SIR_Ruffed_Grouse	1.94E-02	kg-soil/day	Calculated; See estimation of Soil / Sediment Ingestion Rate
Snowshoe_hare	SIR	SIR_Snowshoe_hare	8.78E-03	kg-soil/day	Calculated; See estimation of Soil / Sediment Ingestion Rate
Beef	WIR	WIR_Beef	4.55E+01	L/day	AAFRD 2000
Chicken	WIR	WIR_Chicken	3.18E-01	L/day	AAFRD 2000
Dairy	WIR	WIR_Dairy	1.36E+02	L/day	AAFRD 2000
Eggs	WIR	WIR_Eggs	3.18E-01	L/day	AAFRD 2000
Moose	WIR	WIR_Moose	2.42E+01	L/day	Allometric equation 3-17; US EPA 1993
Ruffed_Grouse	WIR	WIR_Ruffed_Grouse	4.65E-02	L/day	Allometric equation 3-15; US EPA 1993
Snowshoe_hare	WIR	WIR_Snowshoe_hare	1.43E-01	L/day	Allometric equation 3-17; US EPA 1993

Notes:
BW = Body Weight
SIR = Soil ingestion rate
Sed_IR = Sediment ingestion rate
WIR = Water ingestion rate

Table B2-4 Estimation of Soil / Sediment Ingestion Rate

Receptor	Percent Soil in Diet
Ruffed_Grouse	9.3%

NFMR	Units	Percent Sediment in Diet
6.50E+02	kcal/kg/day	9.3%
4.57E+02	kcal/day	
4.57E+05	cal/day	
BW	**Units**	
7.02E-01	kg	

Estimation of Average Metabolizable Energy				
		GE	**AE**	**FIR**
Diet	**Portion**	**[kcal/kg-DW]**	**[%]**	**kg/day**
Invert	20%	5400	72%	2.35E-02
Browse	80%	4200	47%	1.85E-01
Aquatic Plant	0%	4300	23%	0.00E+00
			Sum	**2.09E-01**

Estimation of Total Ingestion Rate [kg-food / day]	2.09E-01
Soil Ingestion Rate [kg-soil / day]	1.94E-02
Sediment Ingestion Rate [kg-sediment / day]	1.94E-02
Estimation of Total Normalized Ingestion Rate [kg-food / kg-BW day]	2.97E-01

Table B2-5 Normalized to Body Weight Free-living (Field) Metabolic Rate (NFMR)

Receptor	NFMR [kcal/kg bw/day] A	FMR [kcal/day] B	Body Weight [grams]	a	b	Reference/Comments
Beef	7.30E+01	4.14E+04	5.67E+05	7.94E+00	6.46E-01	Used "Herbivores" (Nagy et al. 1999)
Chicken	6.17E+02	1.54E+03	2.50E+03	8.51E-01	9.59E-01	Used "Galliformes" (Nagy et al. 1999)
Dairy	7.30E+01	4.14E+04	5.67E+05	7.94E+00	6.46E-01	Used "Herbivores" (Nagy et al. 1999)
Eggs	6.29E+02	1.01E+03	1.60E+03	8.51E-01	9.59E-01	Used "Galliformes" (Nagy et al. 1999)
Moose	7.92E+01	3.56E+04	4.50E+05	7.94E+00	6.46E-01	Used "Herbivores" (Nagy et al. 1999)
Ruffed_Grouse	6.50E+02	4.57E+02	7.02E+02	8.51E-01	9.59E-01	Used "Galliformes" (Nagy et al. 1999)
Snowshoe_hare	6.67E+02	1.00E+03	1.50E+03	5.48E+00	7.12E-01	Used "Rodentia" (Nagy et al. 1999)

A) NFMR = Normalized Free Metabolic Rate = FMR / BW; Where BW is in kg

B) FMR = Free Metabolic Rate [kcal/day] = (a x BW^b) / 4.184 Kj/calorie; Where BW is in grams

Table B2-6 Receptor dietary composition [media % of diet]

Receptor	Media	Abbreviation	Value
Beef	Browse	Beef_Browse	100.0%
Beef	Invert	Beef_Invert	0.0%
Beef	Aquatic Plant	Beef_Aquatic Plant	0.0%
Chicken	Browse	Chicken_Browse	80.0%
Chicken	Invert	Chicken_Invert	20.0%
Chicken	Aquatic Plant	Chicken_Aquatic Plant	0.0%
Dairy	Browse	Dairy_Browse	100.0%
Dairy	Invert	Dairy_Invert	0.0%
Dairy	Aquatic Plant	Dairy_Aquatic Plant	0.0%
Eggs	Browse	Eggs_Browse	80.0%
Eggs	Invert	Eggs_Invert	20.0%
Eggs	Aquatic Plant	Eggs_Aquatic Plant	0.0%
Moose	Browse	Moose_Browse	80.0%
Moose	Invert	Moose_Invert	0.0%
Moose	Aquatic Plant	Moose_Aquatic Plant	20.0%
Ruffed_grouse	Browse	Ruffed_grouse_Browse	80.0%
Ruffed_grouse	Invert	Ruffed_grouse_Invert	20.0%
Ruffed_grouse	Aquatic Plant	Ruffed_grouse_Aquatic Plant	0.0%
Snowshoe_hare	Browse	Snowshoe_hare_Browse	100.0%
Snowshoe_hare	Invert	Snowshoe_hare_Invert	0.0%
Snowshoe_hare	Aquatic Plant	Snowshoe_hare_Aquatic Plant	0.0%

Table B2-7 Metabolizable Energy (ME) of Dietary Items [kcal/kg] [A]

Receptor	Dietary Item	Abbreviation	Value
Beef	Browse	Beef_Browse	3192
Beef	Invert	Beef_Invert	4698
Beef	Aquatic Plant	Beef_Aquatic Plant	1763
Chicken	Browse	Chicken_Browse	1974
Chicken	Invert	Chicken_Invert	3888
Chicken	Aquatic Plant	Chicken_Aquatic Plant	989
Dairy	Browse	Dairy_Browse	3192
Dairy	Invert	Dairy_Invert	4698
Dairy	Aquatic Plant	Dairy_Aquatic Plant	1763
Eggs	Browse	Eggs_Browse	1974
Eggs	Invert	Eggs_Invert	3888
Eggs	Aquatic Plant	Eggs_Aquatic Plant	989
Moose	Browse	Moose_Browse	3192
Moose	Invert	Moose_Invert	4698
Moose	Aquatic Plant	Moose_Aquatic Plant	1763
Ruffed_grouse	Browse	Ruffed_grouse_Browse	1974
Ruffed_grouse	Invert	Ruffed_grouse_Invert	3888
Ruffed_grouse	Aquatic Plant	Ruffed_grouse_Aquatic Plant	989
Snowshoe_hare	Browse	Snowshoe_hare_Browse	3192
Snowshoe_hare	Invert	Snowshoe_hare_Invert	4698
Snowshoe_hare	Aquatic Plant	Snowshoe_hare_Aquatic Plant	1763

A) US EPA 1993; Equation 4-17

Table B2-8 Gross Energy (GE) of Dietary Items [kcal/kg dw] [A]

Receptor	Dietary Item	Abbreviation	Value	Reference/Comments
Beef	Browse	Beef_Browse	4200	monocot young grasses; US EPA 1993
Beef	Invert	Beef_Invert	5400	grasshopper, crickets; US EPA 1993
Beef	Aquatic Plant	Beef_Aquatic Plant	4300	aquatic emergent vegetation; US EPA 1993
Chicken	Browse	Chicken_Browse	4200	monocot young grasses; US EPA 1993
Chicken	Invert	Chicken_Invert	5400	grasshopper, crickets; US EPA 1993
Chicken	Aquatic Plant	Chicken_Aquatic Plant	4300	aquatic emergent vegetation; US EPA 1993
Dairy	Browse	Dairy_Browse	4200	monocot young grasses; US EPA 1993
Dairy	Invert	Dairy_Invert	5400	grasshopper, crickets; US EPA 1993
Dairy	Aquatic Plant	Dairy_Aquatic Plant	4300	aquatic emergent vegetation; US EPA 1993
Eggs	Browse	Eggs_Browse	4200	monocot young grasses; US EPA 1993
Eggs	Invert	Eggs_Invert	5400	grasshopper, crickets; US EPA 1993
Eggs	Aquatic Plant	Eggs_Aquatic Plant	4300	aquatic emergent vegetation; US EPA 1993
Moose	Browse	Moose_Browse	4200	monocot young grasses; US EPA 1993
Moose	Invert	Moose_Invert	5400	grasshopper, crickets; US EPA 1993
Moose	Aquatic Plant	Moose_Aquatic Plant	4300	aquatic emergent vegetation; US EPA 1993
Ruffed_grouse	Browse	Ruffed_grouse_Browse	4200	monocot young grasses; US EPA 1993
Ruffed_grouse	Invert	Ruffed_grouse_Invert	5400	grasshopper, crickets; US EPA 1993
Ruffed_grouse	Aquatic Plant	Ruffed_grouse_Aquatic Plant	4300	aquatic emergent vegetation; US EPA 1993
Snowshoe_hare	Browse	Snowshoe_hare_Browse	4200	monocot young grasses; US EPA 1993
Snowshoe_hare	Invert	Snowshoe_hare_Invert	5400	grasshopper, crickets; US EPA 1993
Snowshoe_hare	Aquatic Plant	Snowshoe_hare_Aquatic Plant	4300	aquatic emergent vegetation; US EPA 1993

A) US EPA 1993; Tables 4-1 & 4-2

Table B2-9 Assimilation Efficiency (AE) of Dietary Items [Percent% Efficiency] [A]

Receptor	Dietary Item	Abbreviation	Value	Reference/Comments
Beef	Aquatic Plant	Beef_Aquatic Plant	41%	mature grasses; US EPA 1993
Beef	Browse	Beef_Browse	76%	"herbivory"; US EPA 1993
Beef	Invert	Beef_Invert	87%	insects; US EPA 1993
Chicken	Aquatic Plant	Chicken_Aquatic Plant	23%	aquatic vegetation; US EPA 1993
Chicken	Browse	Chicken_Browse	47%	grasses, leaves; US EPA 1993
Chicken	Invert	Chicken_Invert	72%	terrestrial insects; US EPA 1993
Dairy	Aquatic Plant	Dairy_Aquatic Plant	41%	mature grasses; US EPA 1993
Dairy	Browse	Dairy_Browse	76%	"herbivory"; US EPA 1993
Dairy	Invert	Dairy_Invert	87%	insects; US EPA 1993
Eggs	Aquatic Plant	Eggs_Aquatic Plant	23%	aquatic vegetation; US EPA 1993
Eggs	Browse	Eggs_Browse	47%	grasses, leaves; US EPA 1993
Eggs	Invert	Eggs_Invert	72%	terrestrial insects; US EPA 1993
Moose	Aquatic Plant	Moose_Aquatic Plant	41%	mature grasses; US EPA 1993
Moose	Browse	Moose_Browse	76%	"herbivory"; US EPA 1993
Moose	Invert	Moose_Invert	87%	insects; US EPA 1993
Ruffed_grouse	Aquatic Plant	Ruffed_grouse_Aquatic Plant	23%	aquatic vegetation; US EPA 1993
Ruffed_grouse	Browse	Ruffed_grouse_Browse	47%	grasses, leaves; US EPA 1993
Ruffed_grouse	Invert	Ruffed_grouse_Invert	72%	terrestrial insects; US EPA 1993
Snowshoe_hare	Aquatic Plant	Snowshoe_hare_Aquatic Plant	41%	mature grasses; US EPA 1993
Snowshoe_hare	Browse	Snowshoe_hare_Browse	76%	"herbivory"; US EPA 1993
Snowshoe_hare	Invert	Snowshoe_hare_Invert	87%	insects; US EPA 1993

A) US EPA 1993; Table 4-3

Table B2-10 Percent of exposure derived from impacted area

Receptor	Value	Comment
Beef	100%	Assumed
Chicken	100%	Assumed
Dairy	100%	Assumed
Eggs	100%	Assumed
Moose	100%	Assumed
Ruffed_Grouse	100%	Assumed
Snowshoe_hare	100%	Assumed

Table B2-11 Water content in wildlife food [%]

Receptor	Value	Reference
Browse	85%	US EPA 2005
Invert	69%	Suter et al. 2000
Plant	85%	US EPA 2005
Aquatic Plant	80%	Suter et al. 2000
Prey	75%	Assumed

Table B2-12 Equation variables plant concentration due to direct deposition

Variable	Value	Units	Reference
Empirical Constant - (y)	2.88	Unitless	US EPA OSW 2005
Yield or Standing Biomass for Forage/Browse (Yp)	0.24	kg DW/m^2	US EPA OSW 2005
Plant Surface Loss Coefficient - (kp)	18	yr^{-1}	US EPA OSW 2005
Period of Browse Exposure - (Tp)	0.12	yr	US EPA OSW 2005
Fraction of COPC in Vapour Phase	NA	Chemical Specific	
Deposition Velocity	NA	Chemical Specific	

Table B2-13 Time period of deposition [years]

Variable	Value	Comment
Time	25	Life of facility

Table B2-14 Soil properties

Variable	Value	Units	Reference
Surface Soil Mixing Depth = Depth1	0.02	m	US EPA OSW 2005
Soil Mixing Depth for Plants = Depth2	0.2	m	US EPA OSW 2005
Soil Bulk Density	1500	kg/m^3	US EPA OSW 2005

Table B2-15 Gas constants

Variable	Value	Units
Universal Gas Constant (R)	8.21E-05	atm m^3 / mol
Temperature (T)	288	Kelvin
R x T	2.36E-02	Kelvin atm m^3 / mol

Table B2-16 Literature derived regression models and bio-concentration factors for the ERA [DW Basis]

Media	Chemical	Abbreviation	Constant	Slope	UF	Reference/Comment
Aquatic Plant	Anthracene	Aquatic Plant_Anthracene			1.54E+04	Based on all PAHs; US EPA OSW 1999
Aquatic Plant	Benzo(a)anthracene	Aquatic Plant_Benzo(a)anthracene			1.54E+04	US EPA OSW 1999
Aquatic Plant	Benzo(a)pyrene	Aquatic Plant_Benzo(a)pyrene			1.54E+04	US EPA OSW 1999
Aquatic Plant	Benzo(b)fluoranthene	Aquatic Plant_Benzo(b)fluoranthene			1.54E+04	US EPA OSW 1999
Aquatic Plant	Benzo(ghi) perylene	Aquatic Plant_Benzo(ghi) perylene			1.54E+04	Based on all PAHs; US EPA OSW 1999
Aquatic Plant	Benzo(k)fluoranthene	Aquatic Plant_Benzo(k)fluoranthene			1.54E+04	US EPA OSW 1999
Aquatic Plant	Chrysene	Aquatic Plant_Chrysene			1.54E+04	US EPA OSW 1999
Aquatic Plant	Fluoranthene	Aquatic Plant_Fluoranthene			1.54E+04	Based on all PAHs; US EPA OSW 1999
Aquatic Plant	Fluorene	Aquatic Plant_Fluorene			1.54E+04	Based on all PAHs; US EPA OSW 1999
Aquatic Plant	Indeno(1,2,3-cd)pyrene	Aquatic Plant_Indeno(1,2,3-cd)pyrene			1.54E+04	US EPA OSW 1999
Aquatic Plant	Phenanthrene	Aquatic Plant_Phenanthrene			1.54E+04	Based on all PAHs; US EPA OSW 1999
Aquatic Plant	Pyrene	Aquatic Plant_Pyrene			1.54E+04	Based on all PAHs; US EPA OSW 1999
Browse	Anthracene	Browse_Anthracene			0.00E+00	US EPA OSW 2005
Browse	Benzo(a)anthracene	Browse_Benzo(a)anthracene			0.00E+00	US EPA OSW 2005
Browse	Benzo(a)pyrene	Browse_Benzo(a)pyrene			0.00E+00	US EPA OSW 2005
Browse	Benzo(b)fluoranthene	Browse_Benzo(b)fluoranthene			0.00E+00	US EPA OSW 2005
Browse	Benzo(ghi) perylene	Browse_Benzo(ghi) perylene			0.00E+00	US EPA OSW 2005
Browse	Benzo(k)fluoranthene	Browse_Benzo(k)fluoranthene			0.00E+00	US EPA OSW 2005
Browse	Chrysene	Browse_Chrysene			0.00E+00	US EPA OSW 2005
Browse	Fluoranthene	Browse_Fluoranthene			0.00E+00	US EPA OSW 2005
Browse	Fluorene	Browse_Fluorene			0.00E+00	US EPA OSW 2005
Browse	Indeno(1,2,3-cd)pyrene	Browse_Indeno(1,2,3-cd)pyrene			0.00E+00	US EPA OSW 2005
Browse	Phenanthrene	Browse_Phenanthrene			0.00E+00	US EPA OSW 2005
Browse	Pyrene	Browse_Pyrene			0.00E+00	US EPA OSW 2005
Invert	Anthracene	Invert_Anthracene			4.19E-01	Assumed = B(a)P; US EPA OSW 1999
Invert	Benzo(a)anthracene	Invert_Benzo(a)anthracene			1.80E-01	US EPA OSW 1999
Invert	Benzo(a)pyrene	Invert_Benzo(a)pyrene			4.19E-01	US EPA OSW 1999
Invert	Benzo(b)fluoranthene	Invert_Benzo(b)fluoranthene			4.19E-01	US EPA OSW 1999
Invert	Benzo(ghi) perylene	Invert_Benzo(ghi) perylene			4.19E-01	Assumed = PAHs; US EPA OSW 1999
Invert	Benzo(k)fluoranthene	Invert_Benzo(k)fluoranthene			4.79E-01	US EPA OSW 1999
Invert	Chrysene	Invert_Chrysene			4.19E-01	US EPA OSW 1999
Invert	Fluoranthene	Invert_Fluoranthene			4.19E-01	Assumed = PAHs; US EPA OSW 1999
Invert	Fluorene	Invert_Fluorene			4.19E-01	Assumed = PAHs; US EPA OSW 1999
Invert	Indeno(1,2,3-cd)pyrene	Invert_Indeno(1,2,3-cd)pyrene			4.79E-01	US EPA OSW 1999
Invert	Phenanthrene	Invert_Phenanthrene			4.19E-01	Assumed = PAHs; US EPA OSW 1999
Invert	Pyrene	Invert_Pyrene			4.19E-01	Assumed = PAHs; US EPA OSW 1999

Notes:

Predicted Linear Uptake Factors:

UF Soil - Aquatic Plant [dry weight] = log BCF = 0.819 log(Kow) - 1.146; Southworth et al. 1978

UF Soil - Invertebrate [dry weight] = log BCF = 0.819 log(Kow) - 1.146; Southworth et al.1978

Table B2-17 Bio transfer factors [day/kg FW]

Media	Chemical	Abbreviation	Value	Comment
Beef	Anthracene	Beef_Anthracene	3.38E-04	US EPA OSW 2005
Beef	Benzo(a)anthracene	Beef_Benzo(a)anthracene	3.99E-04	US EPA OSW 2005
Beef	Benzo(a)pyrene	Beef_Benzo(a)pyrene	3.76E-04	US EPA OSW 2005
Beef	Benzo(b)fluoranthene	Beef_Benzo(b)fluoranthene	3.62E-04	US EPA OSW 2005
Beef	Benzo(ghi) perylene	Beef_Benzo(ghi) perylene	1.90E-04	US EPA OSW 2005
Beef	Benzo(k)fluoranthene	Beef_Benzo(k)fluoranthene	3.65E-04	US EPA OSW 2005
Beef	Chrysene	Beef_Chrysene	3.99E-04	US EPA OSW 2005
Beef	Fluoranthene	Beef_Fluoranthene	3.92E-04	US EPA OSW 2005
Beef	Fluorene	Beef_Fluorene	2.93E-04	US EPA OSW 2005
Beef	Indeno(1,2,3-cd)pyrene	Beef_Indeno(1,2,3-cd)pyrene	2.94E-04	US EPA OSW 2005
Beef	Phenanthrene	Beef_Phenanthrene	3.38E-04	US EPA OSW 2005
Beef	Pyrene	Beef_Pyrene	3.84E-04	US EPA OSW 2005
Chicken	Anthracene	Chicken_Anthracene	2.49E-04	US EPA OSW 2005
Chicken	Benzo(a)anthracene	Chicken_Benzo(a)anthracene	2.94E-04	US EPA OSW 2005
Chicken	Benzo(a)pyrene	Chicken_Benzo(a)pyrene	2.77E-04	US EPA OSW 2005
Chicken	Benzo(b)fluoranthene	Chicken_Benzo(b)fluoranthene	2.67E-04	US EPA OSW 2005
Chicken	Benzo(ghi) perylene	Chicken_Benzo(ghi) perylene	1.40E-04	US EPA OSW 2005
Chicken	Benzo(k)fluoranthene	Chicken_Benzo(k)fluoranthene	2.69E-04	US EPA OSW 2005
Chicken	Chrysene	Chicken_Chrysene	2.94E-04	US EPA OSW 2005
Chicken	Fluoranthene	Chicken_Fluoranthene	2.89E-04	US EPA OSW 2005
Chicken	Fluorene	Chicken_Fluorene	2.16E-04	US EPA OSW 2005
Chicken	Indeno(1,2,3-cd)pyrene	Chicken_Indeno(1,2,3-cd)pyrene	2.17E-04	US EPA OSW 2005
Chicken	Phenanthrene	Chicken_Phenanthrene	2.49E-04	US EPA OSW 2005
Chicken	Pyrene	Chicken_Pyrene	2.83E-04	US EPA OSW 2005
Dairy	Anthracene	Dairy_Anthracene	7.12E-05	US EPA OSW 2005
Dairy	Benzo(a)anthracene	Dairy_Benzo(a)anthracene	8.41E-05	US EPA OSW 2005
Dairy	Benzo(a)pyrene	Dairy_Benzo(a)pyrene	7.91E-05	US EPA OSW 2005
Dairy	Benzo(b)fluoranthene	Dairy_Benzo(b)fluoranthene	7.62E-05	US EPA OSW 2005
Dairy	Benzo(ghi) perylene	Dairy_Benzo(ghi) perylene	4.01E-05	US EPA OSW 2005
Dairy	Benzo(k)fluoranthene	Dairy_Benzo(k)fluoranthene	7.68E-05	US EPA OSW 2005
Dairy	Chrysene	Dairy_Chrysene	8.41E-05	US EPA OSW 2005
Dairy	Fluoranthene	Dairy_Fluoranthene	8.26E-05	US EPA OSW 2005
Dairy	Fluorene	Dairy_Fluorene	6.16E-05	US EPA OSW 2005
Dairy	Indeno(1,2,3-cd)pyrene	Dairy_Indeno(1,2,3-cd)pyrene	6.19E-05	US EPA OSW 2005
Dairy	Phenanthrene	Dairy_Phenanthrene	7.12E-05	US EPA OSW 2005
Dairy	Pyrene	Dairy_Pyrene	8.09E-05	US EPA OSW 2005
Eggs	Anthracene	Eggs_Anthracene	1.42E-04	US EPA OSW 2005
Eggs	Benzo(a)anthracene	Eggs_Benzo(a)anthracene	1.68E-04	US EPA OSW 2005
Eggs	Benzo(a)pyrene	Eggs_Benzo(a)pyrene	1.58E-04	US EPA OSW 2005
Eggs	Benzo(b)fluoranthene	Eggs_Benzo(b)fluoranthene	1.52E-04	US EPA OSW 2005
Eggs	Benzo(ghi) perylene	Eggs_Benzo(ghi) perylene	8.02E-05	US EPA OSW 2005
Eggs	Benzo(k)fluoranthene	Eggs_Benzo(k)fluoranthene	1.54E-04	US EPA OSW 2005
Eggs	Chrysene	Eggs_Chrysene	1.68E-04	US EPA OSW 2005

Table B2-17 Bio transfer factors [day/kg FW]

Media	Chemical	Abbreviation	Value	Comment
Eggs	Fluoranthene	Eggs_Fluoranthene	1.65E-04	US EPA OSW 2005
Eggs	Fluorene	Eggs_Fluorene	1.23E-04	US EPA OSW 2005
Eggs	Indeno(1,2,3-cd)pyrene	Eggs_Indeno(1,2,3-cd)pyrene	1.24E-04	US EPA OSW 2005
Eggs	Phenanthrene	Eggs_Phenanthrene	1.42E-04	US EPA OSW 2005
Eggs	Pyrene	Eggs_Pyrene	1.62E-04	US EPA OSW 2005
Moose	Anthracene	Moose_Anthracene	3.38E-04	US EPA OSW 2005
Moose	Benzo(a)anthracene	Moose_Benzo(a)anthracene	3.99E-04	US EPA OSW 2005
Moose	Benzo(a)pyrene	Moose_Benzo(a)pyrene	3.76E-04	US EPA OSW 2005
Moose	Benzo(b)fluoranthene	Moose_Benzo(b)fluoranthene	3.62E-04	US EPA OSW 2005
Moose	Benzo(ghi) perylene	Moose_Benzo(ghi) perylene	1.90E-04	US EPA OSW 2005
Moose	Benzo(k)fluoranthene	Moose_Benzo(k)fluoranthene	3.65E-04	US EPA OSW 2005
Moose	Chrysene	Moose_Chrysene	3.99E-04	US EPA OSW 2005
Moose	Fluoranthene	Moose_Fluoranthene	3.92E-04	US EPA OSW 2005
Moose	Fluorene	Moose_Fluorene	2.93E-04	US EPA OSW 2005
Moose	Indeno(1,2,3-cd)pyrene	Moose_Indeno(1,2,3-cd)pyrene	2.94E-04	US EPA OSW 2005
Moose	Phenanthrene	Moose_Phenanthrene	3.38E-04	US EPA OSW 2005
Moose	Pyrene	Moose_Pyrene	3.84E-04	US EPA OSW 2005
Ruffed_Grouse	Anthracene	Ruffed_Grouse_Anthracene	2.49E-04	US EPA OSW 2005
Ruffed_Grouse	Benzo(a)anthracene	Ruffed_Grouse_Benzo(a)anthracene	2.94E-04	US EPA OSW 2005
Ruffed_Grouse	Benzo(a)pyrene	Ruffed_Grouse_Benzo(a)pyrene	2.77E-04	US EPA OSW 2005
Ruffed_Grouse	Benzo(b)fluoranthene	Ruffed_Grouse_Benzo(b)fluoranthene	2.67E-04	US EPA OSW 2005
Ruffed_Grouse	Benzo(ghi) perylene	Ruffed_Grouse_Benzo(ghi) perylene	1.40E-04	US EPA OSW 2005
Ruffed_Grouse	Benzo(k)fluoranthene	Ruffed_Grouse_Benzo(k)fluoranthene	2.69E-04	US EPA OSW 2005
Ruffed_Grouse	Chrysene	Ruffed_Grouse_Chrysene	2.94E-04	US EPA OSW 2005
Ruffed_Grouse	Fluoranthene	Ruffed_Grouse_Fluoranthene	2.89E-04	US EPA OSW 2005
Ruffed_Grouse	Fluorene	Ruffed_Grouse_Fluorene	2.16E-04	US EPA OSW 2005
Ruffed_Grouse	Indeno(1,2,3-cd)pyrene	Ruffed_Grouse_Indeno(1,2,3-cd)pyrene	2.17E-04	US EPA OSW 2005
Ruffed_Grouse	Phenanthrene	Ruffed_Grouse_Phenanthrene	2.49E-04	US EPA OSW 2005
Ruffed_Grouse	Pyrene	Ruffed_Grouse_Pyrene	2.83E-04	US EPA OSW 2005
Snowshoe_Hare	Anthracene	Snowshoe_Hare_Anthracene	3.38E-04	US EPA OSW 2005
Snowshoe_Hare	Benzo(a)anthracene	Snowshoe_Hare_Benzo(a)anthracene	3.99E-04	US EPA OSW 2005
Snowshoe_Hare	Benzo(a)pyrene	Snowshoe_Hare_Benzo(a)pyrene	3.76E-04	US EPA OSW 2005
Snowshoe_Hare	Benzo(b)fluoranthene	Snowshoe_Hare_Benzo(b)fluoranthene	3.62E-04	US EPA OSW 2005
Snowshoe_Hare	Benzo(ghi) perylene	Snowshoe_Hare_Benzo(ghi) perylene	1.90E-04	US EPA OSW 2005
Snowshoe_Hare	Benzo(k)fluoranthene	Snowshoe_Hare_Benzo(k)fluoranthene	3.65E-04	US EPA OSW 2005
Snowshoe_Hare	Chrysene	Snowshoe_Hare_Chrysene	3.99E-04	US EPA OSW 2005
Snowshoe_Hare	Fluoranthene	Snowshoe_Hare_Fluoranthene	3.92E-04	US EPA OSW 2005
Snowshoe_Hare	Fluorene	Snowshoe_Hare_Fluorene	2.93E-04	US EPA OSW 2005
Snowshoe_Hare	Indeno(1,2,3-cd)pyrene	Snowshoe_Hare_Indeno(1,2,3-cd)pyrene	2.94E-04	US EPA OSW 2005
Snowshoe_Hare	Phenanthrene	Snowshoe_Hare_Phenanthrene	3.38E-04	US EPA OSW 2005
Snowshoe_Hare	Pyrene	Snowshoe_Hare_Pyrene	3.84E-04	US EPA OSW 2005

Table B2-18 Fat content

Receptor	%	Reference/Comment
Beef	19%	US EPA OSW 2005
Chicken	14%	US EPA OSW 2005
Dairy	4%	US EPA OSW 2005
Eggs	8%	US EPA OSW 2005
Moose	19%	US EPA OSW 2005; assumed equal to beef
Ruffed_Grouse	14%	US EPA OSW 2005; assumed equal to chicken
Snowshoe_Hare	19%	US EPA OSW 2005; assumed equal to beef

References - ERA

AAFRD. 2000. Alberta Agriculture, Food and Rural Development. Agri-Facts, Agdex 716(C01). January 2000.

ASRD (Alberta Sustainable Resource Development). 2002a. Game Species. Living with Fish and Wildlife. Fish and Wildlife Division, Alberta Sustainable Resource Development. Last Reviewed/Updated August 12, 2002. Available at: http://www.srd.gov.ab.ca/fishwi

ASRD (Alberta Sustainable Resource Development). 2002b. Rabbits and Large Rodents . Watchable Wildlife. Fish and Wildlife Division, Alberta Sustainable Resource Development. Last Reviewed/Updated May 31, 2002. Available at: http://www.srd.gov.ab.ca/fishwi

Mackay, D., Ying Siu, W., and Ching Ma, K. 1992. Illustrated Handbook of Physical-Chemical Properties and Environmental Fate for Organic Chemicals. Vol I-III. Lewis Publishers. Chelsea, Michigan.

Nagy, K.A., I.A. Girard and T.K. Brown. 1999. Energetics of Free-Ranging Mammals, Reptiles, and Birds. Annu. Rev. Nutr. 19: 247-277.

Southworth, G.R., Beauchamp, J.J., and Schmieder, P.K. 1978. Bioaccumulation potential of polycyclic aromatic hydrocarbons in *Daphnia Pulex.* Water Research. Volume 12. Pages 973-977. As cited in Lyman, Reehl, and Rosenblatt (1982).

Suter, G.W., Efroymson, R.A., Sample, B.E., and Jones, D.S. 2000. Ecological Risk Assessment for Contaminated Sites. Lewis Publishers, CRC Press LLC.

US EPA (United States Environmental Protection Agency). 1993. Wildlife Exposure Factors Handbook. Volumes I and II. Office of Research and Development. ORD. EPA-600-R-93-187. December 1993.

US EPA OSW (United States Environmental Protection Agency Office of Solid Waste). 1999. Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities, Volume I Peer Review Draft. (US) United States Environmental Protection

US EPA OSW (United States Environmental Protection Agency Office of Solid Waste). 2005. Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities. Final. United States Environmental Protection Agency Region 6. Multimedia Planning

Wesley, M.L. and Hicks, B.B. 2000. A review of the current status of knowledge on dry deposition. Atmospheric Environment 34:2261-2282.