

From: Saliars, Gwen N - DNR
Sent: Wednesday, April 13, 2022 3:05 PM
To: Dave Franc
Subject: DNR Comments on Recreational PRG, Sheboygan River & Harbor Superfund Site
Attachments: Recreator_chem_rsl_07APR2022_prg2986576.pdf; DNR PRG Comments.docx

Dave,

Attached are DNR comments about the recreational PRG. In discussions with DHS we changed the exposure frequency along with the target risk, which lowered values by roughly an order of magnitude. DNR and DHS is recommending a total PCB value of 0.5 mg/kg for recreational land uses. Perhaps next week or the week after we could have a short meeting to discuss if needed. Thanks,

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Comments on 'Sheboygan Harbor & River Superfund Site, Former Tecumseh Plant, Preliminary Remediation Goal for Polychlorinated Biphenyls in Recreational Soil, March 29, 2022'

DNR and DHS reviewed the memo and have the following comments:

- Source of park data is from the website <https://sheboyganfalls.org/sheboygan-falls-parks-and-trails/>. More specific information was shared on the April 7, 2022 meeting with City of Sheboygan Falls regarding park use. During the meeting the City affirmed the uses of the park, and highlighted significant use of the dog park areas and sports leagues utilizing the ball fields by children in 3rd grade and older consistently throughout the summer, with practices beginning in May.
- DNR concurs with the use of the RSL Calculator and the Recreator Scenario to derive PRGs
- Climate zone – Minneapolis, MN was selected; Chicago, IL is probably closer. Probably not a major difference in the results, however.
- Depth of source – 0.4 m used based on soil sampling depths of 0-6". Do we have vertical extent defined? This value might need to be increased. Probably not a significant factor as this value is used in the volatilization factor, and risk is primarily driven by ingestion.
- Acreage – 10 acres. Probably not a significant factor as this value is used in the volatilization factor, and risk is primarily driven by ingestion.
- Exposure frequency: 100 days/year (3 days/week for 8 months/year) – recommend modifying to 175 days/yr (5 days/wk for 35 weeks/yr) based on the proximity of the park to residential neighborhoods and consistency with decisions made for similar recreational settings.
- Exposure time: 3 hours/event (conservative value between the 50th and 75th percentiles for ages 0-6 based on Table 16-20 of EPA's Exposure Factors Handbook) – probably acceptable
- Target hazard quotient: 1 – acceptable
- Target risk: 1×10^{-5} – not acceptable. Wis. Admin. Code s. NR 720.12(1)(a) specifies an excess cancer risk of 1×10^{-6} for individual carcinogenic compounds.
- All other default parameters in the RSL Calculator were used – acceptable

Other comments:

- The proposed PRGs in this memo are based on recreational use of the park. DNR recommends that any other PRGs derived for other portions of the Superfund site utilize a 1×10^{-6} target risk.
- DNR and DHS calculated potential PRGs using the same parameters included in the memo, with the following exceptions:
 - Changed location from Minneapolis, MN to Chicago, IL
 - Changed exposure frequency from 100 days/yr to 175 days/yr
 - Changed target risk from 1×10^{-5} to 1×10^{-6}
- The resulting PRGs are:
 - Aroclor 1248 – 0.492 mg/kg
 - Aroclor 1254 – 0.495 mg/kg
 - Aroclor 1260 – 0.496 mg/kg
 - High Risk PCBs – 0.492 mg/kg
- Based on these results, DNR and DHS recommend a total PCB concentration of 0.5 mg/kg as a protective PRG for the park.

Site-specific Recreator Soil Inputs

Variable	Recreator Soil Default Value	Form-input Value
A (PEF Dispersion Constant)	16.2302	16.8653
A (VF Dispersion Constant)	11.911	16.8653
A (VF Dispersion Constant - mass limit)	11.911	16.8653
B (PEF Dispersion Constant)	18.7762	18.7848
B (VF Dispersion Constant)	18.4385	18.7848
B (VF Dispersion Constant - mass limit)	18.4385	18.7848
City (PEF Climate Zone) Selection	Default	Chicago, IL (7)
City (VF Climate Zone) Selection	Default	Chicago, IL (7)
C (PEF Dispersion Constant)	216.108	215.0624
C (VF Dispersion Constant)	209.7845	215.0624
C (VF Dispersion Constant - mass limit)	209.7845	215.0624
d_s (depth of source) m	.	.4
foc (fraction organic carbon in soil) g/g	0.006	0.006
F(x) (function dependent on U_{ms}/U_s) unitless	0.194	0.182
n (total soil porosity) L_{pore}/L_{ent}	0.43396	0.43396
ρ_b (dry soil bulk density) g/cm ³	1.5	1.5
ρ_b (dry soil bulk density - mass limit) g/cm ³	1.5	1.5
PEF (particulate emission factor) m ³ /kg	1359344438	945642522.57044
ρ_p (soil particle density) g/cm ³	2.65	2.65
Q/C_{wind} (g/m ² -s per kg/m ³)	93.77	59.646911819041
Q/C_{vnl} (g/m ² -s per kg/m ³)	68.18	59.646911819041
Q/C_{vnl} (g/m ² -s per kg/m ³ - mass limit)	68.18	59.646911819041
A_s (PEF acres)	0.5	10
A_s (VF acres)	0.5	10
A_s (VF mass-limit acres)	0.5	10
AF_{n-7} (skin adherence factor) mg/cm ²	0.2	0.2
AF_{7-6} (skin adherence factor) mg/cm ²	0.2	0.2
AF_{6-16} (skin adherence factor) mg/cm ²	0.07	0.07
AF_{16-20} (skin adherence factor) mg/cm ²	0.07	0.07
AF_{rec-a} (skin adherence factor - adult) mg/cm ²	0.07	0.07
AF_{rec-c} (skin adherence factor - child) mg/cm ²	0.2	0.2

Site-specific Recreator Soil Inputs

Variable	Recreator Soil Default Value	Form-input Value
AT _{rec} (averaging time)	365	365
BW _{n,c} (body weight) kg	15	15
BW _{γ,c} (body weight) kg	15	15
BW ₆₋₁₆ (body weight) kg	80	80
BW ₁₆₋₂₀ (body weight) kg	80	80
BW _{rec-a} (body weight - adult) kg	80	80
BW _{rec-c} (body weight - child) kg	15	15
DFS _{rec-adj} (age-adjusted soil dermal factor) mg/kg	.	51695
DFS _M _{rec-adj} (mutagenic age-adjusted soil dermal factor) mg/kg	.	214130
ED _{rec} (exposure duration - recreator) years	26	26
ED _{n,c} (exposure duration) year	2	2
ED _{γ,c} (exposure duration) year	4	4
ED ₆₋₁₆ (exposure duration) year	10	10
ED ₁₆₋₂₀ (exposure duration) year	10	10
ED _{rec-c} (exposure duration - child) years	6	6
EF _{rec} (exposure frequency) days/year	.	175
EF _{n,c} (exposure frequency) days/year	.	175
EF _{γ,c} (exposure frequency) days/year	.	175
EF ₆₋₁₆ (exposure frequency) days/year	.	175
EF ₁₆₋₂₀ (exposure frequency) days/year	.	175
EF _{rec-a} (exposure frequency - adult) days/year	.	175
EF _{rec-c} (exposure frequency - child) days/year	.	175
ET _{rec} (exposure time - recreator) hours/day	.	3
ET _{n,c} (exposure time) hours/day	.	3
ET _{γ,c} (exposure time) hours/day	.	3
ET ₆₋₁₆ (exposure time) hours/day	.	3
ET ₁₆₋₂₀ (exposure time) hours/day	.	3
ET _{rec-a} (adult exposure time) hours/day	.	3
ET _{rec-c} (child exposure time) hours/day	.	3
THQ (target hazard quotient) unitless	0.1	1
IFS _{rec-adj} (age-adjusted soil ingestion factor) mg/kg	.	18375

Site-specific Recreator Soil Inputs

Variable	Recreator Soil Default Value	Form-input Value
IFSM _{recre-adi} (mutagenic age-adjusted soil ingestion factor) mg/kg	.	83416.667
IRS _{n-3} (soil intake rate) mg/day	200	200
IRS ₃₋₆ (soil intake rate) mg/day	200	200
IRS ₆₋₁₆ (soil intake rate) mg/day	100	100
IRS ₁₆₋₂₀ (soil intake rate) mg/day	100	100
IRS _{recre-a} (soil intake rate - adult) mg/day	100	100
IRS _{recre-c} (soil intake rate - child) mg/day	200	200
LT (lifetime - recreator) years	70	70
SA _{n-3} (skin surface area) cm ² /day	2373	2373
SA ₃₋₆ (skin surface area) cm ² /day	2373	2373
SA ₆₋₁₆ (skin surface area) cm ² /day	6032	6032
SA ₁₆₋₂₀ (skin surface area) cm ² /day	6032	6032
SA _{recre-a} (skin surface area - adult) cm ² /day	6032	6032
SA _{recre-c} (skin surface area - child) cm ² /day	2373	2373
TR (target risk) unitless	1.0E-06	1.0E-06
T _w (groundwater temperature) Celsius	25	25
Theta _a (air-filled soil porosity) L _{air} /L _{cnil}	0.28396	0.28396
Theta _w (water-filled soil porosity) L _{water} /L _{cnil}	0.15	0.15
T (exposure interval) s	819936000	819936000
T (exposure interval) yr	26	26
U _m (mean annual wind speed) m/s	4.69	4.65
U _t (equivalent threshold value)	11.32	11.32
V (fraction of vegetative cover) unitless	0.5	0.5
VF _{ml} (volitization factor - mass limit) m ³ /kg	.	81511.083815428

Site-specific

Recreator Regional Screening Levels (RSL) for Soil

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; G = see user's guide; U = user provided; ca = cancer; nc = noncancer; * = where: nc SL < 100X ca SL; ** = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

CSAT substitution for soil inhalation pathway has been enabled.

Substitution for threshold maximum in soil has been enabled.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	SF _o (mg/kg-day) ⁻¹	SF _o Ref	IUR (ug/m ³) ⁻¹	IUR Ref	RfD (mg/kg-day)	RfD Ref	RfC (mg/m ³)	RfC Ref	GIABS	ABS
Aroclor 1248	12672-29-6	No	Yes	Organics	2.00E+00	G	5.71E-04	G	-		-		1	0.14
Aroclor 1254	11097-69-1	No	Yes	Organics	2.00E+00	G	5.71E-04	G	2.00E-05	I	-		1	0.14
Aroclor 1260	11096-82-5	No	Yes	Organics	2.00E+00	G	5.71E-04	G	-		-		1	0.14
Polychlorinated Biphenyls (high risk)	1336-36-3	No	Yes	Organics	2.00E+00	I	5.71E-04	I	-		-		1	0.14

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RBA	Soil Saturation Concentration (mg/kg)	S (mg/L)	K_{oc} (cm ³ /g)	K_d (cm ³ /g)	HLC (atm-m ³ /mole)	Henry's Law Constant Used in Calcs (unitless)	H ^c and HLC Ref	Normal Boiling Point BP (K)	BP Ref	Critical Temperature T _c (K)	T _c Ref
1	-	1.00E-01	7.65E+04	4.59E+02	4.40E-04	1.80E-02	PHYSPROP	613.15	EPI	919.725	Approx. from Tcrit=1.5xTBoil
1	-	4.30E-02	1.31E+05	7.83E+02	2.83E-04	1.16E-02	PHYSPROP	651.36	EPI	957.225	Approx. from Tcrit=1.5xTBoil
1	-	1.44E-02	3.50E+05	2.10E+03	3.36E-04	1.37E-02	PHYSPROP	688.75	EPI	987.225	Approx. from Tcrit=1.5xTBoil
1	-	7.00E-01	7.81E+04	4.69E+02	4.15E-04	1.70E-02	PHYSPROP	632.66	EPI	-	

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Chemical Type	D _i \ (cm ² /s)	D _{iw} \ (cm ² /s)	D _A \ (cm ² /s)	Particulate Emission Factor (m ³ /kg)	Volatilization		Ingestion SL TR=1E-06 (mg/kg)	Dermal SL TR=1E-06 (mg/kg)	Inhalation SL TR=1E-06 (mg/kg)	
					Factor Unlimited Reservoir (m ³ /kg)	Factor Mass Limit (m ³ /kg)				
PCB	2.41E-02	6.18E-06	5.03E-08	9.46E+08	4.50E+05	8.15E+04	4.50E+05	6.95E-01	1.77E+00	3.53E+01
PCB	2.37E-02	6.10E-06	1.87E-08	9.46E+08	7.37E+05	8.15E+04	7.37E+05	6.95E-01	1.77E+00	5.79E+01
PCB	2.20E-02	5.61E-06	7.70E-09	9.46E+08	1.15E+06	8.15E+04	1.15E+06	6.95E-01	1.77E+00	9.03E+01
PCB	2.43E-02	6.27E-06	4.70E-08	9.46E+08	4.65E+05	8.15E+04	4.65E+05	6.95E-01	1.77E+00	3.66E+01

Site-specific

Recreator Regional Screening Levels (RSL) for Soil

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Carcinogenic SL TR=1E-06 (mg/kg)	Ingestion SL Child THQ=1 (mg/kg)	Dermal SL Child THQ=1 (mg/kg)	Inhalation SL Child THQ=1 (mg/kg)	Noncarcinogenic SL Child THI=1 (mg/kg)	Ingestion SL Adult THQ=1 (mg/kg)	Dermal SL Adult THQ=1 (mg/kg)	Inhalation SL Adult THQ=1 (mg/kg)	Noncarcinogenic SL Adult THI=1 (mg/kg)	Screening Level (mg/kg)
4.92E-01	-	-	-	-	-	-	-	-	4.92E-01 ca
4.95E-01	3.13E+00	9.42E+00	-	2.35E+00	3.34E+01	5.65E+01	-	2.10E+01	4.95E-01 ca
4.96E-01	-	-	-	-	-	-	-	-	4.96E-01 ca
4.92E-01	-	-	-	-	-	-	-	-	4.92E-01 ca