Message

From: DeFriece, John R. (DNREC) [John.DeFriece@state.de.us]
Sent: 6/15/2015 1:15:00 PM
To: McIlwain, Jaclyn [Mcilwain.Jaclyn@epa.gov]; Cruz, Francisco [Cruz.Francisco@epa.gov]; Trulear, Brian [Trulear.Brian@epa.gov]
CC: Roushey, Jennifer S. (DNREC) [Jennifer.Roushey@state.de.us]
Subject: Additional Info. re. LTA/MDL calcs.
Attachments: AML_and_MDL_ from_LTA_SampleFrequency_and_CVs.thru_2013.RE-CHECK_jrd.v02.xlsx; DMR_Statistics.LTA_cross-check.001_Toxicity.Thru_2014-Aug.xlsm; DeSWQS_001.20141106.old_stds.check_TUa_Limits.xlsm; TUa_Limits.DRBC_Calcs.xlsx; Statistical Analysis Attachment A_Final 11_02_2007.doc; 1971-086-2 (Dupont Edgemoor IWTP).doc

Ladies & Gentlemen,

Here is some more info. re. my e-mail, "Perdue Question":

> **From:** DeFriece, John R. (DNREC)
> **Sent:** Wednesday, June 10, 2015 2:08 PM
> **To:** mcilwain.jaclyn@epa.gov; trulear.brian@epa.gov
> **Cc:** Roushey, Jennifer S. (DNREC)
> **Subject:** Resend: Perdue Question (FW: Broadkill TMDL & Perdue, Georgetown)

Discussion started by comments from a DuPont consultant (Dr. "Ferrair"?). The directly relevant stuff is in the 1st spreadsheet. Main thing to note is on the "TSD_Check_Eqns" sheet, TSD Appendix E, pg. 8 has an error in one of the equations.

John

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From: DeFriece, John R. (DNREC)
Sent: Wednesday, February 18, 2015 3:54 PM
To: Vimal.Vijaykumar@chemours.com; J-BART.RUITER@chemours.com; Thomas Fikslin (thomas.fikslin@drbc.state.nj.us); david.kovach@drbc.state.nj.us; McAleer, Shane (Shane.McAleer@drbc.state.nj.us)
Cc: Ashby, Bryan A. (DNREC); Roushey, Jennifer S. (DNREC)
Subject: Corrections of TUa Limit Calculations

Lady & Gentlemen,

Short answer is I should have used LN(Geometric Mean) instead of LN(Arithmetic Mean) for the LogNormal Distribution. Other, relatively minor correction, is that I had switched Coefficients of Variation (cv) between the Normal and LogNormal Distributions.

Shorter answer is that I think we can leave well enough alone, and leave the AML for TUa at 6.7.

Please let me know if think some alternative limit is appropriate, and/or if you spot any additional needed corrections. I am wary enough to view the updated attachments no less infallible than the earlier versions.

As a check of my spreadsheets, I used commercial statistics software, StatGraphics, to calculate %'iles for normal and log-normal distributions from DuPont's TUa results. The Table below is from the DMR_Statistics attachment. The "Cross-check" columns are checks of corrections of the "AML_and_MDL" attachment. That attachment includes corrections mentioned above. Note that the last sheet of the "AML_and_MDL" shows an error in the eqns. on TSD pg. E-8.

Data Summary	Permit No.	DE0000051	Cross-check	Cross-check	Cross-check	Cross-check	DE0000051	DE0000051	DE0000
	Facility	PCS					PCS	PCS	PCS
	Outfall	**001**					**001**	**001**	**001**
	Parameter Code	**99999**		**From "AML_MDL"**			**99999**	**99999**	**9999**
	Monitoring Location	**1**	StatGraphics calc'd %'iles	From original	From Chemour-corrections	JRD Re-checked	**1**	**1**	**1**
	Parameter	**TUa**	**TUa**	**TUa**	**TUa**	**TUa**	**TUa**	**TUa 4-Sample_Avg Updated**	**TUa Sample_ Updat**
	Units	Ac. Toxicity Units	Ac. Toxicity Units	Ac. Toxicity Units	Ac. Toxicity Units	Ac. Toxicity Units	Ac. Toxicity Units	Ac. Toxicity Units	Ac. Tox Unit
	Present Limit	0					0	0	0
	Compliance Heading	MCAV					MCAV	MCAV	MCA
	Begin Date	1/14/2010	1/14/2010	1/14/2010	1/14/2010	1/14/2010	2/11/2009	4/22/2009	6/10/2
	End Date	12/18/2013	12/18/2013	12/18/2013	12/18/2013	12/18/2013	8/21/2014	8/21/2014	8/21/2
Lognormal Distribution	1%'ile	0.832	0.831				0.870	1.743	1.95
	5%'ile	1.266	1.267				1.335	2.262	2.47
	50%'ile	3.505	3.505	3.505	1.430	3.505	3.768	4.251	4.33
	95%'ile	9.700	9.693	8.887	10.600	9.69	10.633	7.989	7.59
	99%'ile	14.771	14.774	13.063	15.580	14.77	16.321	10.368	9.57
	Mean	4.243					4.596	4.575	4.59
	Standard Dev.	2.897					3.209	1.820	1.61
	Coef. of Variation	0.683					0.698	0.398	0.35
	Correlation Coef.	0.966					0.970	0.990	0.98
Normal Distribution	1%'ile	-1.792	-1.793				-1.776	0.691	1.19
	5%'ile	-0.045	-0.042				0.063	1.821	2.17
	50%'ile (Mean)	4.184	4.184	3.505	4.184	4.184	4.514	4.556	4.57
	95%'ile	8.413	8.410	7.431	8.860	8.411	8.966	7.292	6.96

	99%'ile	10.160	10.161	9.057	10.80	10.160	10.805	8.422	7.95
	Std. Deviation	2.569	**Limits, 4 samples (LogN Dist'n)**				2.705	1.662	1.45
	Coef. of Variation	0.614	Avg.	6.44	7.68	6.93	0.599	0.365	0.31
	Correlation Coef.	0.907	Max.	7.90	9.42	8.69	0.931	0.986	0.99
Student's T	1% PROB.	-1.957					-1.863	0.637	1.14
	5% PROB.	-0.109	**Limits, 6 samples (LogN Dist'n)**				0.030	1.801	2.16
	50% PROB. (MEAN)	4.184	Avg.	5.99	7.14	6.41	4.514	4.556	4.57
	95% PROB.	8.477	Max.	7.08	8.45	7.72	8.999	7.312	6.98
	99% PROB.	10.325					10.892	8.475	8.00
Sample Statistics	Number of Data Points	87	87	87	87	87	137	134	132
	MEDIAN DATA POINT	4.6000					4.74	4.77	4.36
	MINIMUM	1					1.00	1.74	1.65
	AVERAGE	4.184					4.51	4.56	4.57
	MAXIMUM	14.5					15.38	8.93	7.69
	STD. DEVIATION	2.569					2.705	1.662	1.45

The last two columns above look at recent performance (most recent 24 results), for both 4-sample averages and 6-sample averages.

ATTACHMENTS

1. AML_and_MDL – Calculates AML from eqns. in TSD Appendix E.
2. DMR_Statistics – Calculates AML as 95th %'ile of TUa results, for both normal and log-normal distributions.
3. DeSWQS – Calculates the AML from the De. WQS for acute toxicity, per calculations on TSD pages 99-103. Those calculations use the WQS as the 99th %'ile, then calculate the "LTA. That LTA turns out to be
   LTA = exp(avg. of LN(data)) = geometric mean
   for those calculations, not that it is well explained anywhere.
4. TUa_Limits.DRBC_Calcs is the same calculations as DeSWQS, except that DRBC created that spreadsheet.
5. Statistical Analysis Attachment A is the case DuPont made to get the current AML = 6.7 TUa.
6. 1971-986-2 is the current DRBC Docket for the site. Used that to get the dilution factor of 28.2, per the alternative mixing zone request, used in Items 3 & 4 above to calculate limits.

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