

Appendix A

Comparison of 1989 and the 2005 cumulative health risk assessments

Appendix A
 Comparison of Health Risk Assessment Approaches

Parameter	MDNR 1989	ENSR 2005
Compounds of Potential Concern	<u>Organics</u> 1) TCDD-TEQ 2) PCBs 3) Benzo(a)pyrene 4) Pyrene 5) Formaldehyde <u>Metals</u> 6) Arsenic 7) Beryllium 8) Cadmium 9) Chromium (VI) 10) Nickel	<u>Organics</u> 1) TCDD-TEQ 2) PCBs 3) Total Carinogenic PAH 4) Total PAH 5) Formaldehyde <u>Metals</u> 6) Antimony 7) Arsenic 8) Beryllium 9) Cadmium 10) Chromium (total) 11) Chromium (VI) 12) Cobalt 13) Copper 14) Lead 15) Manganese 16) Mercury 17) Nickel 18) Selenium 19) Zinc

Parameter	MDNR 1989	ENSR 2005
Emission Rates	For the MCRRF, based on emission rates cited in literature for similar facilities.	Based on MCRRF stack test measurements.
Receptors		
<i>Resident Adult and Child</i>	Not Evaluated	Yes - 2 MEI locations 1. Location of Max. Air Conc. 2. Location of Max. Total Dep.
<i>Subsistence Farmer Adult and Child</i>	Yes. Adult Only Evaluated subsistence consumption of produce, dairy milk and beef grown at MEI location. Also evaluated an Average Exposed Farmer.	Required under current US EPA guidance. Evaluated subsistence consumption of beef, milk, produce, pork, chicken, eggs grown at closest actual dairy farm. Evaluated average consumption of beef, milk, produce, pork, chicken, eggs grown at MEI location.
<i>Subsistence Fisher Adult and Child</i>	Not evaluated.	Required under current US EPA guidance. Evaluated subsistence consumption of fish from Potomac River. Evaluated average consumption of fish from rivers and ponds.

<p>Parameter</p>	<p>Exposure Pathways Inhalation Soil Ingestion Ingestion of Drinking Water from Surface Water Sources Ingestion of Homegrown Produce Ingestion of Homegrown Beef Ingestion of Milk from Homegrown Cows Ingestion of Homegrown Chicken Ingestion of Eggs from Homegrown Chicken Ingestion of Homegrown Pork Ingestion of Fish</p>	<p>Yes - MEI Locations. Yes - MEI Locations. Not evaluated. Yes - MEI Locations. Yes - MEI Locations. Yes - MEI Locations. Not evaluated. Not evaluated. Not evaluated. Evaluated in a separate screening assessment where estimated chemical concentrations in surface water in a pond were compared to water quality criteria for fish consumption. Not Evaluated</p>	<p>Yes - receptors listed above. Yes - receptors listed above. Not evaluated. Yes - receptors listed above. Yes - Sub. Farmer only Yes - Sub. Farmer only Yes - Sub. Farmer only Yes - Sub. Farmer only Yes - Sub. Farmer only Yes - Sub. Fisher at Potomac River. Recreational fisher at other locations.</p>
<p>Ingestion of Breast Milk</p>			<p>Infant receptor only. [Predict concentration in mother's milk, relate to background levels in milk.]</p>
<p>Modeling Methodology Study Area</p>	<p>10 km radius</p>		<p>20 km radius</p>
<p>Air Dispersion Modeling</p>	<p>ISCST Version - UNAMAP VI Simple terrain only (terrain elevations truncated at stack heights). Wet and dry deposition routines external to ISCST.</p>		<p>ISCST3 Version - 02035 Updated for modeling both simple and complex terrain. ISCST updated with routines to compute dry and wet deposition of particles as well as vapor. (Note that vapor deposition modeling is a more recent requirement of the guidance and was not considered at the time of the 1989 study.)</p>

Parameter	MDNR 1989	ENSR 2005
Soil Exposure Point Concentrations	Average over facility lifetime (cancer and non-cancer). 1 cm - untilled: 20 cm - tilled. Not Evaluated Deposition and root uptake. --	Cancer - average over facility lifetime Non-cancer - max. 1-year annual average 1 cm - untilled: 20 cm - tilled. BCF, BAF or BSAF depending on COPC. Deposition, vapor transfer, & root uptake Many updates in fate and transport of mercury in the environment.
Soil Mixing Zone Depth		
Fish Tissue Concentrations		
Vegetable Concentrations		
Mercury Modeling		
Exposure Assumptions	--	Adult = 8 g/day; Child 2.5 g/day. (Average rates specific to Mid-Atlantic region.) Subsistence rate = 81.9 g/day.
Fish Consumption Rate	Not Evaluated	
Toxicity Assumptions		
Toxicity Values	EPA 1986 values. Not used.	Current US EPA values (IRIS, HEAST, NCEA). Used for 7 carcinogenic PAH.
Carcinogenic PAH Toxicity Equivalency Factors	Used (1986 version).	Used (1989 version).
TCDD/TCDF Toxicity Equivalency Factors		

Parameter

MIDNR 1989

ENSR 2005

Notes:

- BAF - Bioaccumulation Factor
- BCF - Bioconcentration Factor
- BSAF - Biota-Sediment Accumulation Factor
- COPC - Chemical of Potential Concern
- EPA - Environmental Protection Agency
- HEAST - Health Effects Assessment Summary Tables.
- IRIS - Integrated Risk Information System.
- ISCST - Industrial Source Complex Short-Term
- MEI - Maximally Exposed Individual
- Maximum Air Concentration - Maximum annual average air concentrations at ground level
- Maximum Total Deposition - Maximum dry and wet deposition
- NCEA - National Center for Environmental Assessment
- PAH - Polynuclear Aromatic Hydrocarbons
- PCB - Polychlorinated Biphenyls
- Subsistence Farmer - Receptor who consumes homegrown agricultural products at a subsistence rate
- Subsistence Fisher - Receptor who consumes locally caught fish at a subsistence rate
- TCDD/TCDF - Tetrachlorinated dibenzo(p)dioxins/tetrachlorinated dibenzo(p)furans
- TCDD-TE - Tetrachlorinated dibenzo(p)dioxin toxic equivalents
- Target organ - Adverse noncarcinogenic health effects are summed by the target organ upon which toxic effects are exerted (e.g., liver effects, kidney effects, neurological effects, blood effects).