

**40365 Braithwaite, LA
Stolthaven Terminal Facility
Estimation of On-site Diethanolamine (DEA)
October 3, 2012**

This data report summarizes the mass balance determination of estimated quantities of diethanolamine (DEA) released on-site within the Stolthaven Facility as a result of flooding from Hurricane Isaac.

Potential reservoirs of DEA within environmental media present at the Stolthaven Facility were sampled and analyzed to determine the estimated volume of DEA recovered onsite. A total of 12 samples were collected from 8 containment vessels containing storm waters recovered onsite. CTEH[®] collected samples from four above ground stationary tanks and 4 frac tanks. Three sampling locations contain a second round of samples: Frac Tank #N35867, Frac Tank #998158, Frac Tank #998995. Appendix 1 depicts the location of the samples collected for analysis.

Based on the results of the analysis and available information on the quantity (mass/volume) of storm water being stored in each vessel, the quantity of DEA in each of these vessels was calculated in order to provide an overall estimate of DEA recovered from within the Stolthaven site. The equation for the derivation of the estimated volume of DEA is included in Appendix 2. The estimated volume within the tank/container at the time of CTEH[®] sampling was provided by Stolthaven. It should be noted that the calculated volumes of recovered DEA are estimates based upon one or two samples from each vessel, thus, there is some uncertainty associated with the recovery estimate. Sample RRS0921WW001-C was analyzed a second time to confirm the reported DEA concentration; results from both analysis are reported.

Estimated results from waste-water analysis indicate that between 100,343 and 132,646 gallons of DEA were recovered in storm waters from within the Stolthaven Facility. Appendix 3 provides a summary of the on-site reservoirs and the estimated volumes of DEA for each specific sample and overall minimum and maximum DEA volumes recovered from within the Stolthaven Facility.

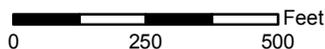
Appendix 1

Map of Sampling Locations



Legend
 Diethanolamine Sample

Diethanolamine Sample Locations



 Project No. 40365	Stolthaven
	Braithwaite, LA
	Plaquemines Parish
Print Date: 10/3/2012	

Appendix 2

Equation for Approximate Volume of DEA

Equation 1 (Mass of DEA in mg)

$$= (\text{Estimated Tank/Container Volume at Time of Sample})_{\text{gal}} \times \frac{3.79 \text{ L}}{\text{gal}} \times \text{Concentrations of DEA } \frac{\text{mg}}{\text{L}}$$

Equation 2 (Conversion from mass (mg) to volume (gal))

$$= \frac{1000 \text{ mg}}{\text{g}} \times \frac{1.097 \text{ g}_{\text{specific gravity of DEA}}}{1 \text{ mL}} \times \frac{1000 \text{ mL}}{1 \text{ L}} \times \frac{3.79 \text{ L}}{1 \text{ gal}}$$

Equation 3 (Calculation of final DEA volume)

$$= \frac{\text{Equation 1}}{\text{Equation 2}} = \text{Approximate Volume of DEA Recovered Onsite (gal)}$$

*Diethanolamine = DEA

Results of the approximate volume of DEA recovered from each containment vessel were added to provide an overall estimation of on-site DEA.

Appendix 3 Estimation of DEA Quantities

<u>Tank/Container #</u>	<u>Estimated Tank/Container Volume at Time of Sampling (gal)⁴</u>	<u>Sample ID</u>	<u>Concentration (mg/L)¹</u>	<u>Approximate Minimum Volume of DEA Recovered Onsite (gal)</u>	<u>Approximate Maximum Volume of DEA Recovered Onsite (gal)</u>
EQ-1	859,500	ACE0916WW004I	250	196	196
	752,000	JML0923WW002 ^{3*}	<10	0	0
E12.5-13	545,000	ACE0916WW002-C	37,000 ⁵	18,382	18,382
E12.5-15	464,211	RRS0921WW001-C [*]	265,000	--	112,138
			190,000	80,401	--
A50-7	1,156,504	JMG0924WW009-C [*]	<25	0	0
Frac Tank #N35867 (Lic. 19M-868)	18,289	JMG0916WW001	53,000 ⁵	884	--
		JMG0918WW005 [*]	83,000 ⁵	--	1,384
Frac Tank #998158 (Lic. 435-7GE)	19,987	JMG0916WW002	3,900	71	--
		JMG0918WW006 [*]	5900 ⁵	--	107
Frac Tank #998995 (Ok Lic. 256-3GX)	17,476	JMG0916WW003	3,700 ⁵	58	--
		JMG0918WW007 [*]	5,500 ⁵	--	88
Frac Tank #SV33887L (Lic. 626967)	16,062	JMG0918WW008 [*]	24,000 ⁵	351	351
Estimation Range ³ of Onsite Diethanolamine				Min. Vol. 100,343	Max Vol. 132,646

¹Analyzed by TestAmerica, Inc. - Mobile, AL or, Gulf Coast Analytical - Baton Rouge, LA

²A range was given to account for the three frac tanks that were sampled on two different occasions and for sample RRS0921WW001-C that was analyzed twice to confirm the reading.

³Additional sampling EQ-1 on September 23, 2012 after storm-water from D/E Tank Farm was transferred into EQ-1.

⁴All estimates quantities were obtained from Stolthaven.

⁵If samples were run more than once; the lowest value is reported to generate a conservative estimate.

*Results pending validation.