



COMMONWEALTH of VIRGINIA

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May 22, 2018

Mr. Michael Liberati
DuPont Corporate Remediation Group
Chestnut Run Plaza 715-236
Wilmington, DE 19805

VIA ELECTRONIC MAIL

**Re: Surfacial Soils Evaluation Framework: Area of Concern 4
Former DuPont Waynesboro Plant
Waynesboro, Virginia
EPA ID# VAD003114832**

Dear Mr. Liberati:

This letter acknowledges the receipt and review of the Surfacial Soils Evaluation Framework: Area of Concern 4 with a revision date of April 8, 2018, submitted to the Virginia Department of Environmental Quality, Office of Remediation Programs (Department) by AECOM on behalf of the E.I du Pont Nemours and Company (DuPont) on April 16, 2018.

**AECOM**

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MEMORANDUM

TO: Michael Liberati, DuPont
Ralph Stahl, DuPont

DATE: January 8, 2018

Rev: 04/08/2018

CC: Joshua Collins, AECOM

FROM: Dana McCue, AECOM
Sagar Thakali, AECOM

SUBJECT: Surficial Soils Evaluation Framework:
Area of Concern (AOC) 4, Former DuPont Waynesboro Site

Background

The Interim Measures Design, Implementation, and Monitoring Work Plan (IM Work Plan) (Anchor QEA, et. al., 2015) for Area of Concern (AOC) 4 describes the rationale for remediating certain riverbanks within the first two miles of the South River downstream of the former DuPont Waynesboro Site (Site) to reduce or eliminate this on-going source of mercury loading to the river.

A reach-level understanding of mercury contamination in floodplain and bank soils and sediment deposits has been achieved. Those data formed the basis of the risk assessment for the study area, and for the selection of bank management areas (BMAs) targeted for remediation based on their mercury loading to the river system.

Bank soils data were not included in the human health risk assessment (HHRA), since potential exposure to mercury contaminated bank soils was considered minimal, and interim remedial measure designs intended to reduce loading to the river were on-going. However, it was agreed with the Virginia Department of Environmental Quality (VDEQ) that an evaluation of bank soils would be incorporated into the AOC 4 Corrective Measures Study (CMS). As a result,

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Initial Evaluation

Soils data for a given parcel or discrete area will initially be evaluated in a three-step process (Figure 1) that includes the following:

- Data gap evaluation – available surficial soils (i.e. 0' to 2' depth) within the evaluation area will be assessed to determine if there is adequate data density present within each decision unit. If additional data are needed, a focused sampling plan will be developed and submitted to VDEQ for approval.
- Outlier determination – Datasets will be inspected for potential outliers using ProUCL software. Screening evaluations will be performed with and without outliers, which is consistent with the approach used in the approved AOC 4 HHRA (URS, 2015).
- Screening evaluation – Maximum total mercury (THg) concentrations within each current land-use/habitat will be compared to conservative soil screening values (SSVs) to determine if a more focused evaluation is warranted (Figure 1b). Table 1 and Table 2 provide a summary of the ecological and human health SSVs used in the screening evaluation. If maximum THg concentrations exceed the applicable SSV, then additional risk and remedial evaluation will be conducted (Figure 1b). If maximum THg concentrations are below the applicable SSVs, then the evaluation is considered complete.

Risk and Remedial Evaluation

Additional risk and remedial evaluation will be conducted where warranted, following the approach outlined in Figure 1b. This framework includes an evaluation of potential risk to ecological receptors, as well as human health; details of each process are provided below.

Where ecological or human health risk-based evaluations indicate the potential for unacceptable risk, a remedial alternatives analysis will be conducted.

Ecological Evaluation

Exposure point concentrations (EPCs) will be determined for each available habitat type. The EPC will be set at the appropriate upper-confidence limit (UCL) of the mean based upon the characteristics of the dataset using ProUCL software. E

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HHRA; supporting documentation regarding exposure parameters are provided in Attachment B.

Examples

Examples using the surficial soils strategy framework have been completed to illustrate the process outlined above; however, they do not represent the final evaluation of the subject properties (Attachment C). Post-interim measures and 'no-action' scenarios are presented in the example evaluations and represent an evaluation of potential risk to both ecological receptors and human health, with and without bank stabilization. Both scenarios will be evaluated in future assessments in order to inform remedial decision-making, as well as to address potential risk to human health from exposure to mercury-impacted bank soils, which were not evaluated in the HHRA.

Summary

A flexible framework has been developed in conjunction with VDEQ risk assessors to assess potential risk due to soil exposure at a given parcel on a case-by-case basis, considering current or reasonably anticipated future land use conditions. Bank soils will be assessed in a phased manner, starting with the first two river miles below the Site. The results of the risk evaluation will provide input to remedial decision-making for that parcel.

References

- AECOM. 2015. RCRA Facility Investigation Report, Former DuPont Waynesboro Site Area of Concern 4: South River and a Portion of the South Fork Shenandoah River, Virginia. August, 2014.
- Anchor QEA LLC, URS Corporation, E.I. du Pont de Nemours and Company. 2015. Final Interim Measures Design, Implementation, and Monitoring Work Plan. Phase-1 South River Area of Concern 4. February 2015.
- URS, 2015. Human Health Risk Assessment Report Area of Concern (AOC) 4, South River and a Segment of the South Fork Shenandoah River, Virginia. Former DuPont Waynesboro Plant, Waynesboro, Virginia. October 2015.

Tables

Table 1
Ecological Benchmarks for Mercury in Floodplain Soil
Area of Concern (AOC) 4
South River and a Segment of the South Fork of the Shenandoah River, Virginia

Soil Screening Value (ESV) for Screening Level Ecological Risk Assessment				
Mercury Species	Receptors	ESV (mg/kg soil)		Basis
THg	All Terrestrial Ecological Receptors	0.18		Based on <i>site-specific background concentration</i> ; Corresponds to the maximum concentration observed in the unimpacted Upstream Reference Reach, RRM -2.7 to RRM -0.7.
Effects/No Effects Benchmarks for Baseline Ecological Risk Assessment				
Mercury Species	Receptors	NOEC (mg/kg soil)	LOEC (mg/kg soil)	Basis
THg	Terrestrial Vegetation	54	87	Based on the geometric mean of select NOECs and LOECs from soil studies (see Table C-2 in Appendix C of the ERA Report) and a site-specific bioavailability factor of 3.
	Terrestrial (Soil) Invertebrates	18	36	Based on the geometric mean of select NOECs and LOECs from soil studies (see Table C-3 in Appendix C of the ERA Report) and a site-specific bioavailability factor of 3.
	Terrestrial Birds	16	72	Lowest back-calculated soil benchmarks for representative terrestrial birds; based on food web model calculations and applicable NOAEL and LOAEL TRVs (see Table 2).
	Terrestrial Mammals	37	343	Lowest back-calculated soil benchmarks for representative terrestrial mammals; based on food web model calculations and applicable NOAEL and LOAEL TRVs (see Table 2).

Notes:

mg/kg soil - Milligrams per kilogram soil
mg/kg bw/day - Mill

Table 2
Human Health Screening Levels for Mercury in Floodplain Soil
Area of Concern (AOC) 4
South River and a Segment of the South Fork of the Shenandoah River, Virginia

Current/Future Potential Land Use	Receptor	Media	Screening Level (mg THg/kg)	Source	Exposure Frequency
Residential	Resident (Adult/Child)	Floodplain Soil	17	VADEQ Screening Level for HHRA	350 days/year
Hay/Pasture	Farmer (Adult/Child)	Floodplain Soil	17	VADEQ Screening Level for HHRA	350 days/year
Park	Floodplain Area Park User (Adult/Child)	Floodplain Soil	73	<i>Site-Specific</i>	84 days/year
-	South River (Adult/Child)	Bank Soil	108	<i>Site-Specific</i>	48 days/year
-	South River Hunter (Angler)	Bank Soil	820	<i>Site-Specific</i>	28 days/yr
Forested	Floodplain Area Hunter	Floodplain Soil	2300	<i>Site-Specific</i>	28 days/yr

Notes:

THg - Total mercury, assumes mercury is present as mercuric chloride

MeHg is not a COPC for human health

Site-specific exposure assumptions and pathways (ingestion, dermal, inhalation) consistent with those used in the HHRA

Screening value based on a hazard quotient (HQ) of 1

mg THg/kg - milligrams of total mercury per kilogram soil

Table 3
Ecological Benchmarks for Mercury in Floodplain Soil
Area of Concern (AOC) 4
South River and a Segment of the South Fork of the Shenandoah River, Virginia

Mercury Species	Receptors	Toxicity Reference Values (TRVs) ¹ (mg/kg bw/day)		Basis
		NOAEL	LOAEL	
MeHg	Carnivorous Birds (Eastern Screech Owl)	0.017	0.055	Reproductive effects on American kestrel (Albers et al., 2007).
	Passerines (Tree Swallow and American Robin)	0.036/0.078 ²	ND	Based on geometric mean of NOAELs derived from field studies (Gerrard and St. Louis, 2001; Longcore et al., 2007; Custer et al., 2008).
MeHg	Herbivorous Mammals (White-Tailed Deer)	0.09	0.42	Based on effects on survival and reproduction in rat (Verschuuren et al., 1976) and maximum tolerance level for cows (NRC, 1980).
	Insectivorous Mammals (Short-Tailed Shrew)	0.09	0.42	Based on effects on survival and reproduction in rat (Verschuuren et al., 1976).
Mercury Species	Receptors	Back-Calculated Soil Benchmark ² (mg/kg soil)		Basis
		NOAEL-Based	LOAEL-Based	
MeHg	Carnivorous Birds (Eastern Screech Owl)	3.20	21.0	NOAEL- and LOAEL-based soil benchmarks are back-calculated for each receptor group based on foodweb modeling, estimated bioaccumulation factors (BAFs), an area use factor (AUF) of 1, and corresponding NOAELs and LOAELs.
	Passerines (Tree Swallow and American Robin)</			

Figures

