EDGEWOOD

CHEMICAL BIOLOGICAL CENTER

U.S. ARMY RESEARCH, DEVELOPMENT AND ENGINEERING COMMAND

ECBC-TR-647

EVAPORATION RATES OF CHEMICAL WARFARE AGENTS USING 5-CM WIND TUNNELS I. CASARM SULFUR MUSTARD (HD) FROM GLASS

Carol A. S. Brevett
John Pence
Robert G. Nickol
Joseph P. Myers
Erin Maloney
Chris V. Giannaras
Aaron Flowers

SAIC

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
Aberdeen Proving Ground, MD 21010-0068

Kenneth B. Sumpter
H. Dupont Durst
Bruce E. King

RESEARCH AND TECHNOLOGY DIRECTORATE

October 2008

Approved for public release;
distribution is unlimited.

20090126149

ABERDEEN PROVING GROUND, MD 21010-5424

Disclaimer

The findings in this report are not to be construed as an official Department of the Army position unless so designated by other authorizing documents.

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. **PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.**

1. REPORT DATE *(DD-MM-YYYY)*	2. REPORT TYPE	3. DATES COVERED *(From - To)*
XX-10-2008	Final	Apr 2005 - Oct 2008

4. TITLE AND SUBTITLE
Evaporation Rates of Chemical Warfare Agents Using 5-cm Wind Tunnels
I. CASARM Sulfur Mustard (HD) from Glass

5a. CONTRACT NUMBER
DAAD13-03-D-0017

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
Brevett, Carol A. S. ; Pence, John; Nickol, Robert G. ; Myers, Joseph P.; Maloney, Erin; Giannaras, Chris V.; Flowers, Aaron (SAIC); Sumpter Kenneth B.; Durst, H. Dupont and King, Bruce E. (ECBC)

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
SAIC, PO Box 68, Gunpowder, MD 21010-0068
DIR, ECBC, ATTN: AMSRD-ECB-RT-CM, APG, MD 21010-5424

8. PERFORMING ORGANIZATION REPORT NUMBER
ECBC-TR-647

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT
Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT
The evaporation of sulfur mustard (HD) from glass was studied as a function of temperature, drop size, and airflow rate. The evaporation rate was measured by collecting the HD vapor using thermal desorption tubes that were connected to the wind tunnel. The evaporation rate increased with higher temperature, drop size, and wind speed. Five different wind tunnels were used, and it was possible to fit all of the data generated to one regression function.

15. SUBJECT TERMS
Wind tunnel Sulfur mustard Glass Evaporation rate HD CASARM

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			Sandra J. Johnson
U	U	U	UL	185	19b. TELEPHONE NUMBER *(include area code)* (410) 436-2914

Blank

PREFACE

The work described in this report was authorized under Contract No. DAAD13-03-D-0017. The work was started in April 2005 and completed in October 2008.

The use of either trade or manufacturers' names in this report does not constitute an official endorsement of any commercial products. This report may not be cited for purposes of advertisement.

This report has been approved for public release. Registered users should request additional copies from the Defense Technical Information Center; unregistered users should direct such requests to the National Technical Information Service.

Acknowledgments

The authors acknowledge Dr. James Savage for programmatic support and Christine Franklin for help in preparing this document.

BIANK PAGE

Blank

CONTENTS

1. INTRODUCTION 9

2. EXPERIMENTAL PROCEDURES 9

2.1 Wind Tunnel 9
2.2 Agent 10
2.3 Gas Chromatography/Mass Spectrometry Detection 10
2.4 Substrates 11
2.5 Experimental Design and Data Analysis 12

3. RESULTS 12

3.1 Effect of Moisture 13
3.2 Variability between Tunnels 15
3.3 Percentage HD Recovered 16
3.4 Analysis of the Entire Dataset 17

4. CONCLUSIONS 18

LITERATURE CITED 23

APPENDIX

I ENVIRONMENTAL FACTORS AND EVAPORATION RATES FOR INDIVIDUAL EXPERIMENTS 25

II WIND TUNNEL DATA 31

FIGURES

1. Schematic of the 5-cm Laboratory Wind Tunnel 10

2. Gas Chromatogram of Sulfur Mustard 11

3. Mass Spectrum of Sulfur Mustard and the First Breakdown Ion 11

4. Evaporation Profiles for Sulfur Mustard from Glass at the Highest, Mid-point and Lowest Wind Tunnel Settings 13

5. Evaporation Data Expressed in Three Methods: (a) Concentration, Percent HD Remaining and (b) mg HD Remaining and the Points Used to Calculate the Evaporation Rate 13

6. Comparison of 000+ Data (e) to 000- Data from the Other Tunnels 14

7. (a) Least Squares Fit for 000- and 000+ Data, and (b) Residuals 15

8. Comparison of Evaporation Rates from the Wind Tunnels Using Four Different Methods 16

9. Distribution of the Percentage HD Recovered 16

10. Cube plot of the Adjusted Evaporation Rates of CASARM Sulfur Mustard from Glass as a Function of Temperature, Drop Size, and Airflow Rate 18

11. Model Fit for CASARM HD Evaporation Rates from Glass (a) as a Function of Temperature, Drop Size and Flow Rate, Tunnel, and % Sulfur Mustard Recovered (b) Residuals 19

12. Model Fit for CASARM HD $\log_{10}$ (Evaporation Rates) from Glass (a) as a Function of Temperature, Drop Size and Flow Rate, Tunnel, and % Sulfur Mustard Recovered (b) Residuals 20

TABLES

1. Comparison of 000+ Data (e) to 000- Data from the Other Tunnels Based on the Student 't' Test 14

2. Parameter Estimates from the Least Squares Fit for 000- and 000+ Data 15

3. Comparison of Means for Four Wind Tunnels Based in the Student 't' Test 16

4. Parameter Estimates of the Major Factors for the Evaporation Rate of CASARM Grade Sulfur Mustard from Glass 19

5. Parameter Estimates of the Major Factors for the $\log_{10}$(Evaporation Rate) of CASARM Grade Sulfur Mustard from Glass 20

BIANK PAGE

Blank

EVAPORATION RATES OF CHEMICAL WARFARE AGENTS USING 5-CM WIND TUNNELS I. CASARM SULFUR MUSTARD (HD) FROM GLASS

1. INTRODUCTION

The evaporation rate of the vesicant chemical warfare (CW) agent sulfur mustard (bis(2-chloroethyl)sulfide, $(ClCH_2CH_2)_2S$, abbreviated H for munitions grade and HD for CASARM grade) from glass was determined as a prelude to measurements from the operationally relevant substrates concrete and sand. The inability to control outdoor temperature and wind speeds, coupled with the requirement for large amounts of agent and personnel, led to the need for evaporation experiments in a controlled environment, thus, the wind tunnels were designed. The measurement of 97% pure agent from a non-porous, non-interacting surface allowed for a comparison of the wind tunnels and a test of the agent detection methods used.

In this work, the vapor flux of CASARM grade HD evaporating from glass surfaces was measured as a function of drop size, temperature, and flow rate using four previously-designed laboratory-sized wind tunnels[1] from which the vapors were quantitatively collected using thermal desorption tubes. Reports that document the wind tunnel characteristics and comparisons to other wind tunnels have been published.[2,3] In addition, video cameras were used to show that the loss of HD vapor was coincident with the disappearance of the droplet.[4] This report describes how the data were analyzed and demonstrates the robustness of the set of data that will be passed to the modelers.

2. EXPERIMENTAL PROCEDURES

2.1 Wind Tunnel

The 5-cm wind tunnels used in these experiments have been described previously (Figure 1).[5] To expose the agent to the wind flow, the piston was removed, and the test substrate (a 1.5 in. diameter circle) with the droplet of agent on it was placed on the piston and inserted into the wind tunnel. The humidified, temperature-controlled air from a Miller-Nelson Environmental Control Unit (ECU) (Monterey, CA) (tunnel a) or an Aalborg MFC (Orangeburg, NY) (tunnels c, d, k, l) was then passed over the sample, and the vapors were collected on thermal desorption tubes at the vapor sampling inlet. The amount of agent on each tube was measured based upon a standard in the GC/MS. The sample volume and tunnel airflow rate were known, thus, the agent concentration (mg/m^3) and evaporation rate (microgram/minute) could be calculated. The rates were not calculated for the initial 5 min of the experiment, before the instrumentation had reached equilibrium, nor at the end of the experiment, when the concentration of mustard was nearing a plateau. Hence, the middle of the concentration data was used to calculate the evaporation rates.

Airflows were 18-, 181- and 405- standard liters per minute (SLPM), which resulted in measured velocity values at a 1-cm height of 0.22, 1.7 and 3.6 m/s. For additional information on how to scale the 5-cm wind tunnel data to outdoor data see the reports by Weber et al.[1,2,3] The flow volume per thermal desorption tube was typically 2 to 10 L volume, and the

tubes were automatically switched using a proprietary Versatile Tube Sampler. The rate at which the tubes were switched was adjusted based upon the evaporation rate of the agent. The air and substrate temperatures were 15, 35, and 50 °C, and the droplet sizes were 1, 6, and 9 µL, corresponding to contamination densities of approximately 1.3, 7, and 11 g/m^2.

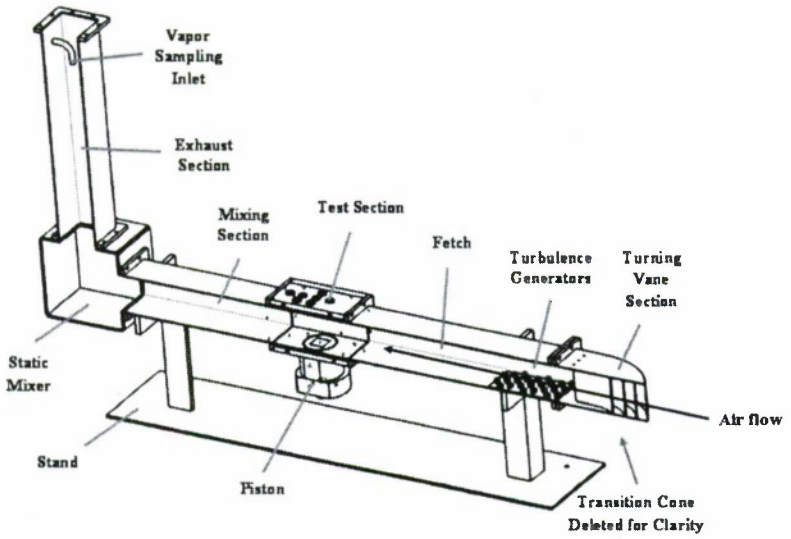


Figure 1. Schematic of the 5-cm Laboratory Wind Tunnel[5]

2.2 Agent

Sulfur mustard, [bis(2-chloroethyl)] sulfide, $(ClCH_2CH_2)_2S$, is commonly abbreviated H for munitions grade and HD for distilled. Distillation removes the impurities that are commonly present in munitions grade mustard: Q (sesquimustard, bis(2-chloroethylthio) ethane, $ClCH_2CH_2SCH_2CH_2SCH_2CH_2Cl$, 10.1%) the cyclic ether 1,4-dithiane, $[S(CH_2CH_2)_2S$, 3.2%], 1,2-dichloroethane (2.6%) and 4-chlorobutyl 2-chloroethyl sulfide (1.0%) and 16 other analytes (totaling 3.9%). **Caution: sulfur mustard is a potent vesicant, and care must be taken to prevent exposure to liquid or vapor. It should only be manipulated by trained personnel employing appropriate engineering controls and personal protective equipment.**

2.3 Gas Chromatography/Mass Spectrometry Detection (GC/MSD)

The GC/MSD analysis of the thermal desorption tubes was performed on a Markes UNITY/ULTRA Thermal Desorption system connected to an Agilent Technologies 6890N GC / 5973 MSD equipped with a 30m X 0.25mm HP-5 capillary column (Agilent Technologies, Wilmington, DE). The thermal desorption tubes used were Markes Tenax thermal desorption tubes (Markes International, Llantrisant, UK, Part #C0102S). Each sample was pre-purged for 1 min then desorbed for 2.5 min at 250 °C. The transfer line to the GC was heated to 180 °C. The GC oven temperature profile was ramped from 75 °C (2 min), to 110 °C at 20/min, to 290 °C at 80 °C/min. The column flow rate (at 75 °C) was 1.6 mL/min (46 cm/sec) at a constant pressure of 15 psi. The injection temperature was 250 °C; MSD transfer line 180 °C;

MSD quad 150 °C; and MSD source at 230 °C. The sample extracts were analyzed in the electron impact (EI) mode scanning from 30-300 amu, with 2.78 scans/sec. Under these conditions, HD eluted at ~2 min (Figure 2). Sulfur mustard and a breakdown ion were seen in the mass spectrum (Figure 3).

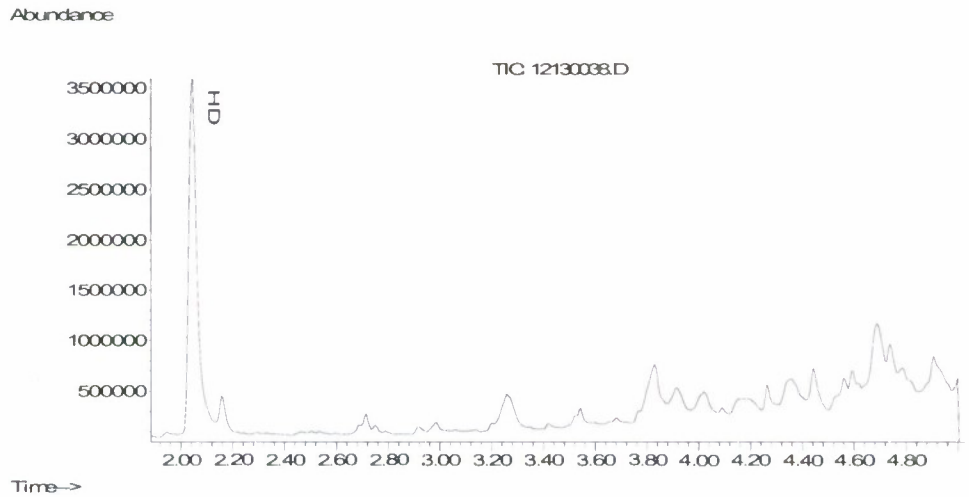


Figure 2. Gas Chromatogram of Sulfur Mustard

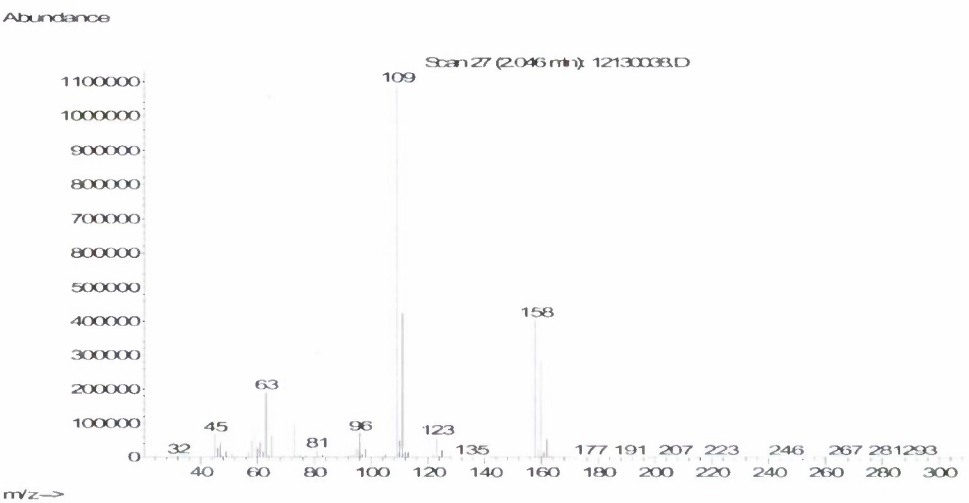


Figure 3. Mass Spectrum of Sulfur Mustard (m/z = 160 and 158) and the First Breakdown Ion (m/z = 111 and 109)

2.4 Substrates

The glass slides used in the wind tunnels were Schott Borofloat glass 1.45" ± 0.050 diameter x 0.7 mm thick (Valley Design Corporation, Santa Cruz, CA). The glass slides were washed in laboratory detergent, (Sparkleen® Biodegradable Laboratory Detergent

from Fisher), thrice rinsed with deionized water, submerged in nitric acid for 24 hr (EMD), rinsed with deionized water, dried with a paper towel (Kimwipes® EXL), rinsed with hexane (EMD OmniSOLV HR-GC Hexanes), and re-dried with a Kimwipe®.

2.5 Experimental Design and Data Analysis

The experimental design was generated, and the data were analyzed using JMP® Statistical Discovery Software (Cary, NC). There were three variables: temperature, drop size, and airflow rate at three levels each. Measuring all combinations of these levels would yield 27 conditions (3 x 3 x 3). The cubic composite design chosen required nine conditions, which can be described as the vertices of a cube and the body mid-point. The data were collected in triplicate as two blocks of four vertices (chosen as the corners of a tetrahedron) and the mid-point. This collection of data would allow for the determination of the major contributing variables and cross-variables. The substrate temperature (°C), droplet mass (mg), airflow (SLPM), total percent HD recovered and tunnel identity (five similar 5-cm tunnels were available) were defined as variables that may affect the raw evaporation rate. Cross factors between droplet mass, airflow and temperature were included.

3. RESULTS

The evaporation profiles for HD on glass varied greatly as a function of drop size, airflow, and temperature (Figure 4). The variables of the samples were coded in terms of (+-0-), where +, 0, - represented the high, middle, and low set points for the variables, and the order was (temperature - drop size - airflow rate - %RH). The evaporation profiles were generated by collecting the HD on the thermal desorption tubes over a period of time (minutes) and dividing the amount of HD collected (milligrams) by the volume of air that had passed through the tube during that period of time (in m^3) to give a mustard concentration in the air in milligrams per cubic meter. An additional representation of the data was derived by computing the %HD remaining by subtracting the amount of agent on the thermal desorption tube from the initial droplet mass (which was corrected for the purity of the HD, Figure 5a). This gave a curve of %HD remaining versus time, which could also be converted into a curve of milligrams HD versus time (equivalent to a TGA curve, Figure 5b). The slope for this curve was computed during the linear portion and was used as the evaporation rate (Figure 5b). A summary sheet that includes the tunnel conditions, evaporation profile, %HD remaining, and the raw concentration data was made for each sample (see Appendix I, Table AI-1).

The percentage mustard recovered and the evaporation rates were calculated for each sample. It was observed that the %HD recovered was often not 100%. This was attributed to loss of agent during the first few minutes when the agent was being placed into the wind tunnel, and random variation. Thus, an adjusted evaporation rate was calculated by dividing the raw evaporation rate by the %HD recovered. Whereas the average raw and adjusted evaporation rates were similar, the adjusted evaporation rates generally had a much lower standard deviation than did the raw data (see Appendix I, Table I-1).

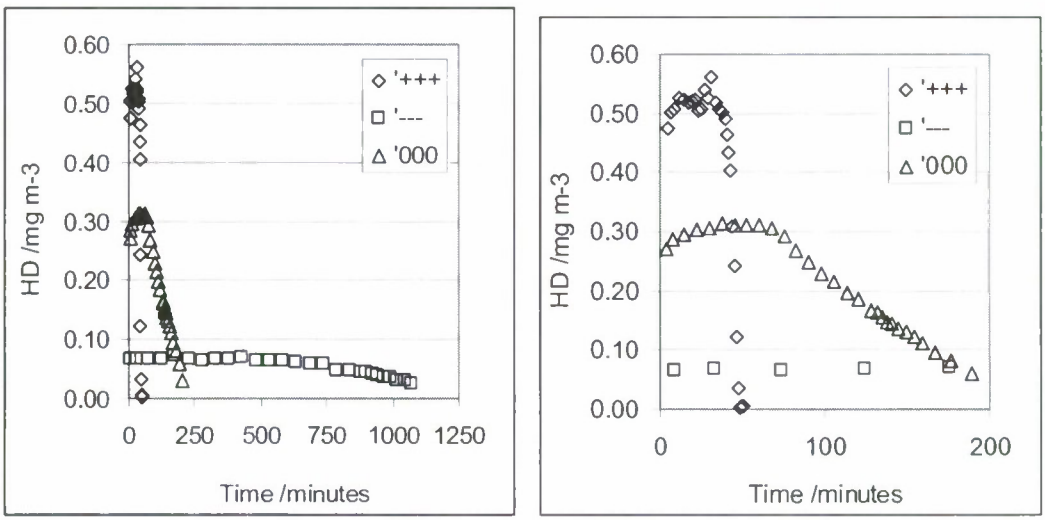
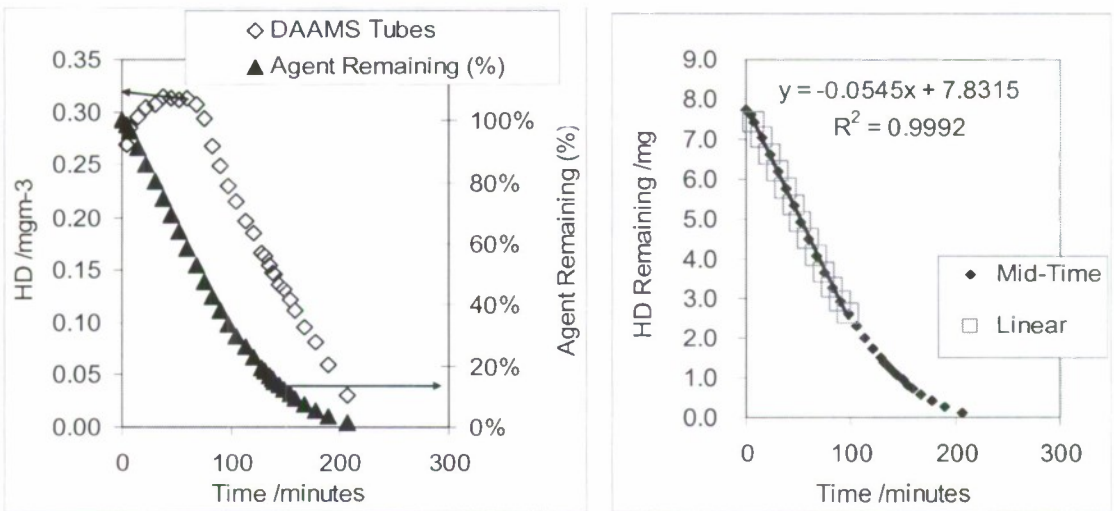


Figure 4. Evaporation Profiles for Sulfur Mustard from Glass at the Highest (+++, ◇), Mid-point (000, △) and Lowest (---, □) Wind Tunnel Settings



a. b.

Figure 5. Evaporation Data Expressed in Three Methods: (a) Concentration (◇mg m^{-3}), %HD Remaining (▲) and (b) mg HD Remaining (◆) and the Points used to Calculate the Evaporation Rate (□)

3.1 Effect of Moisture

Prior to comparing all of the data, preliminary tests to measure the effect of relative humidity (RH) and a comparison of all four tunnels (two sub-ambient and two high temperatures) were performed. The effect of moisture was evaluated by comparing 000- and 000+ data. This was done in two manners; by comparing the averages on a per-tunnel basis, and by using the %RH as a continuous variable. Using the per-tunnel method and comparing the means (in which the 000+ runs were labeled 'e' yet run in tunnel 'a') showed that humidity did

make a statistically significant difference (Figure 6 and Table 1) for three out of four statistical methods used.[i] The interpretation of Table 1 is that tunnels not connected by same letter were significantly different. Hence, c and e were not statistically significantly different, whereas e was statistically significantly different from tunnels a, k and l. (note - there were no 000 runs for tunnel d). In Figure 6, the data points are shown as dots; the 95% confidence interval is shown by the diamond. The colored circles in Figure 6 provide a visual depiction of whether or not two sample means are significantly different; circles that are nested or intersect greatly indicate that the sample means are not significantly different. The gray circles are significantly different from the red circles. The size of the circle represents the 95% confidence interval.

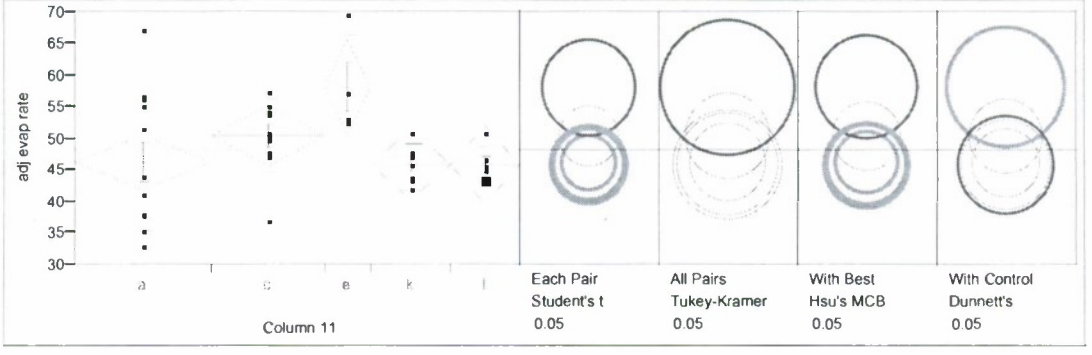


Figure 6. Comparison of 000+ Data (e) to 000- Data from the Other Tunnels

Table 1. Comparison of 000+ Data (e) to 000- Data from the Other Tunnels Based on the Student 't' Test

Tunnel	Statistical Grouping	Statistical Grouping	Mean
e	A		58.18
c	A	B	50.45
a		B	46.28
k		B	45.96
l		B	45.85

Tunnels not connected by same letter are significantly different

The other method consisted of adding the %RH for each run as a continuous variable, and performing a least squares fit with temperature, drop size, %HD remaining and %RH. With this treatment, $r^2 = 0.91$, $r^2_{adj} = 0.89$,[ii] and the significant factors for the evaporation

[i] The explanations of the various tests and the assumptions made therein may be found in the JMP® Statistics and Graphics Guide Version 5, SAS Institute Inc., Cary, NC, pp 105-109.

[ii] r^2_{adj} uses the degrees of freedom, and is useful for comparing datasets that have different sizes. The explanations of the various tests and the assumptions made therein may be found in the JMP® Statistics and Graphics Guide Version 5, SAS Institute Inc., Cary, NC, p 186.

rate were drop size and %HD remaining; the %RH was not a significant factor (Figure 7 and Table 2). Thus, in the analysis of the entire set of 150 points, which employed a least-squares method, the 000+ and 000- data were both treated as 000; a comparison of the least squares regression without the 000+ (i.e., 146 points) showed that the numerical results were not significantly affected by the deletion.

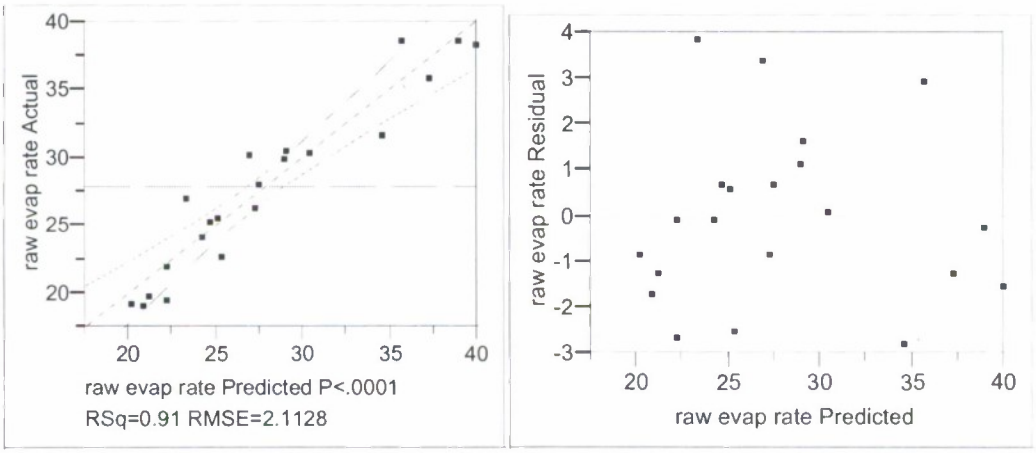


Figure 7. (a) Least Squares Fit for 000- and 000+ Data (b) Residuals

Table 2. Parameter Estimates from the Least Squares Fit for 000- and 000+ Data

Term	Estimate	Std Error	Prob>|t|
Intercept	51.16	33.44	0.1455
temp	-1.02	0.944	0.2969
drop size	3.29	0.9034	0.0022
%HD remaining	-0.36	0.033	<.0001
%RH	0.039	0.025	0.1413

3.2 Variability between Tunnels

The variability between the different tunnels was evaluated from the 000- set of data using various statistical methods to compare the means. The Student t-test and Hsu's method (Figure 8, Table 3) showed that tunnels a and c were statistically significantly different; the Tukey-Kramer and Dunnett's test did not.[iii] Thus, the tunnel identity was retained as a variable in the analysis of the data.

[iii] The explanations of the various tests and the assumptions made therein may be found in the JMP® Statistics and Graphics Guide Version 5, SAS Institute Inc., Cary, NC, pp 105-109.

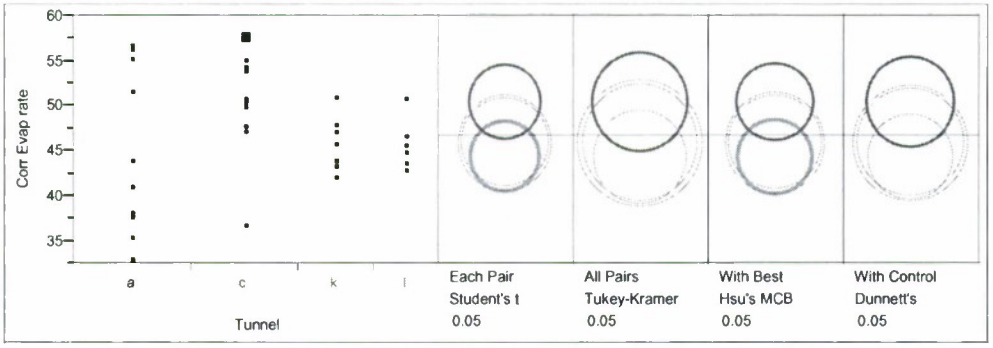


Figure 8. Comparison of Evaporation Rates from the Wind Tunnels Using Four Different Methods.

Table 3. Comparison of Means for Four Wind Tunnels Based on the Student 't' Test

Tunnel*	Statistical Grouping	Statistical Grouping	Mean
c	A		50.45
k	A	B	45.96
l	A	B	45.85
a		B	44.36

*Tunnels not connected by same letter are significantly different

3.3 Percentage HD Recovered

The recovery rates for sulfur mustard evaporation from glass were measured from the amounts of agent present on the thermal desorption tubes, which were calibrated daily using a 1-point continuing calibration verification (CCV) with a 15% tolerance. The %HD recovered averaged 86% with 90% of the data betwecn 82 and 91% recovered; the full range was 0 to almost 200% (Figure 9). Given the tolerance on the CCV and the complexity of the instrumentation, all data were included in the analysis unless the least squares analysis indicated that they were 'outliers' – which was only the case for 3 of the 153 samples.

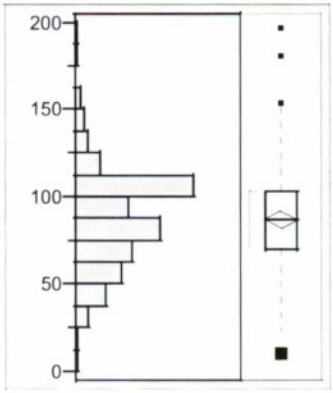


Figure 9. Distribution of the Percentage HD Recovered

3.4 Analysis of the Entire Dataset

The average adjusted evaporation rates of HD on glass are depieted as a eube plot (Figure 10). The evaporation rate inereased with temperature (°C), initial droplet mass (mg) and wind speed (in standard liters per minutes, SLPM); the data used are listed in Table A1.

A least squares fit of the data, whieh eonsisted of 150 evaporation rates at 22 different conditions, had an $r^2 = 0.86$ and $r^2_{adj} = 0.85$, (Figure 11) and yielded the parameter estimates shown in Table 4. In other words, the evaporation rate of H from glass in a given tunnel may be ealeulated from eq 1:

Raw evaporation rate = (1)
-189.4 + (3.52 * "Temperature /C") + (4.95 * "drop mass /mg") + (0.184 * SLPM)
+ (0.551 * "%HD reeovery")
+ Mateh(Tunnel, "a" -13.489; "e" -12.63; "d" 30.55; "k" -2.90)
+ [("Temperature /C"- 37.67) * ("drop mass /mg" - 6.99) * 0.274]
+ [("drop mass /mg") - 6.99) * (SLPM - 160.42) * 0.017]
+ [("Temperature /C" - 37.67) * (SLPM - 160.42) * 0.0073]

In the least squares fit, the raw evaporation rates and the %HD recovered were used, rather than the adjusted evaporation rates. The residual plot indieated that there were no major outlying points. The predieted values and standard deviation for eaeh sample are listed in Appendix I, Table I-2. All of the faetors exeept tunnel e and tunnel k had a Prob>|t| that was <0.0001, indieating that these faetors were signifieantly eontributing to the fit; tunnel l was the tunnel to which the others were compared. Tunnel c was also significant (Prob>|t| = 0.0003), yet tunnel k was not.

There was suffieient HD on glass data to test the model by splitting the data into two sets (a modeling set and a validation set). The model was run with the modeling set of data, and the predieted evaporation rates for the validation set of data were correctly ealculated. Likewise, the data was split into one set that eontained the vertiees and mid-point, and another set that eontained the balance. The parameters ealeulated were similar to those obtained by using all 150 data points. Excluding the top two and bottom outliers for %HD reeovered (Figure 9) resulted in an increase in r^2 of 0.01% and did not change the predieted values significantly. The ability to get similar predieted values of the raw evaporation rate by splitting the data into different sets illustrates the robustness of the data.

Although the predicted vs. aetual plot in Figure 11a has $r^2 = 0.86$, it does exhibit a slight curvature at the higher evaporation rates. Thus, the data were fit using the $\log_{10}$ of the raw evaporation rate. This resulted in a better straight line fit with $r^2 = 0.91$ (Figure 12), and eross faetors were not important. The parameter estimates are given in Table 5. The justifieation for thc use of a logarithmie fit may be found in Navaz et al.[6] Thus, the $\log_{10}$(evaporation rate) may be ealeulated using eq 2:

$\log_{10}$(evaporation rate) = -0.469 + (0.0249 * "Temperature /C") (2)
+ (0.0502 * "drop mass /mg") + (0.00147 * SLPM) + (0.0051* "%HD recovery")
+ Match(Tunnel, "a", 0.0238, "c", 0.0189, "d", -0.284, "k", 0.154)

4. CONCLUSIONS

A robust set of 150 wind tunnel experiments was generated from the evaporation of sulfur mustard (HD) on glass using the 5-cm wind tunnels coupled to thermal desorption tubes that were analyzed using gas chromatography/mass spectrometry detection (GC/MSD). Differences between the tunnels were noted for which the least squares analysis of the raw evaporation rate and $\log_{10}$(raw evaporation rate) could account. The factors that were initially determined - temperature, airflow, and drop size - were significant contributors to the concentration of HD vapors; humidity was not a major factor.

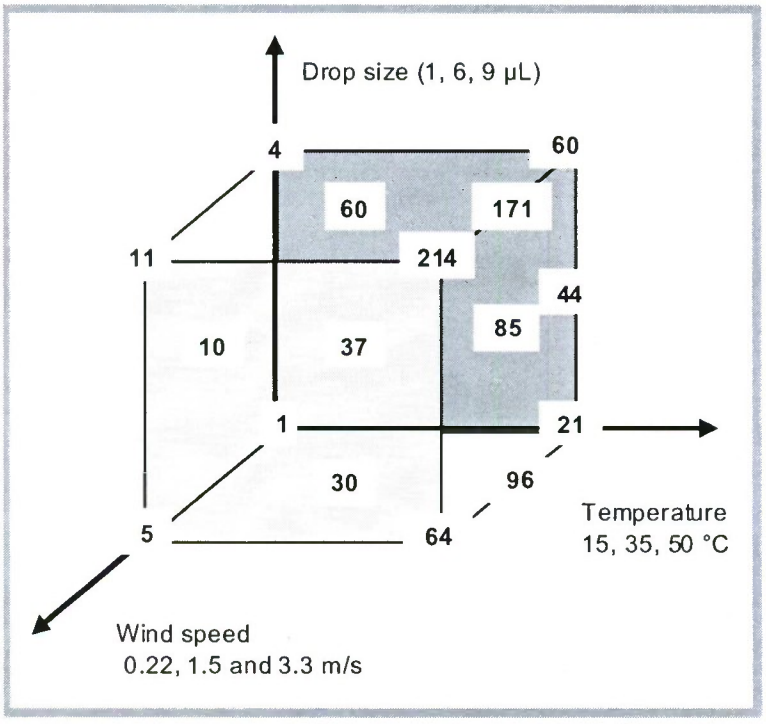


Figure 10. Cube Plot of the Adjusted Evaporation Rates of CASARM Sulfur Mustard from Glass as a Function of Temperature, Drop Size, and Airflow Rate

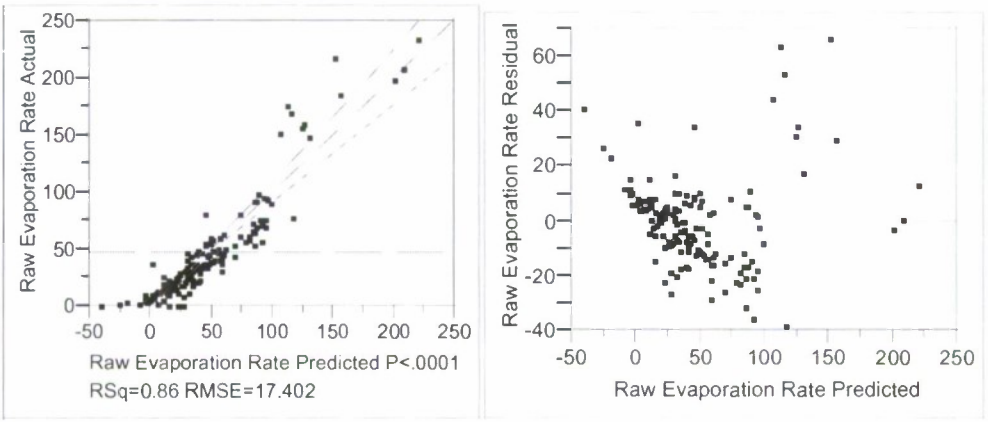


Figure 11. Model Fit for CASARM HD Evaporation Rates from Glass (a) as a Function of Temperature, Drop Size and Flow Rate, Tunnel, and %Sulfur Mustard Recovered (b) Residuals

Table 4. Parameter Estimates of the Major Factors for the Evaporation Rate of CASARM Grade Sulfur Mustard from Glass

Term	Estimate	Std Error	Prob>|t|
Intercept	-189.4	10.5	<.0001
Temperature/°C	3.52	0.224	<.0001
drop mass/mg	4.95	0.525	<.0001
SLPM (airflow rate)	0.184	0.0135	<.0001
(Temperature/°C-37.67)*(drop mass /mg-6.99)	0.274	0.0344	<.0001
(Temperature/°C-37.6711)*(SLPM-160.42)	0.0073	0.000902	<.0001
(drop mass/mg-6.99)*(SLPM-160.42)	0.017	0.003425	<.0001
%HD recovery	0.551	0.0516	<.0001
Tunnel[a]†	-13.48	2.89	<.0001
Tunnel[c]†	-12.63	3.42	0.0003
Tunnel[d]†	30.55	5.89	<.0001
Tunnel[k]†	-2.90	4.14	0.4842

†Compared to tunnel l.

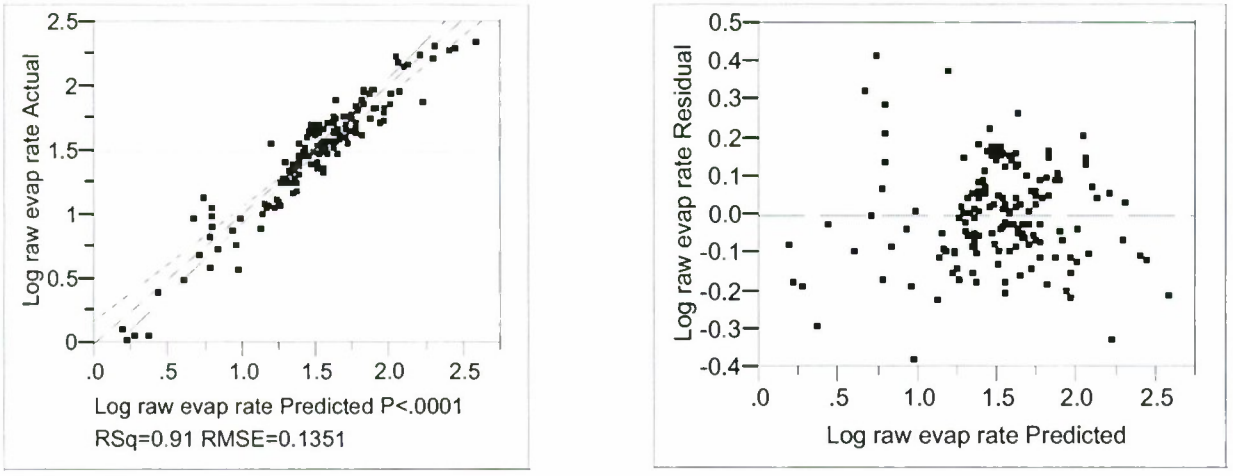


Figure 12. Model Fit for CASARM HD $\log_{10}$(Evaporation Rates) from Glass (a) as a Function of Temperature, Drop Size and Flow Rate, Tunnel, and %Sulfur Mustard Recovered (b) Residuals

Table 5. Parameter Estimates of the Major Factors for the $\log_{10}$(Evaporation Rate) of CASARM Grade Sulfur Mustard from Glass

Term	Estimate	Std Error	Prob>|t|
Intercept	-0.469	0.0816	<.0001
Temperature /°C	0.0249	0.00174	<.0001
drop mass /mg	0.0502	0.00407	<.0001
SLPM	0.00147	0.000102	<.0001
%HD recovery	0.00510	0.000401	<.0001
Tunnel[a]	0.0238	0.0224	0.2907
Tunnel[c]	0.0189	0.0265	0.4776
Tunnel[d]	-0.284	0.0457	<.0001
Tunnel[k]	0.154	0.0321	<.0001
(Temperature /C-37.6711)*(drop mass /mg-6.99195)	0.000244	0.000268	0.3633
(drop mass /mg-6.99195)*(SLPM-160.42)	0.0000108	0.000027	0.6856
(Temperature /C-37.6711)*(SLPM-160.42)	0.000009	0.000007	0.1988

LITERATURE CITED

[1] Weber, D.J.; Scudder, M.K.; Moury, C.S.; Shuely, W.J.; Molnar, J.W.; Miller, M.C. *Development of the 5-cm Agent Fate Wind Tunnel*; ECBC-TR-327; U.S. Army Edgewood Chemical Biological Center: Aberdeen Proving Ground, MD, 2006; UNCLASSIFIED Report (AD-A462 884).

[2] Danberg, J. *Evaluation of 5-cm Agent Fate Wind Tunnel Velocity Profiles*; ECBC-CR-091; U.S. Army Edgewood Chemical Biological Center: Aberdeen Proving Ground, MD, 2007; UNCLASSIFIED Report (AD-A472 909).

[3] Weber, D.J.; Scudder, M.K.; Moury, C.S.; Shuely, W.J.; Molnar, J.W.; Danberg, J.F.; Miller, M. *Velocity Profile Characterization for 5-cm Agent Fate Wind Tunnel*; ECBC-TR-567; U.S. Army Edgewood Chemical Biological Center: Aberdeen Proving Ground, MD, 2007; UNCLASSIFIED Report (AD-A476 518).

[4] Savage, J.J.; D'Onfrio, T.G.; Durst, H.D.; Kilpatrick, W. *Environmental Fate of Chemical Agents*; ECBC-TR-532; U.S. Army Edgewood Chemical Biological Center: Aberdeen Proving Ground, MD, 2007; UNCLASSIFIED Report (AD-B333 475).

[5] Weber, D.J.; Scudder, M.K.; Moury, C.S.; Donnelly, T.; Park, K.; D'Onofrio, T.G.; Molnar, J.W.; Shuely, W.J.; Nickol, R.G.; King, B.; Danberg, J.; Miller, M.C. Micro Wind Tunnel for Hazardous Chemical Fate Studies. In *Proceedings of the 45th AIAA Conference*; AIAA-2007-0960; AIAA, Reston, VA, 2007; UNCLASSIFIED Report.

[6] Navaz, H. K.; Chan, E.; Markicevic, B. Convective Evaporation of Sessile Droplets in a Turbulent Flow – Comparison with Wind Tunnel Data. *International Journal of Thermal Sciences* **2008,** *47*, pp 963-971.

BLANK PAGE

Blank

APPENDIX I

ENVIRONMENTAL FACTORS AND EVAPORATION RATES FOR INDIVIDUAL EXPERIMENTS

Table I-1. Wind Tunnel Variables and Evaporation Rates

run #	TMAH	Temp (°C)	drop mass (mg)	Airflow (SLPM)	%HD mass recov	raw evap rate	adj evap rate	tunnel	avg raw evap	avg adj evap	stdev raw	stdev adj
3a81	+-0-	50.1	1.35	182	71.4	44.4	62.2	a				
3c47	+-0-	50	1.21	182	68	30.4	44.7	c				
3k019	+-0-	49.8	1.29	182	76.8	81	105.5	k				
3l018	+-0-	50.7	1.29	182	182.6	152	83.2	l				
3k020	+-0-	51.3	1.29	182	198.7	170	85.6	k	**95.56**	**76.23**	**62.85**	**23.36**
3a05	000-	35.8	7.13	181	89.5	31.8	35.5	a				
3a06	000-	36	7.07	181	93.9	38.7	41.2	a				
3a07	000-	35.4	7.05	181	101.3	38.7	38.2	a				
3a15	000-	34.9	5.2	181	77	25.4	33.0	a				
3a16	000-	35	7.21	182	101.8	38.5	37.8	a				
3a21	000-	35	7.12	182	94.8	36	38.0	a				
3c128	000-	35.9	8.1	180	59.5	30.3	50.9	c				
3k001	000-	35.1	7.75	181	70.3	30.5	43.4	k				
3c129	000-	34.7	7.9	181	59.6	28.2	47.3	c				
3k002	000-	34.6	7.75	182	60	26.4	44.0	k				
3c130	000-	34.3	8.16	182	60.2	30.1	50.0	c				
3k003	000-	34.2	7.75	182	64	30.7	48.0	k				
3c135	000-	35.3	8.09	182	50.5	24.2	47.9	c				
3k008	000-	34.7	7.75	182	54.3	25.7	47.3	k				
3a097	000-	34.8	8.12	182	51.7	22.8	44.1	a				
3l005	000-	35.1	7.75	182	46.4	21.7	46.8	l				
3c146	000-	35.2	8.13	182	38.3	19.3	50.4	c				
3l008	000-	34.8	7.75	182	42.5	19.1	44.9	l				
3l009	000-	35	7.75	182	42.9	18.8	43.8	l				
3a143	000-	34.8	7.91	182	86.6	49.2	56.8	a				
3c180	000-	35	8.01	181	101.7	54.9	54.0	c				
3a144	000-	34.8	7.92	182	98.5	54.5	55.3	a				
3c181	000-	34.3	8.14	181	108.6	59.1	54.4	c				
3a145	000-	34.7	7.96	182	70.3	47.3	67.3	a				
3c182	000-	34.6	7.75	182	99.9	55.1	55.2	c				
3k042	000-	34.7	7.75	182	67.4	34.4	51.0	k				
3l040	000-	35.2	7.75	182	64	32.6	50.9	l				
3a146	000-	34.8	7.75	182	92.7	47.9	51.7	a				
3c183	000-	34.7	7.93	182	106	60.9	57.5	c				
3k043	000-	35	7.75	182	107.1	45.2	42.2	k				
3l041	000-	35	7.75	182	120	54.8	45.7	l				
3a147	000-	34.9	7.56	182	72.9	41.1	56.4	a				
3c184	000-	34.9	5.5	182	86.2	31.8	36.9	c				
3k044	000-	35	7.61	182	109.8	50.3	45.8	k				
3l042	000-	35.1	7.61	182	101.1	43.5	43.0	l	**37.13**	**47.33**	**12.47**	**7.33**
3a099	000+	35.9	8.06	182	41.43	22.1	53.3	a				
3a101	000+	34.3	8.03	182	39.1	27.2	69.6	a				
3a103	000+	34.9	8.04	182	34.7	19.9	57.3	a				
3a104	000+	34.8	8.06	182	37.3	19.6	52.5	a	**22.20**	**58.20**	**3.51**	**7.86**
3a001	00--	35.2	7.08	14.9	61.9	10.5	17.0	a				
3a002	00--	36.5	7.17	14.6	75.3	13.7	18.2	a				
3a003	00--	35.1	7.06	15	85.6	13	15.2	a				
3a004	00--	35.1	7.23	14.6	97.6	23.1	23.7	a				

Table I-1. Wind Tunnel Variables and Evaporation Rates (Continued)

3a008	00--	35	7.13	13.9	105.9	20.2	19.1	a				
3a009	00--	35.2	7.13	14	106.3	19.7	18.5	a				
3a010	00--	35.4	7.17	14.2	110	26.9	24.5	a				
3a011	00--	35.2	7.16	14.1	103.6	18.6	18.0	a				
3a014	00--	36.1	7.08	14	106.7	24.8	23.2	a				
3a037	00--	34.7	7.12	18	110.1	15.8	14.4	a				
3c002	00--	35.8	7.13	18	57.6	8.1	14.1	c				
3a038	00--	34.2	7.26	18.1	104.6	15.5	14.8	a				
3c004	00--	35.6	7.29	18	139	23.5	16.9	c				
3c005	00--	35	7.11	18	128.1	26.2	20.5	c				
3a041	00--	33.9	7.22	18	77.6	37.3	48.1	a				
3c006	00--	35	7.12	18	80.7	11.8	14.6	c				
3l007	00--	35.2	7.75	18.7	10.1	3.9	38.6	l	**18.39**	**21.13**	**8.19**	**9.12**
3a068	0+0-	34.9	11.68	181	141	92	65.2	a				
3c030	0+0-	35.11	11.68	182	155.2	94.1	60.6	c				
3c075	0+0-	35.3	11.53	161	73.5	44.3	60.3	c				
3c037	0+0-	35.7	11.4	182	76.8	41.2	53.6	c				
3a076	0+0-	35.3	11.48	182	83	48.2	58.1	a				
3c038	0+0-	34.2	11.37	182	71.9	38.6	53.7	c	**59.73**	**58.59**	**26.01**	**4.47**
3a019	00+-	35.6	7.37	432	101.8	56.8	55.8	a				
3a020	00+-	35.3	7.15	432	113.5	77	67.8	a				
3c145	00+-	35.1	8.12	405	43.1	30.9	71.7	c	**54.90**	**65.11**	**23.11**	**8.29**
3k017	0-0-	33.9	1.29	181	110.7	32.3	29.2	k				
3l015	0-0-	35.2	1.29	181	115.2	34.5	29.9	l				
3k018	0-0-	34.8	1.29	181	120	45.3	37.8	k				
3l016	0-0-	35.2	1.29	181	130.6	44.1	33.8	l				
3k021	0-0-	35.2	1.29	181	103.5	34.7	33.5	k				
3l019	0-0-	36.5	1.29	182	102	37.2	36.5	l				
3a66	0-0-	35.1	1.31	182	92	13.9	15.1	a				
3c21	0-0-	35.2	1.37	182	81.2	12.4	15.3	c				
3a74	0-0-	35.9	1.38	182	72.5	11.9	16.4	a	**29.59**	**27.49**	**13.36**	**9.33**
3d009	-00-	15.1	7.8	182	31.4	2.6	8.3	d				
3d027	-00-	15.5	7.72	182	100.7	10.3	10.2	d				
3d031	-00-	15.5	7.58	182	89.6	14.2	15.8	d				
3d034	-00-	14.9	7.6	182	102.8	11.9	11.6	d				
3d036	-00-	15.2	7.62	181	77.8	9.8	12.6	d				
3d074	-00-	15.6	5.61	181	118.6	8.6	7.3	d	**9.57**	**10.96**	**3.92**	**3.11**
3d006	----'	15.6	1.7	18.1	73.1	1.3	1.8	d				
3d024	----'	15.4	1.3	18.1	92.4	1.2	1.3	d				
3d022	----'	15.1	1.23	18.1	84.9	1.1	1.3	d	**1.20**	**1.46**	**0.10**	**0.28**
3c028	+00-	49.8	7.81	182	113.9	177	155.4	c				
3a073	+00-	49.6	7.52	182	87.5	96.5	110.3	a				
3c032	+00-	48.9	7.56	182	77.7	93.4	120.2	c				
3a077	+00-	50.1	7.7	182	80	96.7	120.9	a				
3c040	+00-	49	7.69	182	68.3	67.5	98.8	c				
3a080	+00-	50.3	7.42	182	72.9	99.4	136.4	a				
3c046	+00-	50.5	7.67	182	70.3	76.4	108.7	c				
3c136	+00-	49.9	8.1	181	57.4	73	127.2	c				
3k009	+00-	50.9	7.75	182	57.3	70.6	123.2	k				
3c138	+00-	50.1	8.09	182	51	59.4	116.5	c				
3k011	+00-	49.7	7.75	181	60.1	71.1	118.3	k				
3c140	+00-	49.7	7.91	182	54.3	62.1	114.4	c				

Table I-1. Wind Tunnel Variables and Evaporation Rates (Continued)

3c142	+00-	49.2	7.95	181	46.4	61.7	133.0	c				
3l013	+00-	50.5	7.75	182	63.5	91.1	143.5	l	**85.42**	**123.3**	**29.99**	**14.85**
3a031	+0--	48.8	7.22	18	99.7	40.1	40.2	a				
3a032	+0--	48.5	6.98	18	102.4	48.4	47.3	a				
3a033	+0--	50	7.13	18	103.2	51.3	49.7	a				
3a034	+0--	48.3	7.32	18	95.2	38.5	40.4	a				
3a035	+0--	48.3	7.09	18	94.3	34.1	36.2	a				
3c007	+0--	47.6	7.18	18	100.8	39.2	38.9	c				
3c009	+0--	48.6	7.21	18	113.5	37.9	33.4	c				
3c011	+0--	48.4	7.37	18	101.4	41.1	40.5	c				
3a051	+0--	50.7	7.84	18.1	100	47.4	47.4	a				
3a053	+0--	50.5	7.145	18.1	100	41.7	41.7	a				
3a054	+0--	51	7.197	18.1	100	60	60.0	a				
3a056	+0--	51.2	7.61	18.1	100	63.3	63.3	a				
3c012	+0--	48.2	7.02	18	118.4	47.4	40.0	c				
3c013	+0--	48.4	7.41	18	83	35	42.2	c				
3c014	+0--	48.65	7.25	18	92.4	46.1	49.9	c				
3c015	+0--	48.8	7.24	18	70.7	36.1	51.1	c				
3a055	+0--	51.1	7.58	18	60.2	37.6	62.5	a	**43.84**	**46.15**	**8.40**	**8.99**
3c016	+0x-	50.3	7.78	50.2	108.7	81.9	75.3	c				
3c052	+0+-	49.7	7.59	406	80.9	185.8	229.7	c				
3d011	--+-	14.9	1.4	403	23.7	1.2	5.1	d				
3d028	--+-	15.9	1.35	406	109.1	5.7	5.2	d				
3d033	--+-	15.1	1.37	406	87.5	5.1	5.8	d				
3d035	--+-	14.9	1.34	406	103.1	7	6.8	d	**4.75**	**5.73**	**2.50**	**0.78**
3d007	-+--	15.8	11.74	18	103.2	4.1	4.0	d				
3d023	-+--	15.6	10.08	18	81.8	3.2	3.9	d	**3.65**	**3.94**	**0.64**	**0.04**
3a061	+---	49	1.19	18	138	22.3	16.2	a				
3a064	+---	49.2	1.34	18	128.3	24.1	18.8	a				
3a084	+---	49.5	1.51	18	86.6	18.2	21.0	a				
3c050	+---	49.7	1.59	18	83.2	18.4	22.1	a	**20.75**	**19.52**	**2.92**	**2.63**
3c026	++0-	49.8	11.46	181	127.3	218	171.2	c				
3a079	++0-	50.7	11.45	182	81.8	148.7	181.8	c				
3c045	++0-	50.1	11.55	182	75.9	160.7	211.7	c				
3c051	++0-	49.7	11.37	182	81.3	156.8	192.9	c	**171.1**	**189.4**	**31.70**	**17.30**
3d010	-++-	15.1	11.71	405	46.9	9.9	21.1	d				
3d016	-++-	15.2	11.7	406	100	12.4	12.4	d				
3d017	-++-	15.1	11.58	406	37.4	7.9	21.1	d				
3d026	-++-	15.5	11.42	406	102.4	18.2	17.8	d				
3d032	-++-	15.3	11.49	406	81.1	12.9	15.9	d				
3d037	-++-	15.2	12.1	406	38.2	6	15.7	d	**11.22**	**17.34**	**4.31**	**3.40**
3c022	+-+-	50.3	1.21	398	151.8	78.7	51.8	c				
3c041	+-+-	49.8	1.28	404	95.7	54.6	57.1	c				
3c043	+-+-	50	1.32	405	80.4	57.4	71.4	c	**63.57**	**60.10**	**13.18**	**10.12**
3a063	++--	49.6	11.44	18	84.2	43.6	51.8	a				
3a083	++--	49.5	11.85	18	110	65.4	59.5	a				
3c049	++--	50	11.69	18	109.1	70.6	64.7	c	**59.87**	**58.65**	**14.33**	**6.50**
3c042	+++-	50	11.49	404	74.2	199	268.2	c				
3c044	+++-	50.1	11.38	405	108.5	233.9	215.6	c				
3c053	+++-	50.1	11.81	406	76.7	209.2	272.8	c	**214.0**	**252.2**	**17.95**	**31.78**

Table I-2. Results of Evaporation Rate Least Squares Fit

Code	TMAH	%HD recovery	Raw Evaporation Rate	Raw Predicted from all points	Std Err Pred from all points	Log raw evap rate	Pred Formula Log raw evap rate
3a81	+-0-	71.4	44.4	33.58	5.25	1.65	1.49
3c47	+-0-	68	30.4	31.13	5.50	1.48	1.46
3k019	+-0-	76.8	81	45.98	6.16	1.91	1.64
3l018	+-0-	182.6	152	107.49	7.67	2.18	2.13
3k020	+-0-	198.7	170	116.24	7.69	2.23	2.29
3a05	000-'	89.5	31.8	40.66	2.78	1.50	1.53
3a06	000-'	93.9	38.7	43.53	2.79	1.59	1.55
3a07	000-'	101.3	38.7	45.30	2.93	1.59	1.57
3a15	000-'	77	25.4	21.69	3.04	1.40	1.35
3a16	000-'	101.8	38.5	45.00	2.98	1.59	1.58
3a21	000-'	94.8	36	40.73	2.88	1.56	1.54
3c128	000-'	59.5	30.3	29.84	3.26	1.48	1.42
3k001	000-'	70.3	30.5	40.93	4.90	1.48	1.57
3c129	000-'	59.6	28.2	24.43	3.42	1.45	1.38
3k002	000-'	60	26.4	33.49	5.01	1.42	1.51
3c130	000-'	60.2	30.1	24.51	3.45	1.48	1.39
3k003	000-'	64	30.7	34.14	4.98	1.49	1.52
3c135	000-'	50.5	24.2	22.84	3.52	1.38	1.36
3k008	000-'	54.3	25.7	30.75	5.08	1.41	1.48
3a097	000-'	51.7	22.8	20.79	3.28	1.36	1.36
3l005	000-'	46.4	21.7	29.33	5.42	1.34	1.39
3c146	000-'	38.3	19.3	15.91	3.86	1.29	1.30
3l008	000-'	42.5	19.1	26.02	5.49	1.28	1.36
3l009	000-'	42.9	18.8	27.02	5.48	1.27	1.37
3a143	000-'	86.6	49.2	39.05	2.88	1.69	1.53
3c180	000-'	101.7	54.9	49.28	3.33	1.74	1.61
3a144	000-'	98.5	54.5	45.65	2.99	1.74	1.59
3c181	000-'	108.6	59.1	50.88	3.56	1.77	1.63
3a145	000-'	70.3	47.3	29.91	2.95	1.67	1.45
3c182	000-'	99.9	55.1	45.72	3.37	1.74	1.58
3k042	000-'	67.4	34.4	37.96	4.93	1.54	1.55
3l040	000-'	64	32.6	39.41	5.21	1.51	1.48
3a146	000-'	92.7	47.9	41.68	2.91	1.68	1.55
3c183	000-'	106	60.9	50.28	3.45	1.78	1.62
3k043	000-'	107.1	45.2	60.97	5.02	1.66	1.76
3l041	000-'	120	54.8	69.45	5.58	1.74	1.76
3a147	000-'	72.9	41.1	30.31	2.89	1.61	1.44
3c184	000-'	86.2	31.8	29.11	3.50	1.50	1.40
3k044	000-'	109.8	50.3	61.82	5.04	1.70	1.77
3l042	000-'	101.1	43.5	58.79	5.27	1.64	1.66
3a099	000+	41.43	22.1	19.23	3.52	1.34	1.33
3a101	000+	39.1	27.2	11.47	3.66	1.43	1.28
3a103	000+	34.7	19.9	11.47	3.78	1.30	1.27
3a104	000+	37.3	19.6	12.60	3.70	1.29	1.28
3a001	00--	61.9	10.5	-4.88	3.29	1.02	1.13
3a002	00--	75.3	13.7	5.86	2.94	1.14	1.23
3a003	00--	85.6	13	7.90	2.98	1.11	1.25

Table I-2. Results of Evaporation Rate Least Squares Fit (Continued)

3a004	00--	97.6	23.1	14.74	3.02	1.36	1.32
3a008	00--	105.9	20.2	18.77	3.11	1.31	1.35
3a009	00--	106.3	19.7	19.50	3.10	1.29	1.36
3a010	00--	110	26.9	22.14	3.14	1.43	1.38
3a011	00--	103.6	18.6	18.09	3.06	1.27	1.34
3a014	00--	106.7	24.8	21.85	3.00	1.39	1.38
3a037	00--	110.1	15.8	20.99	3.19	1.20	1.37
3c002	00--	57.6	8.1	-4.27	4.14	0.91	1.12
3a038	00--	104.6	15.5	16.95	3.18	1.19	1.34
3c004	00--	139	23.5	40.35	4.61	1.37	1.54
3c005	00--	128.1	26.2	32.49	4.39	1.42	1.46
3a041	00--	77.6	37.3	1.25	3.17	1.57	1.19
3c006	00--	80.7	11.8	6.42	3.91	1.07	1.22
3l007	00--	10.1	3.9	-19.51	6.76	0.59	0.97
3a068	0+0-'	141	92	86.30	4.96	1.96	1.99
3c030	0+0-'	155.2	94.1	96.25	5.45	1.97	2.07
3c075	0+0-'	73.5	44.3	46.42	3.55	1.65	1.62
3c037	0+0-'	76.8	41.2	54.69	3.40	1.61	1.67
3a076	0+0-'	83	48.2	55.67	3.56	1.68	1.70
3c078	0+0-'	71.9	38.6	44.54	3.60	1.59	1.60
3a019	00+-	101.8	56.8	91.92	5.08	1.75	1.96
3a020	00+-	113.5	77	94.73	5.26	1.89	2.00
3c145	00+-	43.1	30.9	59.27	4.62	1.49	1.64
3k017	0-0-	110.7	32.3	30.99	5.40	1.51	1.43
3l015	0-0-	115.2	34.5	37.58	5.68	1.54	1.42
3k018	0-0-	120	45.3	38.00	5.42	1.66	1.50
3l016	0-0-	130.6	44.1	46.06	5.90	1.64	1.50
3k021	0-0-	103.5	34.7	29.76	5.25	1.54	1.42
3l019	0-0-	102	37.2	33.13	5.51	1.57	1.38
3a66	0-0-	92	13.9	12.80	4.04	1.14	1.23
3c21	0-0-	81.2	12.4	8.20	4.75	1.09	1.18
3a74	0-0-	72.5	11.9	4.10	4.12	1.08	1.16
3d009	-00-	31.4	2.6	-24.55	5.04	0.41	0.43
3d027	-00-	100.7	10.3	15.21	4.35	1.01	0.79
3d031	-00-	89.6	14.2	9.21	4.24	1.15	0.73
3d034	-00-	102.8	11.9	14.16	4.35	1.08	0.78
3d036	-00-	77.8	9.8	1.50	4.25	0.99	0.66
3d074	-00-	118.6	8.6	27.01	4.54	0.93	0.79
3d006	----'	73.1	1.3	15.57	8.10	0.11	0.19
3d024	----'	92.4	1.2	27.40	8.39	0.08	0.26
3d022	----'	84.9	1.1	23.25	8.49	0.04	0.21
3c028	+00-	113.9	177	112.96	3.15	2.25	2.04
3a073	+00-	87.5	96.5	94.31	3.53	1.98	1.89
3c032	+00-	77.7	93.4	87.43	2.82	1.97	1.82
3a077	+00-	80	96.7	93.66	3.66	1.99	1.87
3c040	+00-	68.3	67.5	83.73	2.96	1.83	1.78
3a080	+00-	72.9	99.4	88.07	3.73	2.00	1.83
3c046	+00-	70.3	76.4	90.46	3.09	1.88	1.83
3c136	+00-	57.4	73	84.47	3.29	1.86	1.77
3k009	+00-	57.3	70.6	95.29	5.83	1.85	1.91
3c138	+00-	51	59.4	81.95	3.48	1.77	1.74
3k011	+00-	60.1	71.1	91.89	5.65	1.85	1.89

Table I-2. Results of Evaporation Rate Least Squares Fit (Continued)

3c140	+00-	54.3	62.1	80.63	3.35	1.79	1.74
3c142	+00-	46.4	61.7	74.37	3.53	1.79	1.68
3l013	+00-	63.5	91.1	98.53	6.10	1.96	1.86
3a031	+0--	99.7	40.1	51.24	3.33	1.60	1.66
3a032	+0--	102.4	48.4	50.63	3.27	1.68	1.65
3a033	+0--	103.2	51.3	55.67	3.52	1.71	1.70
3a034	+0--	95.2	38.5	48.04	3.26	1.59	1.63
3a035	+0--	94.3	34.1	46.28	3.23	1.53	1.61
3c007	+0--	100.8	39.2	49.44	3.71	1.59	1.63
3c009	+0--	113.5	37.9	59.12	3.91	1.58	1.72
3c011	+0--	101.4	41.1	52.83	3.78	1.61	1.66
3a051	+0-	100	47.4	60.06	3.74	1.68	1.73
3a053	+0-	100	41.7	55.29	3.58	1.62	1.69
3a054	+0-	100	60	56.87	3.67	1.78	1.71
3a056	+0-	100	63.3	59.97	3.77	1.80	1.73
3c012	+0--	118.4	47.4	59.77	3.96	1.68	1.72
3c013	+0--	83	35	42.93	3.79	1.54	1.57
3c014	+0--	92.4	46.1	47.86	3.79	1.66	1.61
3c015	+0--	70.7	36.1	36.24	3.99	1.56	1.50
3a055	+0--	60.2	37.6	37.58	4.15	1.58	1.53
3c016	+0x-	108.7	81.9	73.56	3.68	1.91	1.81
3c052	+0+-	80.9	185.8	155.78	5.20	2.27	2.21
3d011	--+-	23.7	1.2	-40.32	8.41	0.08	0.37
3d028	--+-	109.1	5.7	10.08	7.89	0.76	0.83
3d033	--+-	87.5	5.1	-4.77	7.90	0.71	0.70
3d035	--+-	103.1	7	2.98	8.03	0.85	0.77
3d007	-+--	103.2	4.1	-2.07	9.33	0.61	0.78
3d023	-+--	81.8	3.2	-8.82	8.03	0.51	0.59
3a061	+---	138	22.3	38.64	5.99	1.35	1.55
3a064	+---	128.3	24.1	34.34	5.80	1.38	1.51
3a084	+---	86.6	18.2	12.65	5.74	1.26	1.31
3c050	+---	83.2	18.4	11.44	5.75	1.26	1.30
3c026	++0-	127.3	218	151.50	4.69	2.34	2.30
3a079	++0-	81.8	148.7	131.13	4.09	2.17	2.09
3c045	++0-	75.9	160.7	125.81	4.02	2.21	2.05
3c051	++0-	81.3	156.8	125.27	3.87	2.20	2.06
3d010	-++-	46.9	9.9	2.53	6.58	1.00	0.98
3d016	-++-	100	12.4	32.49	6.70	1.09	1.26
3d017	-++-	37.4	7.9	-2.97	6.63	0.90	0.93
3d026	-++-	102.4	18.2	34.95	6.53	1.26	1.26
3d032	-++-	81.1	12.9	22.13	6.39	1.11	1.15
3d037	-++-	38.2	6	-0.36	6.90	0.78	0.96
3c022	+-+-	151.8	78.7	116.77	8.12	1.90	2.22
3c041	+-+-	95.7	54.6	85.98	7.78	1.74	1.93
3c043	+-+-	80.4	57.4	78.98	7.92	1.76	1.86
3a063	++--	84.2	43.6	69.35	5.34	1.64	1.81
3a083	++--	110	65.4	85.56	5.76	1.82	1.96
3c049	++--	109.1	70.6	86.87	5.50	1.85	1.96
3c042	+++-	74.2	199	201.55	6.95	2.30	2.40
3c044	+++-	108.5	233.9	220.06	7.22	2.37	2.57
3c053	+++-	76.7	209.2	208.27	7.25	2.32	2.44

BIANK PAGE

Blank

APPENDIX II

WIND TUNNEL DATA

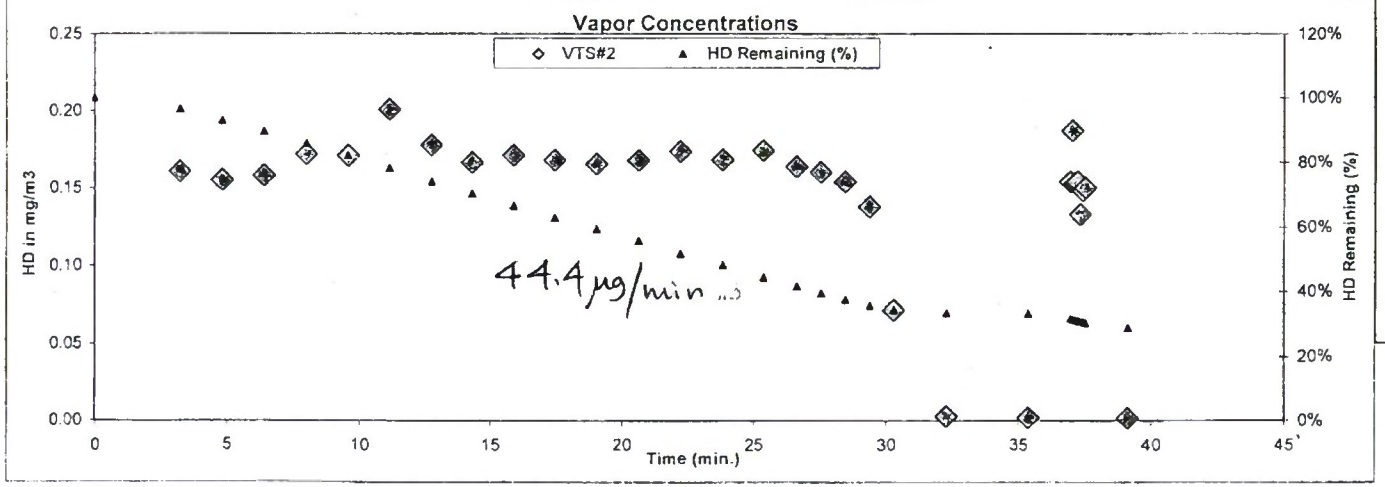
20051101_3a_81

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3a	
Instruments:	VTS#2/GCMSD	
Date/Experiment #:	11/01/05	81
Type of substrate :	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	1 µL	
Mass of agent disseminated:	1.35 mg	
Corrected mass on 100% agent purity:	1.32 mg	
Average substrate temperature:	50.15 °C	
Average air flow rate:	181.98 SLPM	
Average air temperature above drop:	50.65 °C	
Mass % recovery in vapor:	71.4 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	71.4 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.6	1.13%	Go
1.1	0.61%	Go
0.7	1.32%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
3.25	1.61E-01	96.39%
4.83	1.55E-01	92.94%
6.42	1.58E-01	89.52%
8.00	1.72E-01	85.91%
9.58	1.71E-01	82.16%
11.15	2.01E-01	78.14%
12.73	1.78E-01	74.00%
14.32	1.67E-01	70.24%
15.90	1.71E-01	66.55%
17.47	1.68E-01	62.89%
19.05	1.66E-01	59.24%
20.63	1.68E-01	55.60%
22.22	1.73E-01	51.87%
23.80	1.68E-01	48.14%
25.38	1.74E-01	44.41%
26.64	1.64E-01	41.49%
27.55	1.60E-01	39.44%
28.47	1.54E-01	37.45%
29.39	1.38E-01	35.61%
30.29	7.13E-02	34.31%
32.28	2.80E-03	33.29%
35.37	1.85E-03	33.19%
36.96	1.54E-01	31.47%
37.04	1.87E-01	31.28%
37.14	1.53E-01	31.04%
37.24	1.54E-01	30.83%
37.34	1.33E-01	30.63%
37.44	1.48E-01	30.44%
37.54	1.50E-01	30.23%
39.12	1.53E-03	28.59%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL (+-0-)\20051101_3a_81

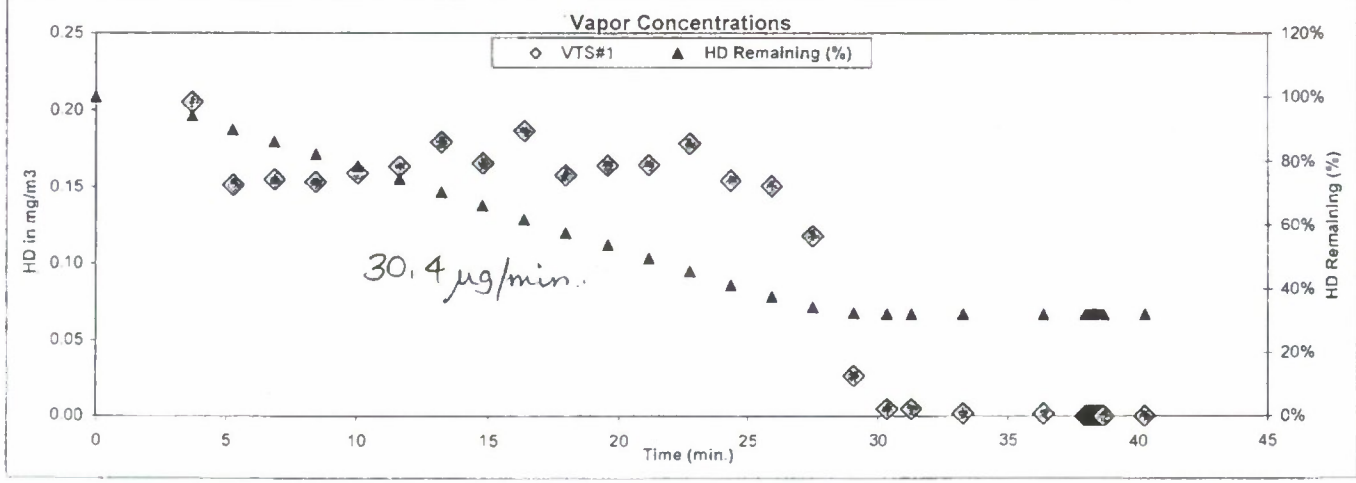
20051101_3c_47

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3c	
Instruments:	VTS#1/GCMSD	
Date/Experiment #:	11/01/05	47
Type of substrate :	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	1 µL	
Mass of agent disseminated:	1.21 mg	
Corrected mass on 100% agent purity:	1.18 mg	
Average substrate temperature:	50.06 °C	
Average air flow rate:	181.70 SLPM	
Average air temperature above drop:	50.47 °C	
Mass % recovery in vapor:	68.0 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	68.0 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.9	1.73%	Go
1.4	0.79%	Go
0.7	1.48%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
3.70	2.05E-01	94.15%
5.28	1.51E-01	89.81%
6.87	1.55E-01	86.07%
8.45	1.53E-01	82.31%
10.05	1.59E-01	78.46%
11.65	1.63E-01	74.48%
13.23	1.79E-01	70.31%
14.82	1.66E-01	66.10%
16.40	1.86E-01	61.81%
17.98	1.58E-01	57.61%
19.58	1.64E-01	53.64%
21.17	1.64E-01	49.63%
22.75	1.78E-01	45.45%
24.33	1.54E-01	41.40%
25.92	1.51E-01	37.68%
27.50	1.18E-01	34.40%
29.08	2.68E-02	32.63%
30.35	4.82E-03	32.32%
31.27	4.93E-03	32.26%
33.28	1.89E-03	32.15%
36.37	1.60E-03	32.07%
37.96	0.00E+00	32.05%
38.06	0.00E+00	32.05%
38.16	0.00E+00	32.05%
38.26	0.00E+00	32.05%
38.36	0.00E+00	32.05%
38.46	0.00E+00	32.05%
38.56	0.00E+00	32.05%
38.66	0.00E+00	32.05%
40.25	0.00E+00	32.05%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL (+-0-)\20051101_3c_47

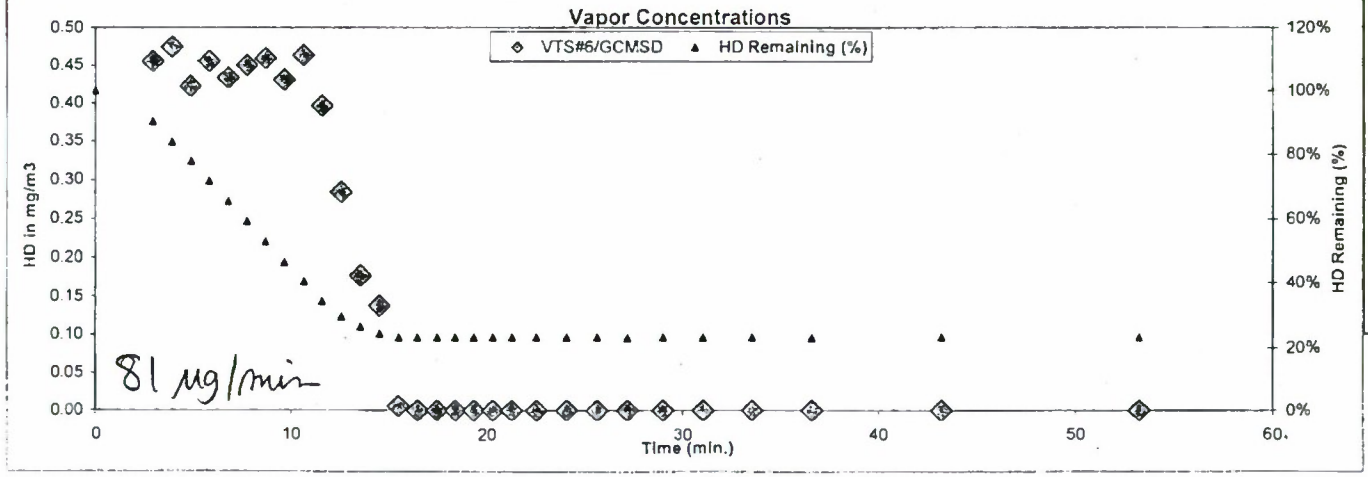
20060810_3k_019

Tunnel:	3K		Date:	08/10/06
Parameters:	VTS#6	GCMSD	Exp. #:	19
type of substrate :	Glass	Dutch Galss		
test agent:	HD			
agent grade::	neat			
agent purity:	97.4%	Date/Chem:	KS	2/28/2006
number of drops:	1			
nominal drop volume:	1 µL			
mass of agent disseminated:	1.29 mg			
corrected mass on 100% agent purity:	1.26 mg		SD	P/F
Miller Nelson temperature:	0.00 °C		0.0	Pass
transition section wall temperature:	50.22 °C		0.5	Pass
fetch section wall temperature:	51.10 °C		0.8	Pass
post-test section wall temperature:	51.04 °C		0.7	Pass
mixing box wall temperature:	51.98 °C		0.8	Pass
sampling duct wall temperature:	51.63 °C		0.64	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			

Substrate: 49.8

182 SLPM

Time (min)	Conc. mg/m^3	HD rem. (%)
2.93	4.55E-01	90.37%
3.89	4.74E-01	83.88%
4.84	4.23E-01	77.72%
5.81	4.56E-01	71.59%
6.78	4.34E-01	65.37%
7.74	4.50E-01	59.20%
8.71	4.60E-01	52.84%
9.68	4.31E-01	46.62%
10.64	4.63E-01	40.37%
11.61	3.96E-01	34.37%
12.58	2.85E-01	29.61%
13.54	1.76E-01	26.39%
14.51	1.37E-01	24.20%
15.48	5.81E-03	23.20%
16.44	0.00E+00	23.16%
17.43	0.00E+00	23.16%
18.39	0.00E+00	23.16%
19.34	0.00E+00	23.16%
20.31	0.00E+00	23.16%
21.28	0.00E+00	23.16%
22.53	0.00E+00	23.16%
24.08	0.00E+00	23.16%
25.63	0.00E+00	23.16%
27.18	0.00E+00	23.16%
28.98	0.00E+00	23.16%
31.03	0.00E+00	23.16%
33.58	0.00E+00	23.16%
36.63	0.00E+00	23.16%
43.18	0.00E+00	23.16%
53.23	0.00E+00	23.16%



81 µg/min

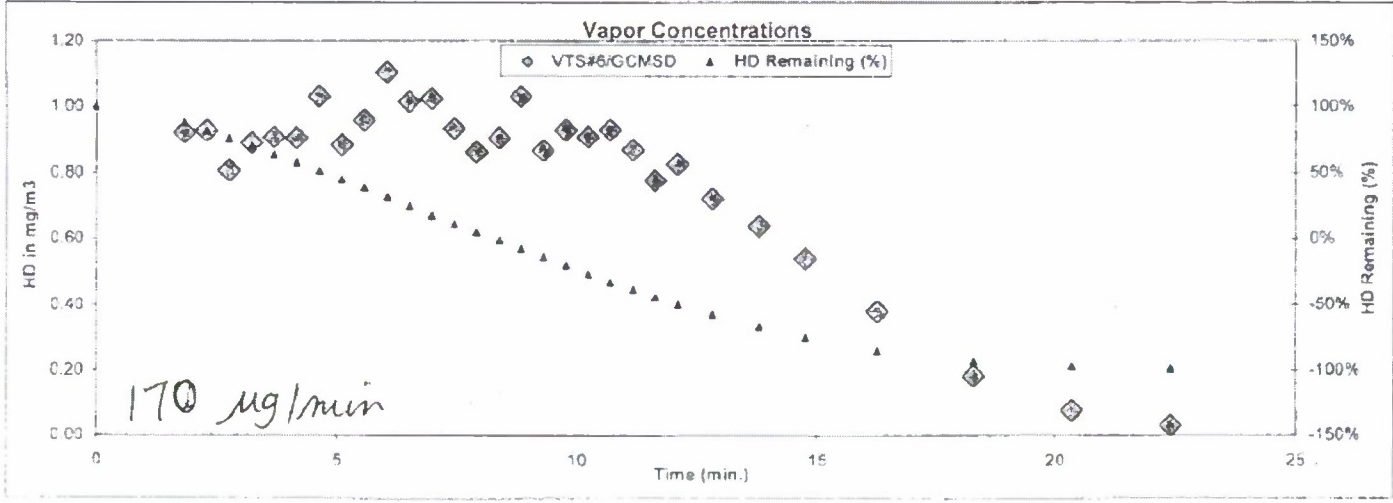
G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+=0-)\20060810_3k_019

20060814_3K_020

Tunnel:	3K		Date:	08/14/06
Parameters:	VTS#5	GCMSD	Exp. #:	20
type of substrate	Glass	Dutch Galss		
test agent	HD			
agent grade	neat			
agent purity	97.4%	Date/Chem	KS	2/28/2006
number of drops	1			
nominal drop volume	1	µL		
mass of agent disseminated	1.29	mg		
corrected mass on 100% agent purity	1.26	mg	SD	P/F
Miller Nelson temperature	0.00	°C	0.0	Pass
transition section wall temperature	50.04	°C	0.2	Pass
fetch section wall temperature	50.90	°C	0.4	Pass
post-test section wall temperature	51.10	°C	0.4	Pass
mixing box wall temperature	52.29	°C	0.5	Pass
sampling duct wall temperature	51.80	°C	0.43	Pass
description				
Tube #s consistant	YES			
Daily CCV < +/- 15%	Pass			

Substrate = 51.3°C

182 SLPM



Time (min)	Conc. mg/m³	HD rem. (%)
1.84	9.21E-01	87.74%
2.31	9.26E-01	81.52%
2.78	8.08E-01	75.68%
3.24	8.91E-01	69.96%
3.71	9.08E-01	63.90%
4.18	9.05E-01	57.80%
4.64	1.03E+00	51.27%
5.11	8.84E-01	44.82%
5.58	9.58E-01	38.61%
6.04	1.10E+00	31.67%
6.51	1.01E+00	24.53%
6.98	1.02E+00	17.67%
7.44	9.34E-01	11.07%
7.91	8.62E-01	5.03%
8.38	9.04E-01	0.92%
8.84	1.03E+00	-7.44%
9.31	8.66E-01	-13.83%
9.78	9.28E-01	-19.88%
10.24	9.08E-01	-26.06%
10.71	9.29E-01	-32.25%
11.18	8.69E-01	-38.31%
11.64	7.76E-01	-43.85%
12.11	8.26E-01	-49.25%
12.83	7.20E-01	-57.24%
13.79	6.38E-01	-66.72%
14.76	5.40E-01	-74.95%
16.27	3.80E-01	-84.96%
18.30	1.83E-01	-93.22%
20.35	7.83E-02	-97.08%
22.40	3.11E-02	-98.70%

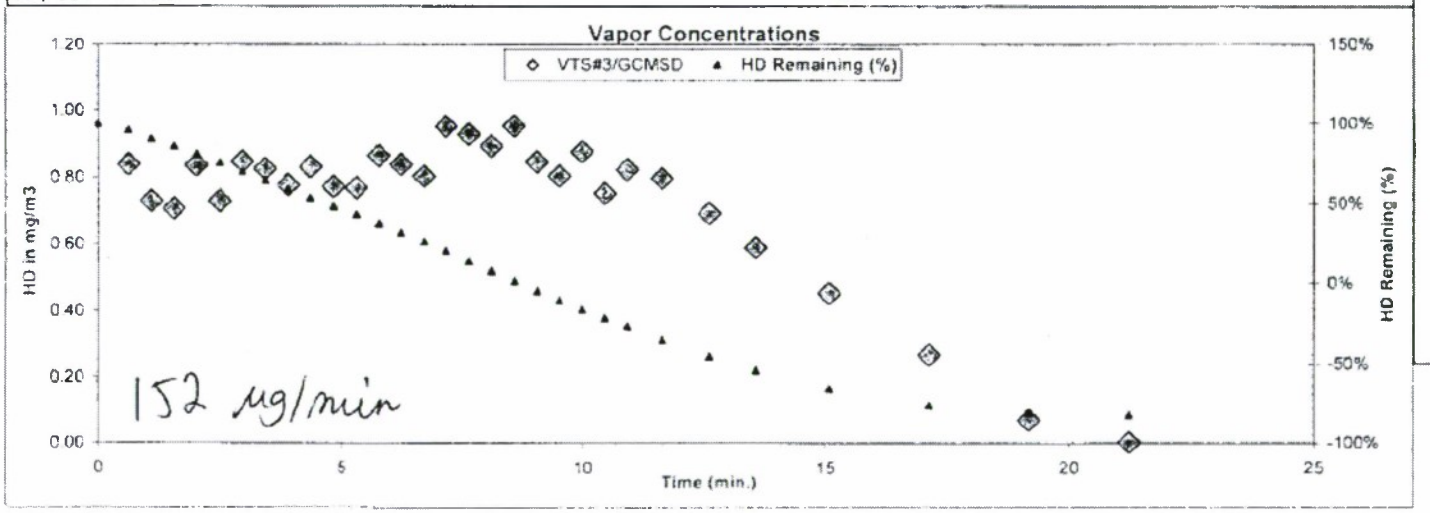
G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+=0-)\20060814_3K_020

20060814_3L_018

Tunnel:	3L		Date:	08/14/06
Parameters:	VTS#3	GCMSD	Exp. #:	18
type of substrate:	Glass	Dutch Galss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem:	KS	2/28/2006
number of drops:	1			
nominal drop volume:	1	µL		
mass of agent disseminated:	1.29	mg		
corrected mass on 100% agent purity:	1.26	mg	SD	P/F
Miller Nelson temperature:	0.00	°C	0.0	Pass
transition section wall temperature:	50.00	°C	0.0	Pass
fetch section wall temperature:	50.00	°C	0.0	Pass
post-test section wall temperature:	50.00	°C	0.0	Pass
mixing box wall temperature:	50.22	°C	0.4	Pass
sampling duct wall temperature:	50.00	°C	0.01	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			

Substrate = 50.7°C

182 SLPM



152 µg/min

Time (min)	Conc. mg/m³	HD rem. (%)
0.64	6.39E-01	96.11%
1.11	7.28E-01	90.83%
1.58	7.06E-01	86.00%
2.04	8.35E-01	80.81%
2.51	7.29E-01	75.54%
2.96	8.47E-01	70.23%
3.44	8.25E-01	64.60%
3.91	7.76E-01	59.21%
4.36	8.31E-01	53.80%
4.84	7.72E-01	48.40%
5.31	7.68E-01	43.21%
5.78	8.63E-01	37.72%
6.24	8.37E-01	31.99%
6.71	8.02E-01	26.47%
7.18	9.52E-01	20.56%
7.66	9.27E-01	14.01%
8.13	8.91E-01	7.88%
8.59	9.53E-01	1.57%
9.06	8.45E-01	-4.38%
9.53	8.03E-01	-9.93%
9.99	8.75E-01	-15.59%
10.46	7.51E-01	-21.06%
10.93	8.21E-01	-26.36%
11.64	7.96E-01	-34.72%
12.61	6.91E-01	-45.09%
13.58	5.89E-01	-54.02%
15.08	4.52E-01	-65.34%
17.13	2.67E-01	-75.99%
19.18	7.06E-02	-80.98%
21.23	2.54E-03	-82.06%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+=0-)\20060814_3L_018

20050411_3a_05

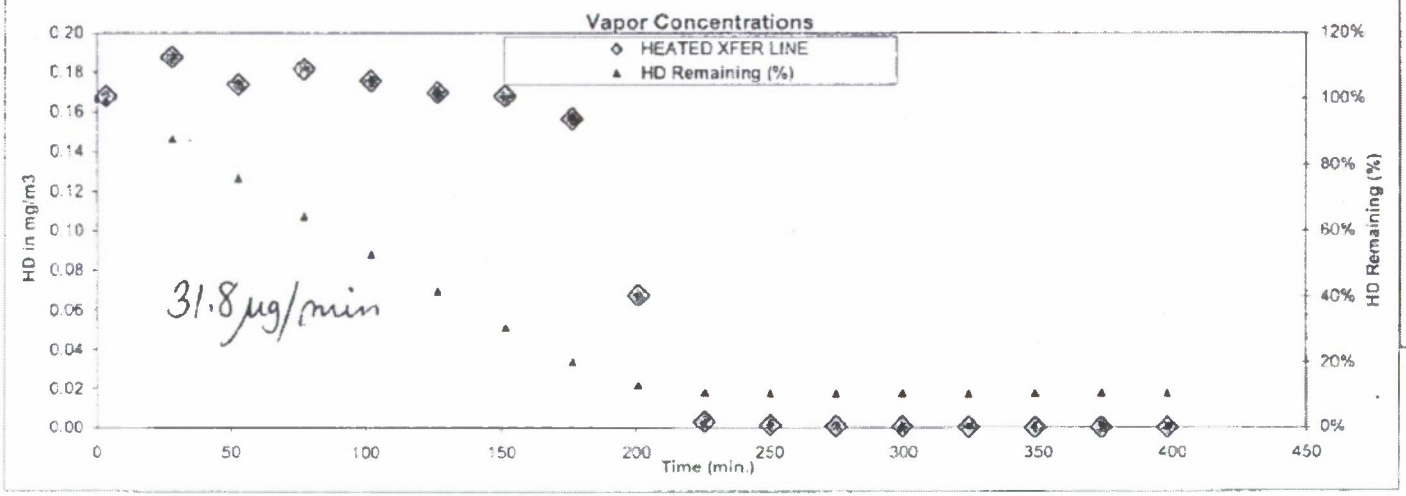
Data Evaluation Grade: **Modeling Grade**

Tunnel:	3a	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #	04/11/05	5
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6	µL
Mass of agent disseminated:	7.13	mg
Corrected mass on 100% agent purity:	6.94	mg
Average substrate temperature:	35.81	°C
Average air flow rate:	181.19	SLPM
Average air temperature above drop:	35.41	°C
Mass % recovery in vapor:	89.5	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	89.5	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	No	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.4	1.25%	Go
0.1	0.06%	Go
0.2	0.52%	Go
-	-	Go

Time (min)	Conc. mg/m³	HD rem. (%)
3.38	1.68E-01	99.26%
28.05	1.88E-01	87.76%
52.73	1.74E-01	76.05%
77.43	1.82E-01	64.54%
102.13	1.76E-01	52.97%
126.83	1.70E-01	41.79%
151.53	1.68E-01	30.87%
176.22	1.57E-01	20.38%
200.90	6.77E-02	13.12%
225.57	3.03E-03	10.84%
250.23	1.28E-03	10.70%
274.90	9.57E-04	10.63%
299.57	6.89E-04	10.57%
324.23	4.22E-04	10.54%
348.90	0.00E+00	10.52%
373.57	0.00E+00	10.52%
398.23	0.00E+00	10.52%



2.9% RH

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20050411_3a_05

20050412_3a_06

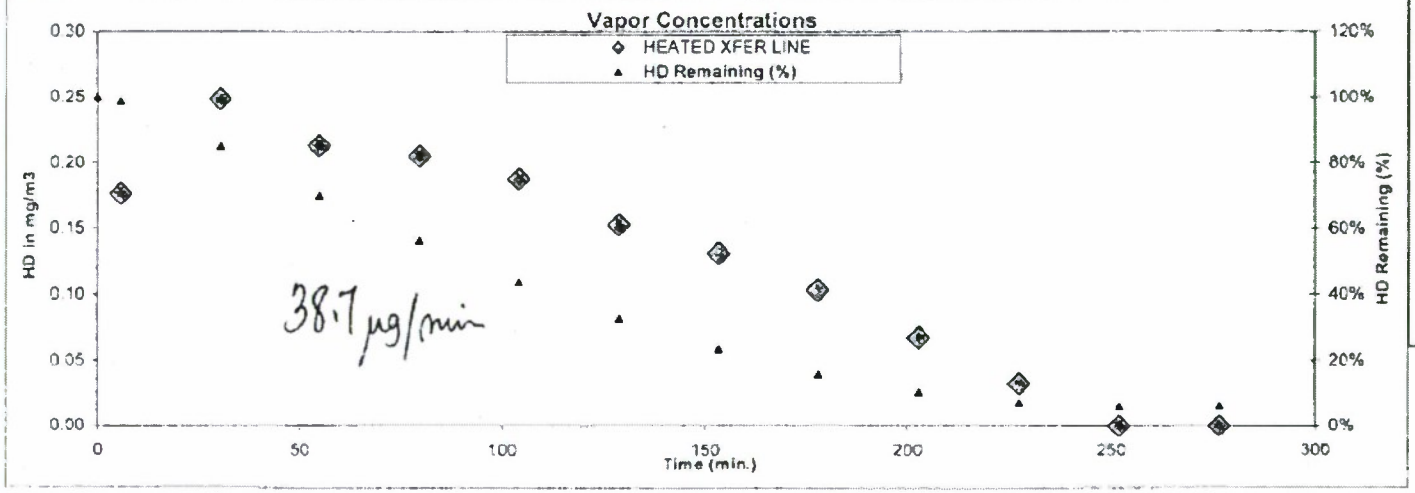
Data Evaluation Grade: **Modeling Grade**

Tunnel:	3a	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	04/12/05	6
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.07 mg	
Corrected mass on 100% agent purity:	6.89 mg	
Average substrate temperature:	36.06 °C	
Average air flow rate:	181.20 SLPM	
Average air temperature above drop:	35.48 °C	
Mass % recovery in vapor:	93.9 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	93.9 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	No	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.3	0.79%	Go
0.1	0.06%	Go
0.1	0.37%	Go
-	-	Go

Time (min)	Conc. mg/m³	HD rem. (%)
5.68	1.77E-01	98.68%
30.27	2.49E-01	84.95%
54.88	2.13E-01	70.02%
79.52	2.05E-01	56.48%
104.15	1.88E-01	43.76%
128.80	1.53E-01	32.73%
153.45	1.31E-01	23.52%
178.10	1.03E-01	15.92%
202.75	6.75E-02	10.38%
227.40	3.26E-02	7.14%
252.07	0.00E+00	6.08%
276.73	0.00E+00	6.08%



2.81% RH

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20050412_3a_06

20050413_3a_07.xls

Data Evaluation Grade: Modeling Grade

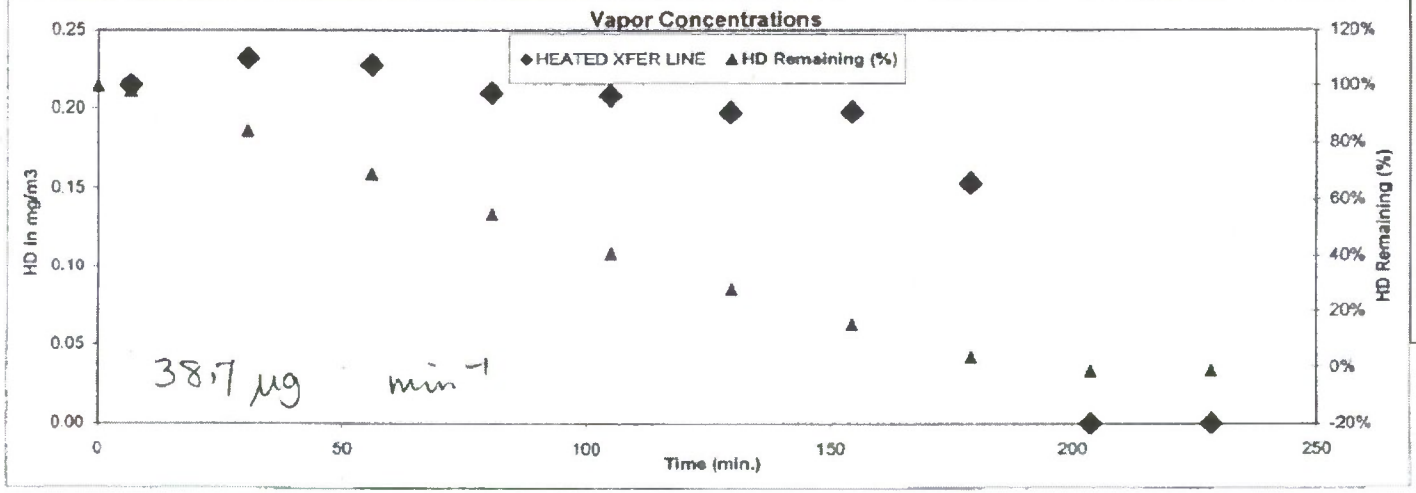
Tunnel:	3a	
Instruments:	HEATED XFER LINE/HAPSITE	
Data/Experiment #:	04/13/05	7
Type of substrate :	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.05 mg	
Corrected mass on 100% agent purity:	6.87 mg	
Average substrate temperature:	35.68 °C	
Average air flow rate:	181.20 SLPM	
Average air temperature above drop:	35.43 °C	
Mass % recovery in vapor:	101.3 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	101.3 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	No	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.2	0.50%	Go
0.1	0.06%	Go
0.1	0.34%	Go
-	-	Go

Time (min)	Conc. mg/m³	HD rem. (%)
6.72	2.15E-01	98.10%
30.63	2.32E-01	84.01%
55.90	2.26E-01	68.70%
80.52	2.10E-01	54.51%
105.15	2.08E-01	40.97%
129.78	1.97E-01	27.82%
154.42	1.97E-01	15.00%
179.05	1.53E-01	3.63%
203.70	0.00E+00	-1.34%
228.35	0.00E+00	-1.34%

2.8% RH



G:\AgentFateTech\Wind Tunnel\Processed Data\Ready for Review\HD GL(000-)\20050413_3a_07.xls

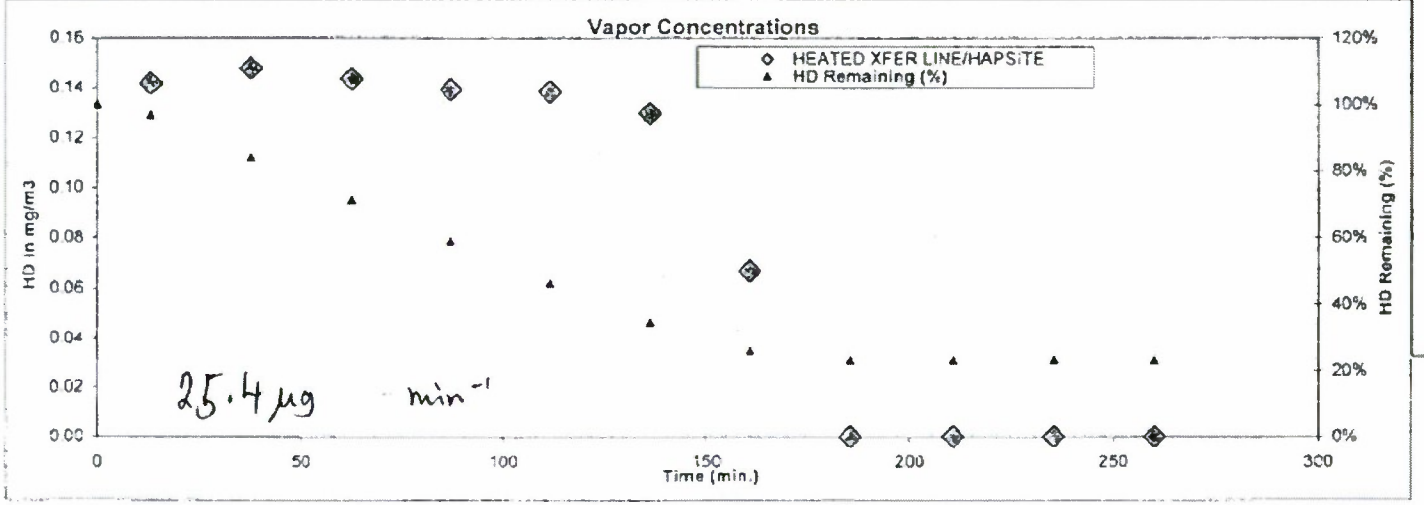
20050509_3a_15

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3a	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	05/09/05	15
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	5.20 mg	
Corrected mass on 100% agent purity:	5.06 mg	
Average substrate temperature:	35.48 °C	
Average air flow rate:	181.19 SLPM	
Average air temperature above drop:	34.89 °C	
Mass % recovery in vapor:	77.0 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	77.0 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.7	2.03%	Go
0.1	0.07%	Go
0.5	1.34%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
13.35	1.42E-01	96.61%
37.92	1.48E-01	83.88%
62.50	1.43E-01	71.06%
87.10	1.39E-01	58.61%
111.70	1.38E-01	46.40%
136.30	1.30E-01	34.61%
160.92	6.67E-02	25.96%
185.53	0.00E+00	23.02%
210.88	0.00E+00	23.02%
235.50	0.00E+00	23.02%
260.12	0.00E+00	23.02%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%

2.91% RH

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20050509_3a_15

20050510_3a_16

Data Evaluation Grade: Modeling Grade

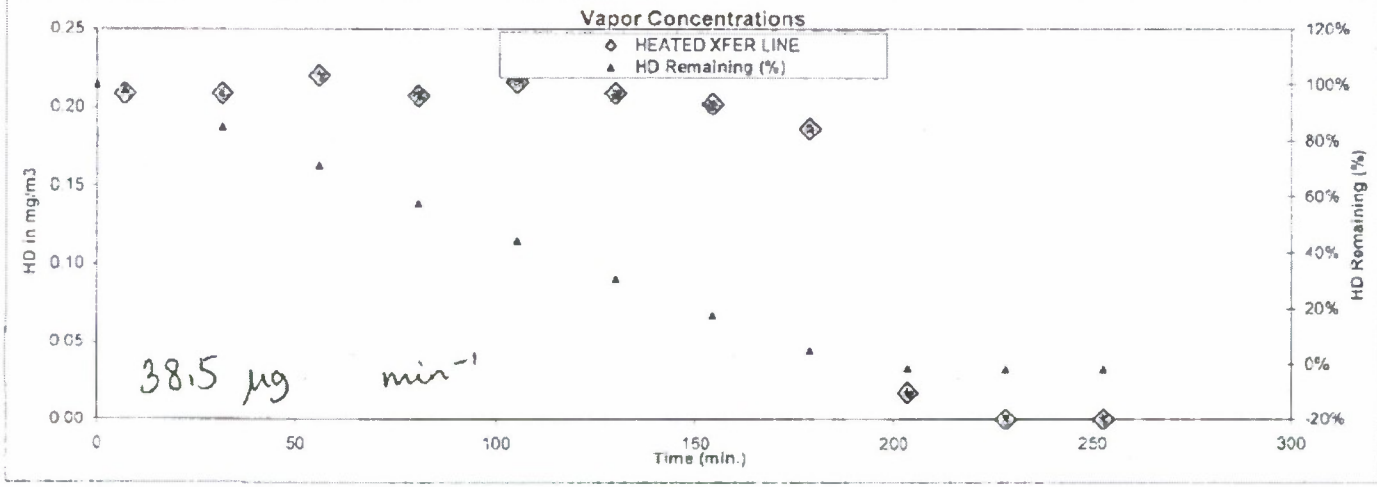
Tunnel:	3a	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	05/10/05	16
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	5 µL	
Mass of agent disseminated:	7.21 mg	
Corrected mass on 100% agent purity:	7.02 mg	
Average substrate temperature:	36.70 °C	
Average air flow rate:	181.83 SLPM	
Average air temperature above drop:	34.96 °C	
Mass % recovery in vapor:	101.8 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	101.8 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.3	0.74%	Go
0.5	0.30%	Go
0.1	0.35%	Go
-	-	Go

Time (min)	Conc. mg/m³	HD rem. (%)
7.05	2.09E-01	98.09%
31.58	2.09E-01	84.83%
56.13	2.20E-01	71.20%
80.72	2.07E-01	57.60%
105.30	2.16E-01	44.14%
129.88	2.09E-01	30.63%
154.45	2.02E-01	17.57%
179.03	1.86E-01	5.22%
203.62	1.77E-02	-1.27%
228.22	0.00E+00	-1.83%
252.82	0.00E+00	-1.83%

2.4% RH



G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20050510_3a_16

20050523_3a_21

Data Evaluation Grade: **Modeling Grade**

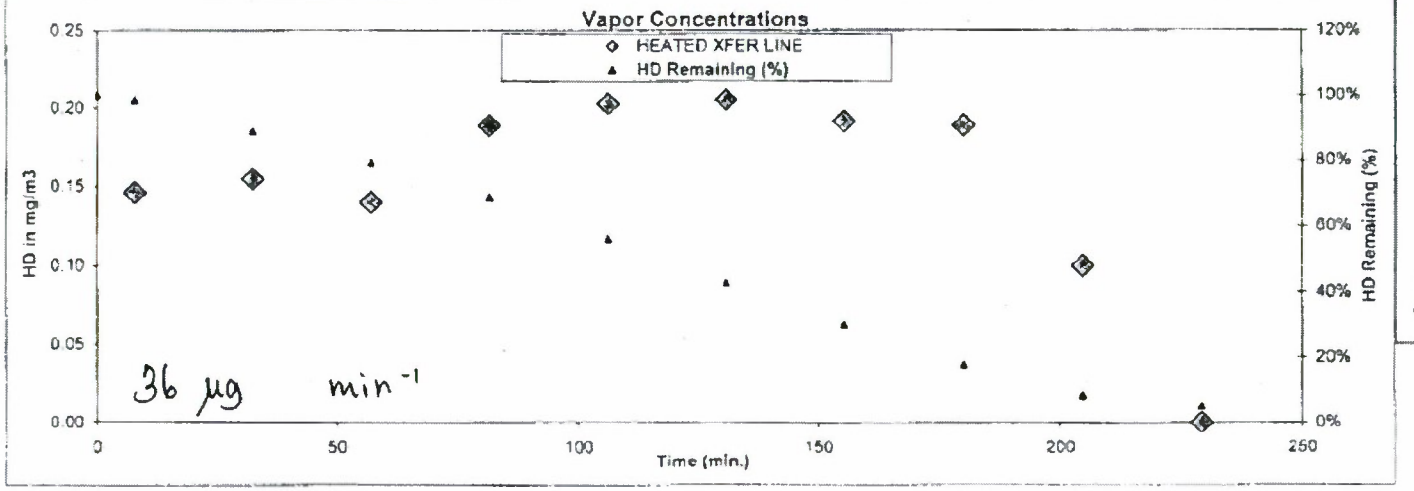
Tunnel:	3a	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	05/23/05	21
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6	µL
Mass of agent disseminated:	7.12	mg
Corrected mass on 100% agent purity:	6.93	mg
Average substrate temperature:	34.96	°C
Average air flow rate:	181.95	SLPM
Average air temperature above drop:	33.70	°C
Mass % recovery in vapor:	94.8	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	94.8	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.3	0.78%	Go
0.5	0.29%	Go
0.1	0.26%	Go
-	-	Go

Time (min)	Conc. mg/m³	HD rem. (%)
7.83	1.46E-01	98.50%
32.42	1.55E-01	88.79%
57.02	1.40E-01	79.28%
81.62	1.89E-01	68.67%
106.23	2.03E-01	56.03%
130.85	2.05E-01	42.86%
155.47	1.91E-01	30.05%
180.08	1.89E-01	17.78%
204.70	1.00E-01	8.46%
229.32	0.00E+00	5.23%

2.4% RH



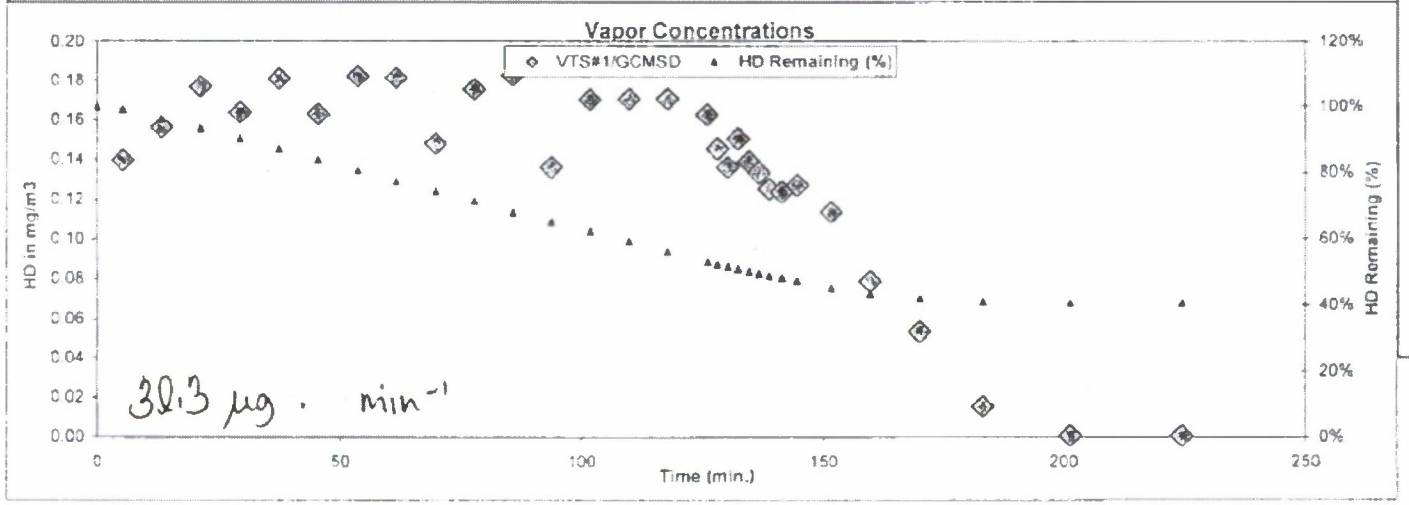
G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20050523_3a_21

20060530_3c_128

Tunnel:	3c		Date:	05/30/06
Parameters:	VTS#1	GCMSD	Exp. #:	128
type of substrate:	Glass	Dutch Galss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem	KS	2/28/2006
number of drops:	1			
nominal drop volume:	6	µL		
mass of agent disseminated:	8.10	mg		
corrected mass on 100% agent purity:	7.88	mg	SD	P/F
Miller Nelson temperature:	0.00	°C	0.0	Pass
transition section wall temperature:	35.02	°C	0.2	Pass
fetch section wall temperature:	36.33	°C	0.5	Pass
post-test section wall temperature:	36.07	°C	0.3	Pass
mixing box wall temperature:	36.78	°C	0.7	Pass
sampling duct wall temperature:	36.75	°C	0.59	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Fails			

substrate 35.9°C

180SLPM



Time (min)	Conc. mg/m³	HD rem (%)
5.35	1.40E-01	99.15%
13.40	1.56E-01	96.42%
21.45	1.77E-01	93.35%
29.50	1.64E-01	90.22%
37.55	1.81E-01	87.05%
45.60	1.63E-01	83.89%
53.65	1.82E-01	80.71%
61.68	1.81E-01	77.37%
69.73	1.48E-01	74.34%
77.78	1.76E-01	71.37%
85.83	1.83E-01	68.07%
93.88	1.36E-01	65.14%
101.93	1.70E-01	62.32%
109.98	1.71E-01	59.18%
118.03	1.71E-01	56.04%
126.10	1.63E-01	52.97%
128.23	1.45E-01	52.22%
130.37	1.36E-01	51.53%
132.48	1.50E-01	50.84%
134.63	1.39E-01	50.13%
136.75	1.33E-01	49.47%
138.88	1.25E-01	48.84%
141.52	1.23E-01	48.09%
144.65	1.27E-01	47.20%
151.70	1.13E-01	45.26%
159.75	7.87E-02	43.49%
170.30	5.36E-02	41.90%
183.35	1.56E-02	40.87%
201.40	7.10E-04	40.53%
224.45	5.82E-04	40.50%

0.24 % RH

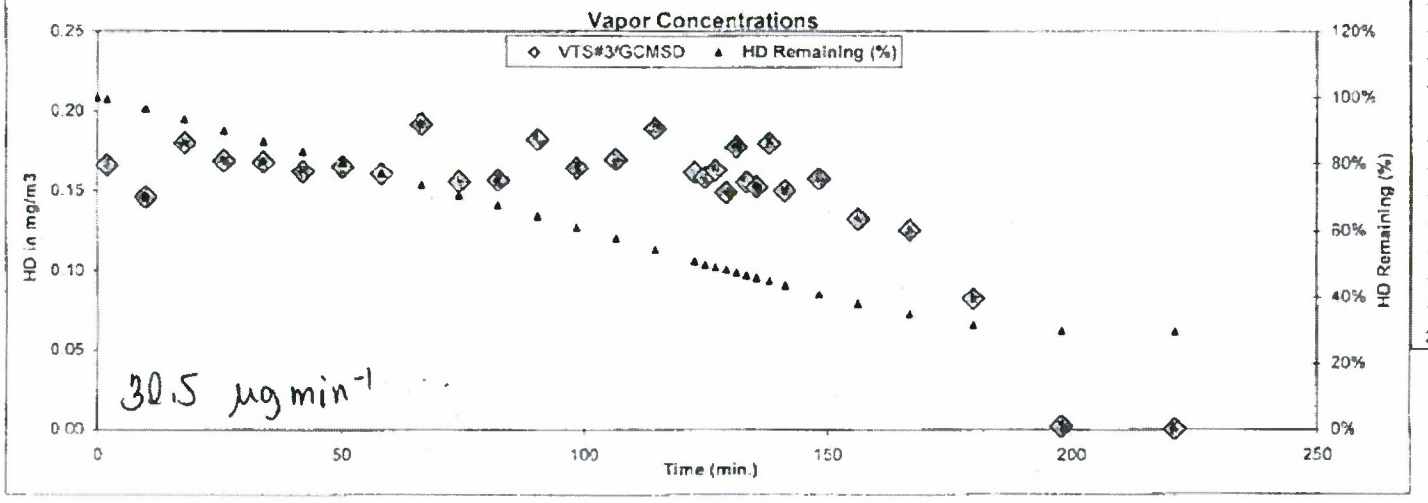
G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20060530_3c_128

20060530_3k_001

Tunnel:	3k		Date:	05/30/06
Parameters:	VTS#3	GCMSD	Exp. #:	1
type of substrate:	Glass	Dutch Galss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem:	KS	2/28/2006
number of drops:	1			
nominal drop volume:	6	µL		
mass of agent disseminated:	7.75	mg		
corrected mass on 100% agent purity:	7.54	mg	SD	P/F
Miller Nelson temperature:	0.00	°C	0.0	Pass
transition section wall temperature:	35.75	°C	0.4	Pass
fetch section wall temperature:	36.00	°C	0.0	Pass
post-test section wall temperature:	36.00	°C	0.0	Pass
mixing box wall temperature:	36.08	°C	0.3	Pass
sampling duct wall temperature:	36.69	°C	0.46	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Fails			

Substrate 35.1°C

181.4 SLPM



30.5 µg min^{-1}

Time (min)	Conc. mg/m^3	HD rem. (%)
1.95	1.66E-01	99.61%
10.00	1.46E-01	96.59%
18.05	1.80E-01	93.44%
26.10	1.69E-01	90.07%
34.15	1.68E-01	86.82%
42.20	1.82E-01	83.63%
50.25	1.65E-01	80.46%
58.30	1.61E-01	77.31%
66.35	1.92E-01	73.90%
74.40	1.56E-01	70.54%
82.45	1.57E-01	67.51%
90.50	1.82E-01	64.24%
98.55	1.64E-01	60.89%
106.60	1.69E-01	57.65%
114.65	1.89E-01	54.20%
122.70	1.61E-01	50.81%
124.83	1.58E-01	49.99%
126.97	1.63E-01	49.16%
129.10	1.49E-01	48.36%
131.23	1.77E-01	47.53%
133.37	1.55E-01	46.67%
135.50	1.52E-01	45.88%
138.13	1.80E-01	44.83%
141.27	1.50E-01	43.59%
148.32	1.57E-01	40.99%
156.37	1.33E-01	38.18%
166.92	1.26E-01	34.91%
179.97	8.26E-02	31.64%
196.02	2.19E-03	29.80%
221.07	3.96E-04	29.73%

0.18% RH

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20060530_3k_001

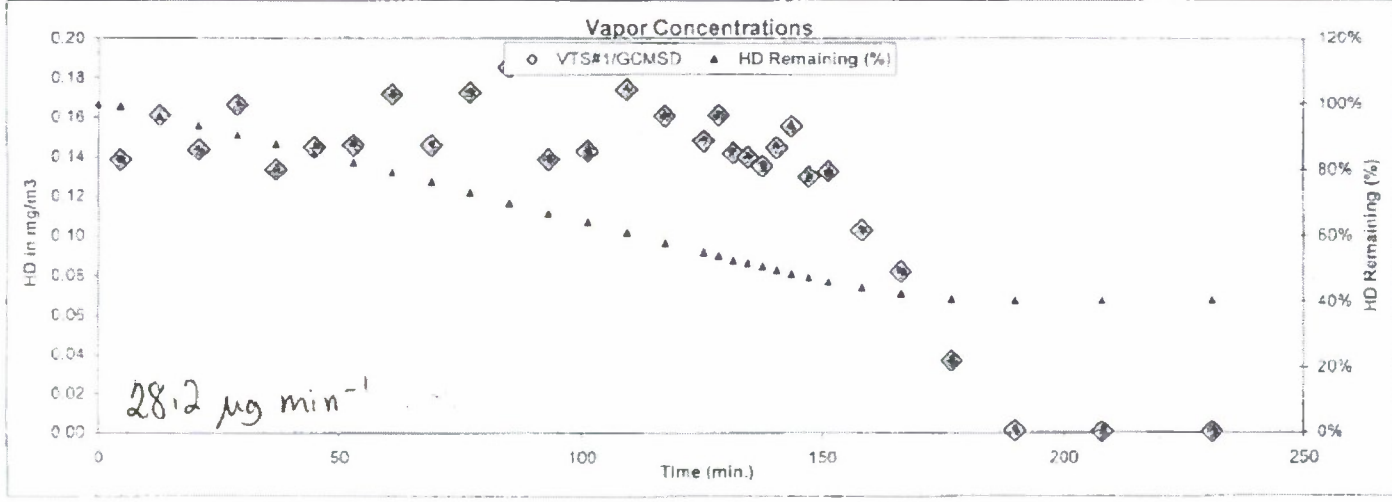
20060531_3c_129

Tunnel:	3c		Date:	05/31/06
Parameters:	VTS#1	GCMSD	Exp. #:	129
type of substrate:	Glass	Dutch Galss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem:	KS	2/28/2006
number of drops:	1			
nominal drop volume:	6	µL		
mass of agent disseminated:	7.90	mg		
corrected mass on 100% agent purity:	7.69	mg	SD	P/F
Miller Nelson temperature:	0.00	°C	0.0	Pass
transition section wall temperature:	35.01	°C	0.1	Pass
fetch section wall temperature:	35.78	°C	0.4	Pass
post-test section wall temperature:	35.12	°C	0.3	Pass
mixing box wall temperature:	35.76	°C	0.4	Pass
sampling duct wall temperature:	35.71	°C	0.45	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			

Substrate 34.7°C

181.3 SLPM

Time (min)	Conc. mg/m³	HD rem. (%)
4.67	1.39E-01	99.24%
12.72	1.61E-01	96.40%
20.77	1.44E-01	93.60%
28.82	1.66E-01	90.56%
36.85	1.34E-01	87.72%
44.90	1.45E-01	85.08%
52.95	1.46E-01	82.32%
61.00	1.72E-01	79.31%
69.05	1.46E-01	76.30%
77.10	1.73E-01	73.28%
85.15	1.86E-01	69.88%
93.20	1.39E-01	66.80%
101.25	1.43E-01	64.12%
109.30	1.74E-01	61.12%
117.35	1.61E-01	57.94%
125.40	1.48E-01	55.01%
128.45	1.61E-01	53.90%
131.50	1.42E-01	52.81%
134.55	1.40E-01	51.80%
137.60	1.35E-01	50.81%
140.65	1.45E-01	49.80%
143.70	1.56E-01	48.72%
147.25	1.30E-01	47.53%
151.30	1.33E-01	46.28%
158.35	1.03E-01	44.31%
166.38	8.23E-02	42.56%
176.93	3.69E-02	41.08%
189.98	1.14E-03	40.49%
208.03	6.35E-04	40.46%
231.08	5.71E-04	40.42%



28.2 µg min⁻¹

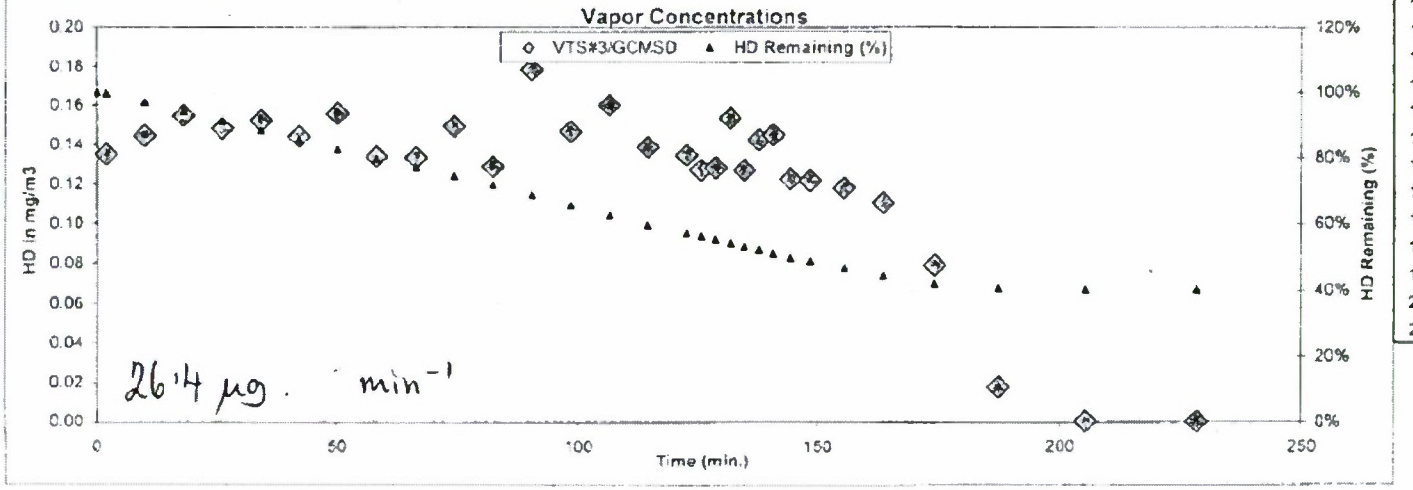
0.04%RH

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20060531_3c_129

20060531_3k_002

Tunnel:	3K		Date:	05/31/06
Parameters:	VTS#3	GC/MSD	Exp. #:	2
type of substrate :	Glass	Dutch Galss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem:	KS	2/28/2006
number of drops:	1			
nominal drop volume:	6	uL		
mass of agent disseminated:	7.75	mg		
corrected mass on 100% agent purity:	7.54	mg	SD	P/F
Miller Nelson temperature:	0.00	°C	0.0	Pass
transition section wall temperature:	35.48	°C	0.5	Pass
fetch section wall temperature:	35.79	°C	0.4	Pass
post-test section wall temperature:	35.92	°C	0.3	Pass
mixing box wall temperature:	36.03	°C	0.2	Pass
sampling duct wall temperature:	36.02	°C	0.13	Pass
description:	Substrate 34.6°C			
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			

Time (min)	Conc. mg/m³	HD rem. (%)
1.96	1.35E-01	99.68%
10.03	1.45E-01	96.97%
18.08	1.55E-01	94.07%
26.13	1.48E-01	91.13%
34.18	1.52E-01	88.22%
42.23	1.44E-01	85.35%
50.28	1.56E-01	82.44%
58.33	1.34E-01	79.64%
66.38	1.33E-01	77.05%
74.43	1.49E-01	74.31%
82.48	1.29E-01	71.62%
90.53	1.78E-01	68.65%
98.58	1.47E-01	65.50%
106.63	1.60E-01	62.53%
114.68	1.39E-01	59.63%
122.73	1.35E-01	56.98%
125.78	1.27E-01	56.02%
128.83	1.28E-01	55.09%
131.88	1.53E-01	54.05%
134.93	1.27E-01	53.02%
137.98	1.42E-01	52.03%
141.03	1.45E-01	50.98%
144.58	1.22E-01	49.84%
148.63	1.22E-01	48.65%
155.68	1.18E-01	46.61%
163.73	1.10E-01	44.40%
174.28	7.92E-02	41.99%
187.33	1.79E-02	40.46%
205.38	4.11E-04	40.07%
228.43	2.69E-04	40.05%

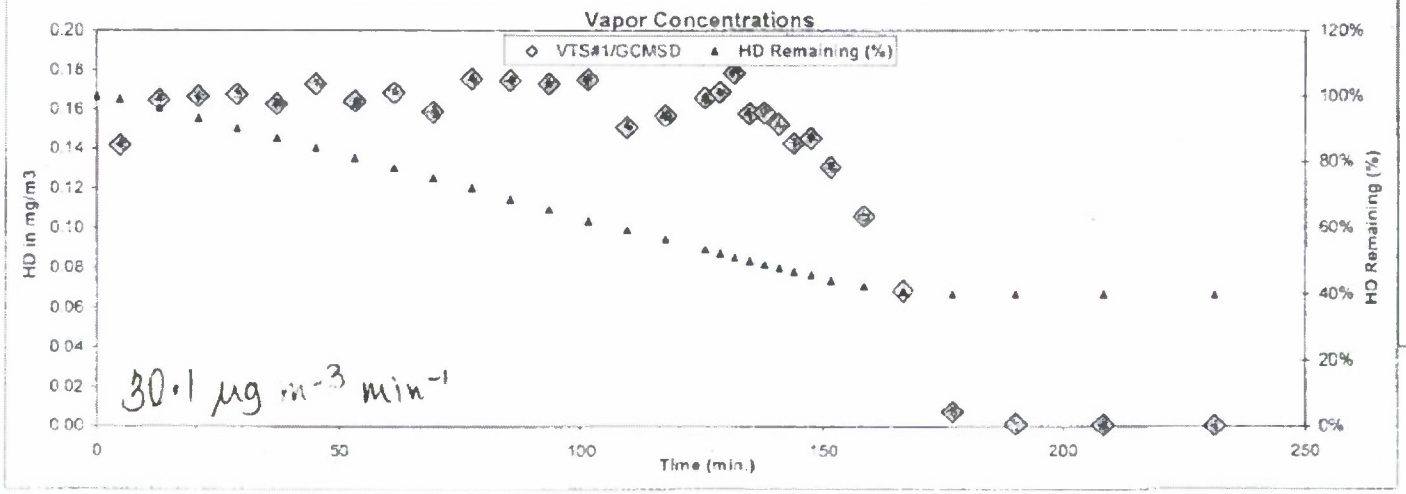


0.03 % RH

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20060531_3k_002

20060605_3c_130

Tunnel:	3c		Date:	06/05/06
Parameters:	VTS#1	GCMSD	Exp. #:	130
type of substrate :	Glass	Dutch Galss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem:	KS	2/28/2006
number of drops:	1			
nominal drop volume:	6	µL		
mass of agent disseminated:	8.16	mg		
corrected mass on 100% agent purity:	7.95	mg	SD	P/F
Miller Nelson temperature:	0.00	°C	0.0	Pass
transition section wall temperature:	35.01	°C	0.1	Pass
fetch section wall temperature:	35.80	°C	0.4	Pass
post-test section wall temperature:	35.03	°C	0.2	Pass
mixing box wall temperature:	35.70	°C	0.5	Pass
sampling duct wall temperature: substrate 34.3°C	35.51	°C	0.50	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			



Time (min)	Conc. mg/m³	HD rem. (%)
4.93	1.42E-01	99.20%
12.98	1.65E-01	96.39%
21.03	1.67E-01	93.34%
29.08	1.68E-01	90.27%
37.13	1.63E-01	87.24%
45.18	1.73E-01	84.16%
53.22	1.64E-01	81.07%
61.27	1.68E-01	78.01%
69.32	1.59E-01	75.01%
77.37	1.75E-01	71.95%
85.42	1.75E-01	68.73%
93.47	1.73E-01	65.55%
101.52	1.75E-01	62.35%
109.57	1.51E-01	59.36%
117.62	1.57E-01	56.54%
125.67	1.66E-01	53.58%
128.72	1.69E-01	52.41%
131.77	1.78E-01	51.20%
134.82	1.58E-01	50.03%
137.87	1.58E-01	48.93%
140.92	1.52E-01	47.85%
143.97	1.43E-01	46.83%
147.52	1.45E-01	45.67%
151.57	1.31E-01	44.39%
158.62	1.06E-01	42.49%
166.67	6.86E-02	40.89%
177.22	7.30E-03	39.97%
190.27	1.02E-03	39.85%
208.32	6.59E-04	39.81%
231.37	4.96E-04	39.78%

0.06% RH

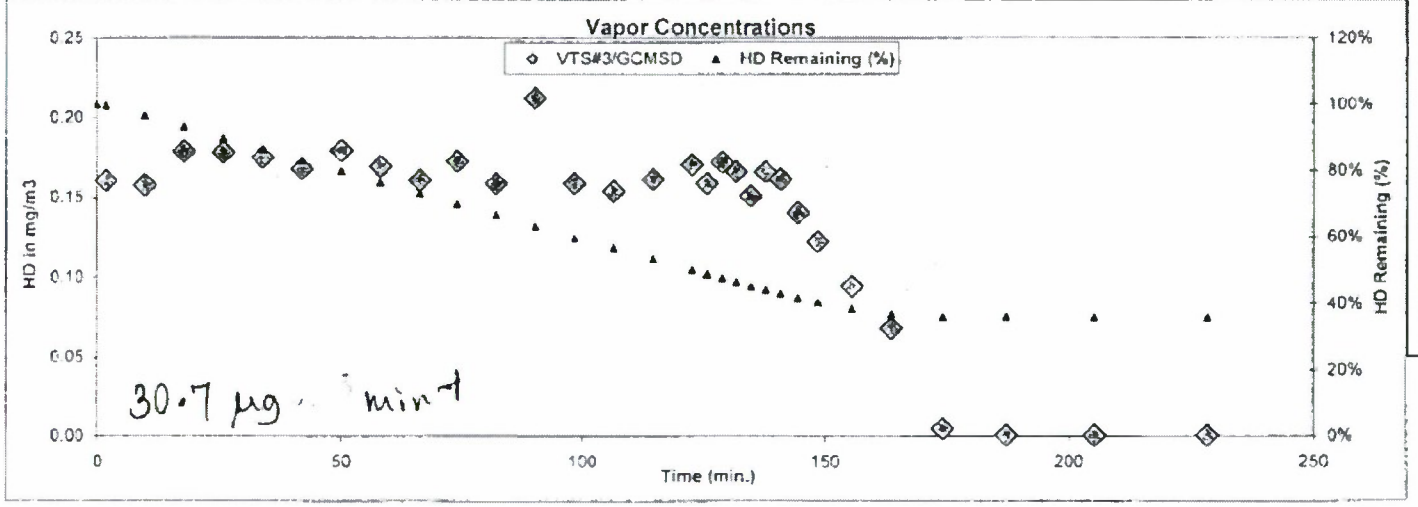
G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20060605_3c_130

20060605_3k_003

Tunnel:	3K		Date:	06/05/06
Parameters:	VTS#3	GCMSD	Exp. #:	3
type of substrate:	Glass	Dutch Galss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem:	KS	2/28/2006
number of drops:	1			
nominal drop volume:	6	µL		
mass of agent disseminated:	7.75	mg		
corrected mass on 100% agent purity:	7.54	mg	SD	P/F
Miller Nelson temperature:	0.00	°C	0.0	Pass
transition section wall temperature:	35.49	°C	0.5	Pass
fetch section wall temperature:	35.66	°C	0.5	Pass
post-test section wall temperature:	35.72	°C	0.4	Pass
mixing box wall temperature:	36.04	°C	0.2	Pass
sampling duct wall temperature:	36.07	°C	0.25	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			

substrate 34.3°C

Time (min)	Conc. mg/m³	HD rem. (%)
1.92	1.61E-01	99.63%
9.97	1.58E-01	96.55%
18.02	1.79E-01	93.28%
26.07	1.78E-01	89.82%
34.12	1.75E-01	86.40%
42.17	1.68E-01	83.07%
50.22	1.79E-01	79.71%
58.27	1.69E-01	76.33%
66.32	1.61E-01	73.13%
74.37	1.72E-01	69.90%
82.42	1.58E-01	66.70%
90.47	2.12E-01	63.10%
98.52	1.58E-01	59.51%
106.57	1.54E-01	56.49%
114.62	1.61E-01	53.44%
122.67	1.70E-01	50.23%
125.72	1.58E-01	49.02%
128.77	1.72E-01	47.80%
131.82	1.66E-01	46.56%
134.87	1.51E-01	45.40%
137.92	1.66E-01	44.24%
140.97	1.61E-01	43.04%
144.52	1.40E-01	41.75%
148.57	1.22E-01	40.47%
155.62	9.46E-02	38.63%
163.67	6.82E-02	37.05%
174.22	4.93E-03	36.12%
187.27	7.40E-04	36.04%
205.32	4.44E-04	36.01%
228.37	3.69E-04	35.99%



0.02 %RH

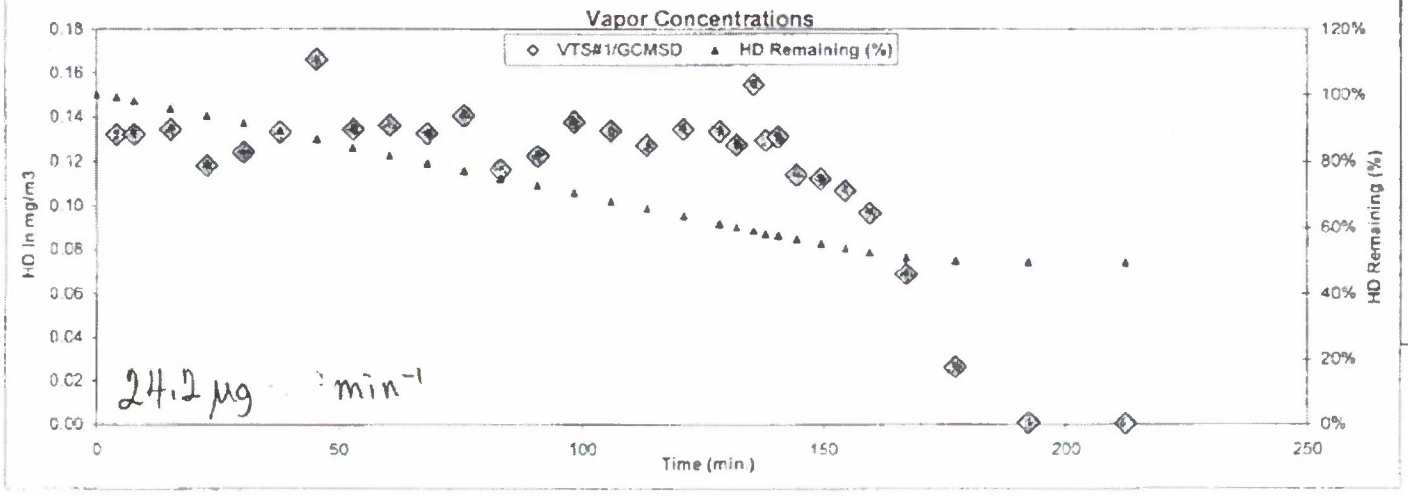
G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20060605_3k_003

20060616_3c_135

Tunnel:	3c		Date:	06/16/06
Parameters:	VTS#1	GCMSD	Exp. #:	135
type of substrate :	Glass	Dutch Galss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem:	KS	2/28/2006
number of drops:	1			
nominal drop volume:	6 µL			
mass of agent disseminated:	8.09 mg			
corrected mass on 100% agent purity:	7.88 mg		SD	P/F
Miller Nelson temperature:	0.00 °C		0.0	Pass
transition section wall temperature:	35.02 °C		0.1	Pass
fetch section wall temperature:	35.10 °C		0.3	Pass
post-test section wall temperature:	35.01 °C		0.1	Pass
mixing box wall temperature:	35.56 °C		0.5	Pass
sampling duct wall temperature:	35.11 °C		0.31	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			

Substrate 35.2°C

Time (min)	Conc. mg/m³	HD rem. (%)
4.18	1.32E-01	99.36%
7.73	1.32E-01	98.28%
15.28	1.35E-01	95.95%
22.83	1.18E-01	93.75%
30.38	1.24E-01	91.64%
37.93	1.34E-01	89.40%
45.48	1.66E-01	86.79%
53.03	1.35E-01	84.17%
60.58	1.37E-01	81.80%
68.13	1.33E-01	79.46%
75.68	1.41E-01	77.08%
83.23	1.16E-01	74.84%
90.78	1.23E-01	72.76%
98.33	1.38E-01	70.49%
105.88	1.34E-01	68.13%
113.43	1.27E-01	65.85%
120.98	1.35E-01	63.57%
128.53	1.34E-01	61.24%
132.08	1.28E-01	60.17%
135.63	1.55E-01	59.01%
136.18	1.29E-01	58.18%
140.73	1.31E-01	57.41%
144.53	1.14E-01	56.34%
149.58	1.12E-01	55.02%
154.63	1.07E-01	53.74%
159.68	9.68E-02	52.55%
167.23	6.92E-02	51.11%
177.28	2.65E-02	50.00%
192.33	8.67E-04	49.52%
212.38	5.39E-04	49.49%



24.2 µg min⁻¹

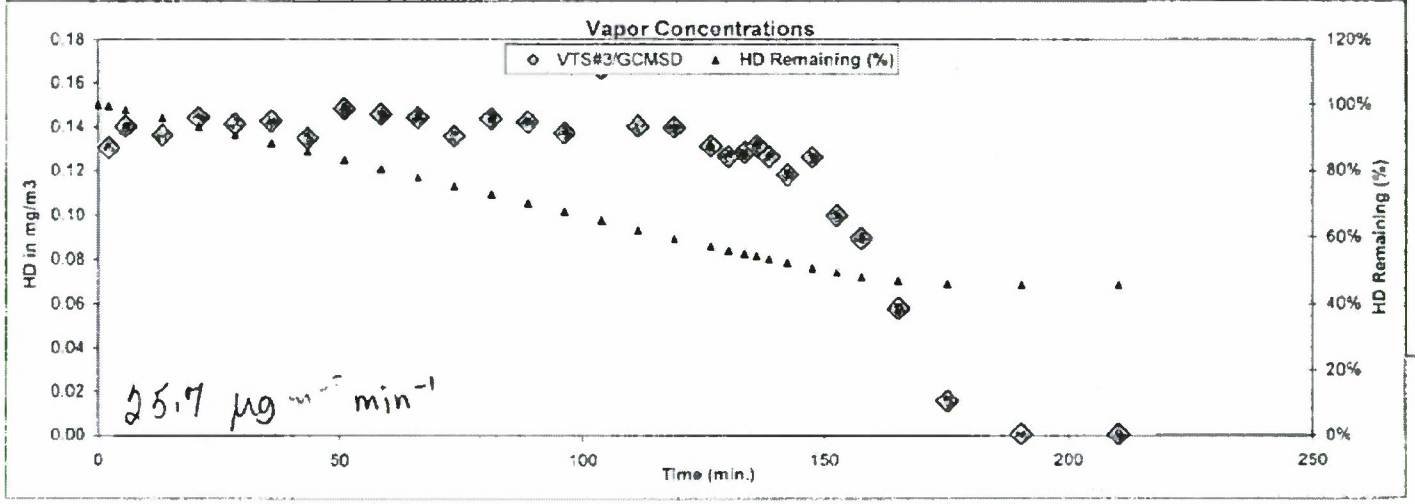
0.08% RH

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20060616_3c_135

20060616_3k_008

Tunnel:	3K		Date:	06/16/06
Parameters:	VTS#3	GCMSD	Exp. #:	8
type of substrate:	Glass	Dutch Galss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem:	KS	2/28/2006
number of drops:	1			
nominal drop volume:	6	µL		
mass of agent disseminated:	7.75	mg		
corrected mass on 100% agent purity:	7.54	mg	SD	P/F
Miller Nelson temperature:	0.00	°C	0.0	Pass
transition section wall temperature:	35.52	°C	0.5	Pass
fetch section wall temperature:	35.69	°C	0.5	Pass
post-test section wall temperature:	35.94	°C	0.2	Pass
mixing box wall temperature:	36.02	°C	0.1	Pass
sampling duct wall temperature:	36.02	°C	0.14	Pass
description:	substrate 35.3°C			
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			

Time (min)	Conc. mg/m³	HD rem. (%)
2.18	1.31E-01	99.66%
5.73	1.40E-01	98.50%
13.28	1.36E-01	95.99%
20.83	1.44E-01	93.44%
28.38	1.41E-01	90.85%
35.93	1.43E-01	88.27%
43.48	1.35E-01	85.74%
51.03	1.48E-01	83.17%
58.58	1.46E-01	80.50%
66.13	1.44E-01	77.86%
73.68	1.36E-01	75.32%
81.23	1.44E-01	72.78%
88.78	1.42E-01	70.18%
96.33	1.37E-01	67.64%
103.88	1.67E-01	64.89%
111.43	1.40E-01	62.10%
118.98	1.40E-01	59.56%
126.53	1.31E-01	57.10%
130.08	1.26E-01	56.00%
133.63	1.28E-01	54.91%
136.18	1.31E-01	54.12%
138.73	1.26E-01	53.33%
142.53	1.18E-01	52.21%
147.58	1.26E-01	50.73%
152.63	9.98E-02	49.35%
157.68	8.95E-02	48.20%
165.23	5.81E-02	46.89%
175.28	1.60E-02	45.97%
190.33	5.79E-04	45.67%
210.38	3.71E-04	45.65%

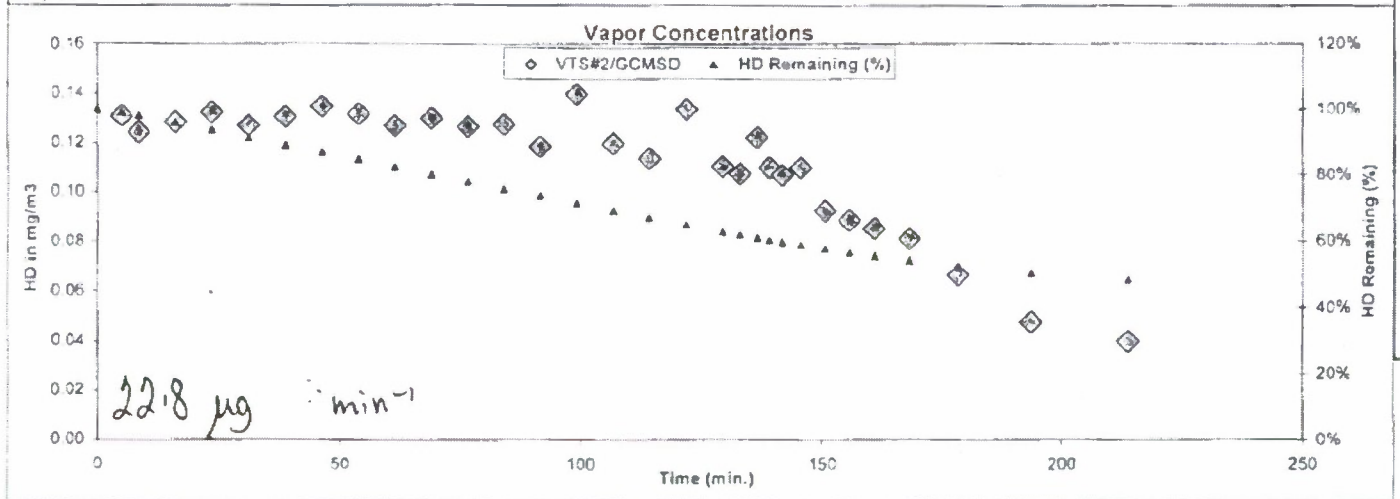


0.02% RH

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20060616_3k_008

20060627_3a_097

Tunnel:	3a		Date:	06/27/06
Parameters:	VTS#2	GCMSD	Exp. #:	97
type of substrate:	Glass	Dutch Galss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem:	KS	2/28/2006
number of drops:	1			
nominal drop volume:	6 µL			
mass of agent disseminated:	8.12 mg			
corrected mass on 100% agent purity:	7.91 mg		SD	P/F
Miller Nelson temperature:	0.00 °C		0.0	Pass
transition section wall temperature:	35.04 °C		0.2	Pass
fetch section wall temperature:	35.08 °C		0.3	Pass
post-test section wall temperature:	35.01 °C		0.1	Pass
mixing box wall temperature:	36.17 °C		0.4	Pass
sampling duct wall temperature: substate 34.7°C	35.80 °C		0.40	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			



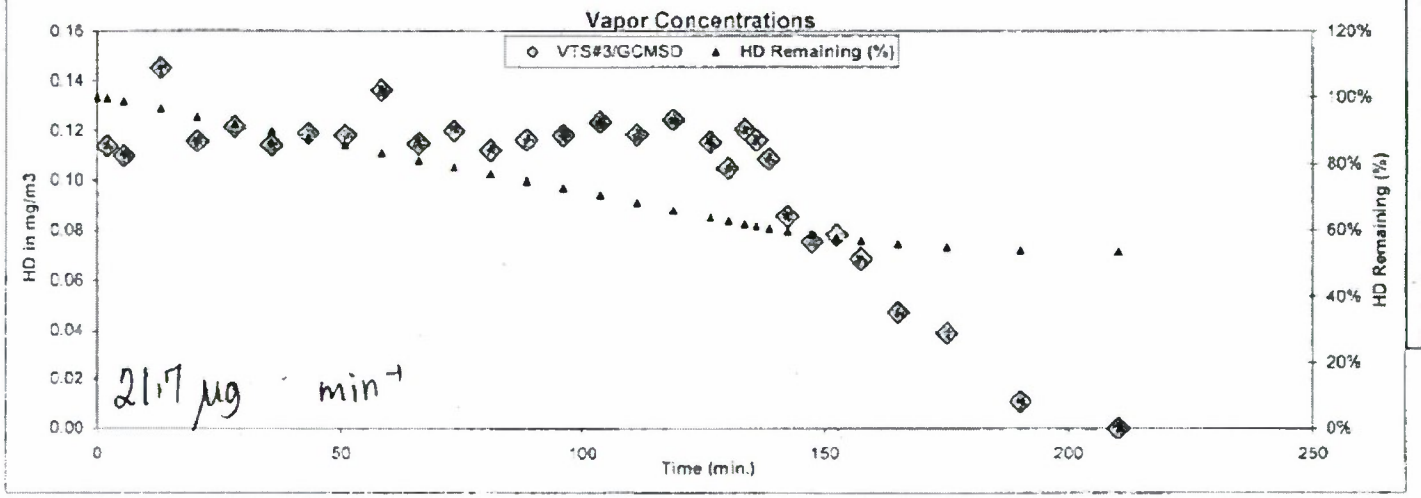
Time (min)	Conc. mg/m³	HD rem. (%)
5.12	1.31E-01	99.23%
8.67	1.24E-01	98.19%
16.22	1.28E-01	96.00%
23.77	1.32E-01	93.74%
31.32	1.27E-01	91.49%
38.87	1.30E-01	89.25%
46.42	1.35E-01	86.95%
53.97	1.32E-01	84.64%
61.52	1.27E-01	82.40%
69.07	1.30E-01	80.17%
76.62	1.26E-01	77.95%
84.17	1.27E-01	75.75%
91.72	1.18E-01	73.62%
99.27	1.39E-01	71.39%
106.82	1.19E-01	69.14%
114.37	1.13E-01	67.12%
121.92	1.33E-01	64.98%
129.47	1.10E-01	62.87%
133.02	1.07E-01	61.98%
136.57	1.22E-01	61.04%
139.17	1.10E-01	60.35%
141.77	1.07E-01	59.70%
145.62	1.10E-01	58.75%
150.70	9.22E-02	57.57%
155.80	8.84E-02	56.51%
160.90	8.51E-02	55.49%
168.50	8.10E-02	54.04%
178.60	6.64E-02	52.33%
193.70	4.74E-02	50.35%
213.80	3.98E-02	48.34%

0.11% RH

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20060627_3a_097

20060706_3L_005

Tunnel:	3L		Date:	07/06/06
Parameters:	VTS#3	GCMSD	Exp. #:	5
type of substrate:	Glass	Dutch Galss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem	KS	2/28/2006
number of drops:	1			
nominal drop volume:	6	µL		
mass of agent disseminated:	7.75	mg		
corrected mass on 100% agent purity:	7.54	mg	SD	P/F
Miller Nelson temperature:	0.00	°C	0.0	Pass
transition section wall temperature:	35.00	°C	0.1	Pass
fetch section wall temperature:	35.11	°C	0.3	Pass
post-test section wall temperature:	35.01	°C	0.1	Pass
mixing box wall temperature: substrate 34.8°C	35.81	°C	0.4	Pass
sampling duct wall temperature:	35.80	°C	0.40	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			



Time (min)	Conc. mg/m³	HD rem. (%)
2.08	1.14E-01	99.72%
5.63	1.10E-01	96.76%
13.18	1.45E-01	96.45%
20.73	1.16E-01	94.09%
28.28	1.22E-01	91.94%
35.83	1.14E-01	89.80%
43.38	1.19E-01	87.68%
50.92	1.18E-01	85.54%
58.47	1.36E-01	83.24%
66.02	1.15E-01	80.97%
73.57	1.20E-01	78.84%
81.12	1.12E-01	76.74%
88.67	1.16E-01	74.67%
96.22	1.18E-01	72.55%
103.77	1.23E-01	70.36%
111.33	1.18E-01	68.17%
118.88	1.24E-01	65.97%
126.43	1.15E-01	63.80%
129.98	1.05E-01	62.86%
133.53	1.20E-01	61.91%
136.08	1.16E-01	61.18%
138.63	1.09E-01	60.49%
142.43	8.57E-02	59.61%
147.48	7.59E-02	58.63%
152.53	7.82E-02	57.70%
157.58	6.87E-02	56.81%
165.13	4.72E-02	55.76%
175.18	3.89E-02	54.72%
190.23	1.09E-02	53.82%
210.28	0.00E+00	53.56%

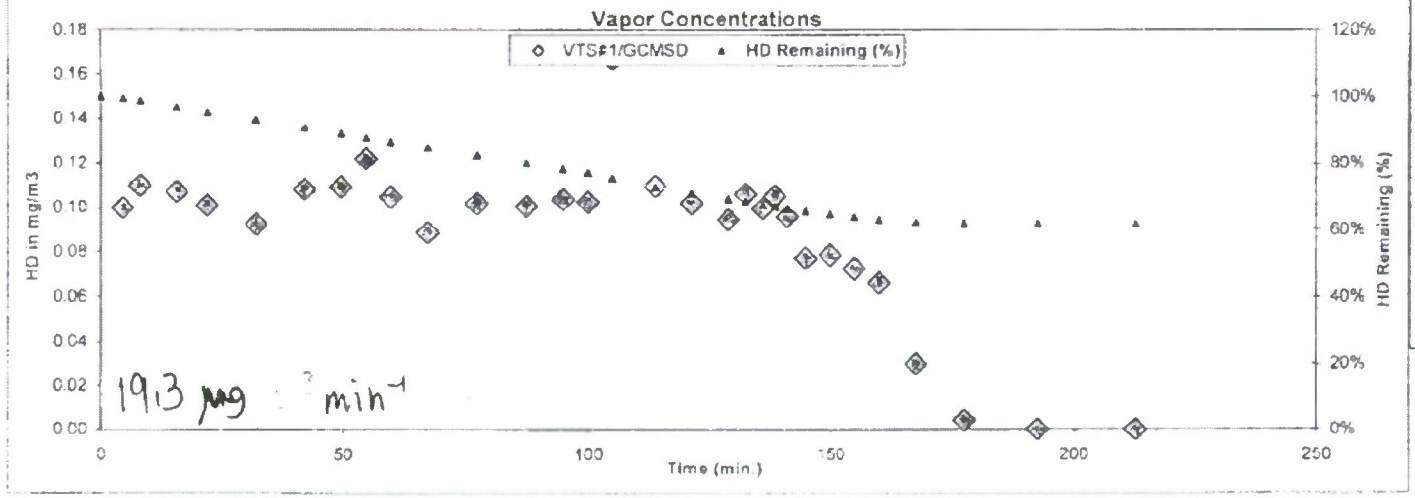
0% RH

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20060706_3L_005

20060713_3c_146

Tunnel:	3c		Date:	07/13/06
Parameters:	VTS#1	GCMSD	Exp. #:	146
type of substrate:	Glass	Dutch Galss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem:	KS	2/28/2006
number of drops:	1			
nominal drop volume:	6	µL		
mass of agent disseminated:	8.13	mg		
corrected mass on 100% agent purity:	7.92	mg	SD	P/F
Miller Nelson temperature:	0.00	°C	0.0	Pass
transition section wall temperature:	35.07	°C	0.3	Pass
fetch section wall temperature:	36.14	°C	0.5	Pass
post-test section wall temperature:	36.38	°C	0.6	Pass
mixing box wall temperature:	39.00	°C	1.0	Pass
sampling duct wall temperature:	37.61	°C	0.64	Pass
description:	substrate 35.0°C			
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			

Time (min)	Conc mg/m³	HD rem. (%)
4.60	9.99E-02	99.47%
8.15	1.10E-01	98.62%
15.70	1.07E-01	96.74%
22.00	1.01E-01	95.24%
32.05	9.25E-02	93.01%
42.10	1.08E-01	90.70%
49.65	1.09E-01	88.82%
54.70	1.22E-01	87.48%
59.75	1.05E-01	86.17%
67.30	8.87E-02	84.50%
77.35	1.02E-01	82.30%
87.40	1.01E-01	79.97%
94.95	1.04E-01	78.21%
100.00	1.02E-01	77.02%
105.05	1.67E-01	75.46%
113.85	1.10E-01	72.68%
121.40	1.02E-01	70.85%
128.95	9.46E-02	69.15%
132.50	1.06E-01	68.34%
136.05	9.95E-02	67.50%
138.60	1.05E-01	66.90%
141.15	9.59E-02	66.32%
144.95	7.71E-02	65.56%
149.98	7.86E-02	64.67%
155.03	7.24E-02	63.79%
160.08	6.62E-02	62.99%
167.63	2.99E-02	62.16%
177.68	4.17E-03	61.77%
192.73	1.96E-05	61.70%
212.78	0.00E+00	61.70%



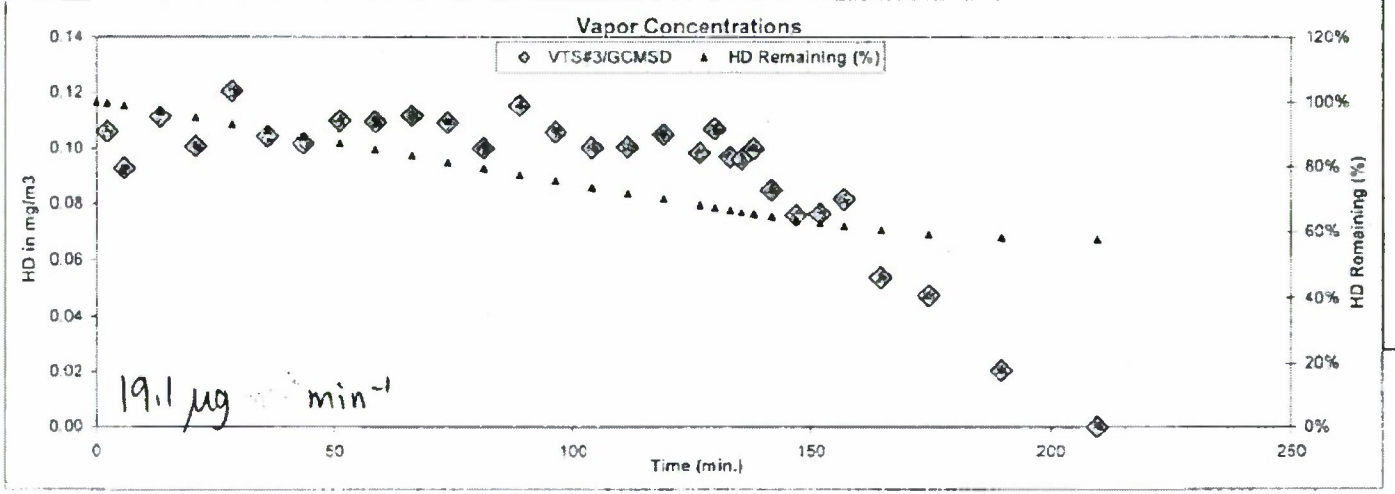
0.07% RH

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20060713_3c_146

20060713_3L_008

Tunnel:	3L		Date:	07/13/06
Parameters:	VTS#3	GCMSD	Exp. #:	8
type of substrate:	Glass	Dutch Galss		
test agent:	HD			
agent grade.:	neat			
agent purity:	97.4%	Date/Chem.	KS	2/28/2005
number of drops:	1			
nominal drop volume:	6	µL		
mass of agent disseminated:	7.75	mg		
corrected mass on 100% agent purity:	7.54	mg	SD	P/F
Miller Nelson temperature:	0.00	°C	0.0	Pass
transition section wall temperature:	35.01	°C	0.1	Pass
fetch section wall temperature:	35.14	°C	0.4	Pass
post-test section wall temperature:	35.03	°C	0.2	Pass
mixing box wall temperature:	35.85	°C	0.4	Pass
sampling duct wall temperature:	35.88	°C	0.33	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			

Substrate 35.1°C



19.1 µg min⁻¹

Time (min)	Conc. mg/m³	HD rem. (%)
2.30	1.06E-01	99.71%
5.85	9.29E-02	98.86%
13.38	1.11E-01	97.02%
20.93	1.01E-01	95.10%
28.48	1.21E-01	93.10%
36.03	1.04E-01	91.07%
43.58	1.02E-01	89.20%
51.13	1.10E-01	87.29%
58.68	1.10E-01	85.31%
66.23	1.12E-01	83.30%
73.78	1.09E-01	81.31%
81.33	1.00E-01	79.41%
88.88	1.15E-01	77.47%
96.43	1.06E-01	75.47%
103.98	1.00E-01	73.60%
111.53	1.00E-01	71.79%
119.08	1.05E-01	69.93%
126.63	9.83E-02	68.09%
129.81	1.07E-01	67.31%
132.98	9.69E-02	66.54%
135.53	9.61E-02	65.95%
138.08	9.98E-02	65.35%
141.86	8.49E-02	64.51%
146.93	7.59E-02	63.54%
151.98	7.64E-02	62.62%
157.03	8.16E-02	61.66%
164.58	5.39E-02	60.43%
174.63	4.75E-02	59.21%
189.68	2.06E-02	57.99%
209.73	0.00E+00	57.49%

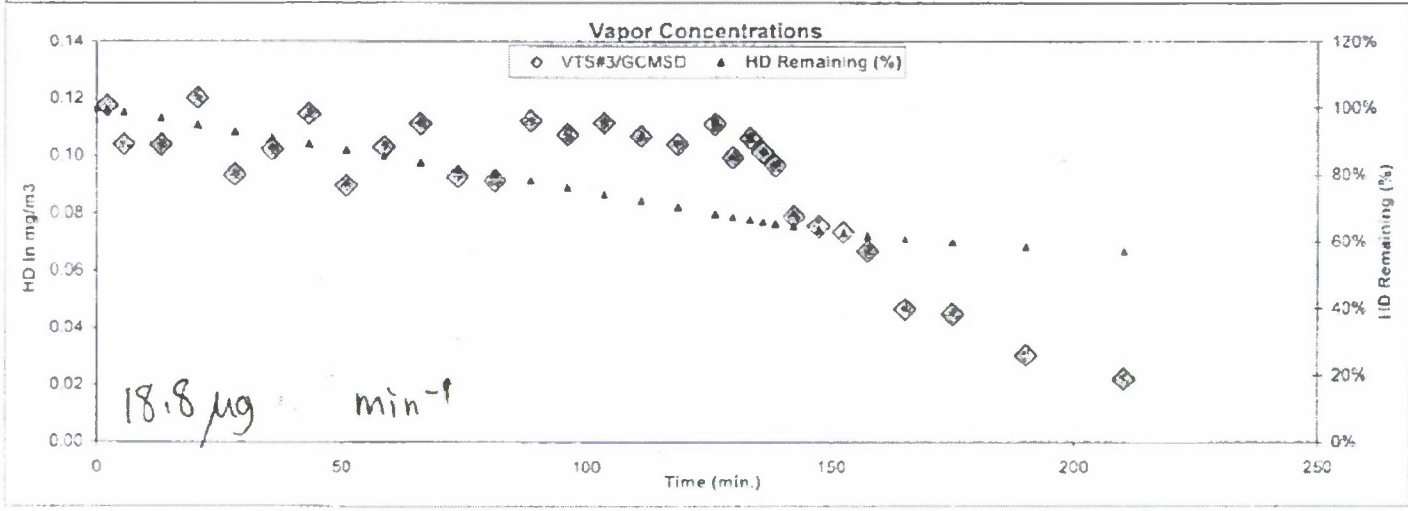
0.18%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20060713_3L_008

20060720_3L_009

Tunnel:	3L		Date:	07/20/06
Parameters:	VTS#3	GCMSD	Exp. #:	20060720_3L_009
type of substrate:	Glass	Dutch Galss		
test agent:	HD			
agent grade:	neat			
agent purity	97.4%	Date/Chem:	KS	2/28/2006
number of drops:	1			
nominal drop volume:	6	µL		
mass of agent disseminated:	7.75	mg		
corrected mass on 100% agent purity:	7.54	mg	SD	P/F
Miller Nelson temperature:	0.00	°C	0.0	Pass
transition section wall temperature:	35.00	°C	0.0	Pass
fetch section wall temperature:	35.08	°C	0.3	Pass
post-test section wall temperature:	35.05	°C	0.2	Pass
mixing box wall temperature:	35.62	°C	0.5	Pass
sampling duct wall temperature:	35.69	°C	0.46	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			

substrate 35.2°C



18.8 µg min⁻¹

Time (min)	Conc. mg/m³	HD rem. (%)
2.15	1.18E-01	99.70%
5.70	1.04E-01	98.75%
13.25	1.04E-01	96.86%
20.80	1.20E-01	94.83%
28.33	9.34E-02	92.89%
35.88	1.02E-01	91.11%
43.43	1.15E-01	89.14%
50.98	8.97E-02	87.29%
58.53	1.03E-01	85.54%
66.08	1.11E-01	83.59%
73.63	9.27E-02	81.74%
81.18	9.12E-02	80.07%
88.73	1.12E-01	78.22%
96.28	1.07E-01	76.23%
103.83	1.11E-01	74.24%
111.40	1.07E-01	72.25%
118.95	1.04E-01	70.34%
126.50	1.11E-01	68.39%
130.05	9.93E-02	67.49%
133.60	1.06E-01	66.61%
136.15	1.01E-01	65.98%
138.68	9.66E-02	65.37%
142.48	7.88E-02	64.57%
147.53	7.55E-02	63.64%
152.58	7.34E-02	62.73%
157.63	6.67E-02	61.88%
165.18	4.66E-02	60.85%
175.23	4.47E-02	59.75%
190.28	3.04E-02	58.39%
210.33	2.22E-02	57.12%

0%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20060720_3L_009

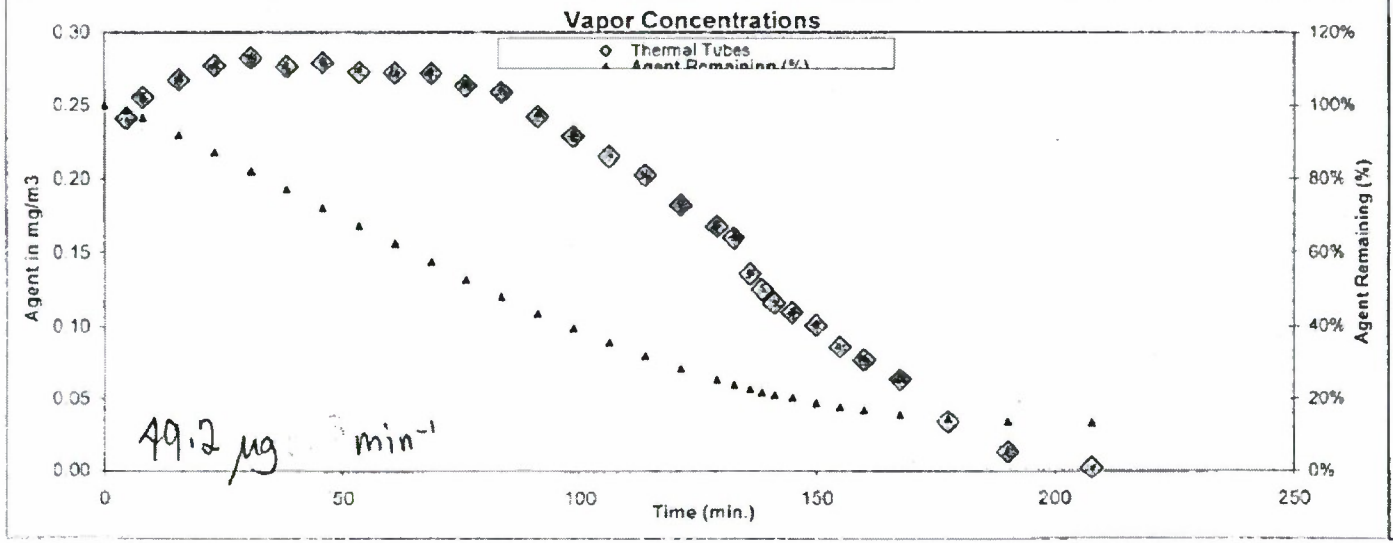
20061211_3a_143

Data Evaluation Grade: Modeling Grade

Tunnel:	3a	
Instruments:	VTS#8/GCMSD	
Date/Experiment #:	12/11/06	143
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.91 mg	
Corrected mass on 100% agent purity:	7.71 mg	
Average substrate temperature:	34.80 °C	
Average air flow rate:	181.86 SLPM	
Average air temperature above drop:	34.89 °C	
Mass % recovery in vapor:	86.6 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	86.6 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.2	0.46%	Go
1.8	0.97%	Go
0.1	0.41%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
4.60	2.41E-01	98.69%
8.13	2.55E-01	96.62%
15.68	2.68E-01	91.96%
23.23	2.77E-01	87.11%
30.78	2.82E-01	82.12%
38.33	2.77E-01	77.14%
45.88	2.79E-01	72.19%
53.43	2.73E-01	67.27%
60.98	2.73E-01	62.41%
68.53	2.72E-01	57.56%
76.07	2.64E-01	52.80%
83.62	2.59E-01	48.15%
91.17	2.43E-01	43.68%
98.72	2.29E-01	39.48%
106.27	2.15E-01	35.52%
113.82	2.03E-01	31.80%
121.37	1.82E-01	28.37%
128.92	1.68E-01	25.25%
132.47	1.60E-01	23.88%
136.02	1.36E-01	22.64%
138.57	1.25E-01	21.85%
141.12	1.16E-01	21.13%
144.90	1.10E-01	20.12%
149.95	1.01E-01	18.86%
155.00	8.57E-02	17.75%
160.05	7.69E-02	16.76%
167.60	6.33E-02	15.54%
177.65	3.42E-02	14.38%
190.20	1.31E-02	13.68%
207.75	2.11E-03	13.37%

0%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20061211_3a_143

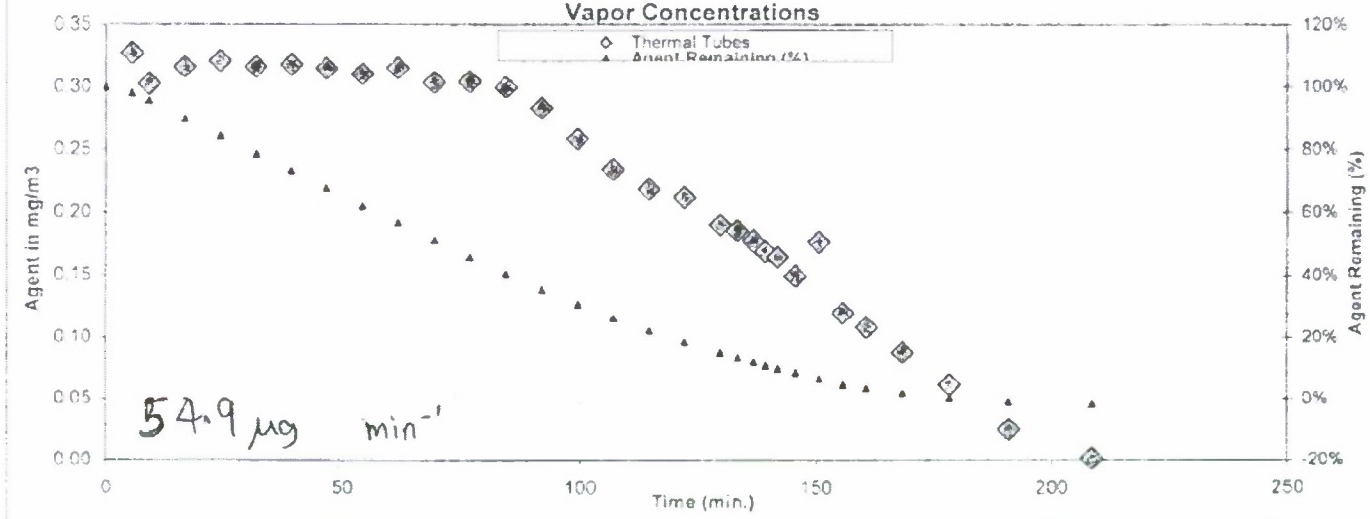
20061211_3c_180

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3c	
Instruments:	VTS#9/GCMSD	
Date/Experment #:	12/11/06	180
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	8.01 mg	
Corrected mass on 100% agent purity:	7.80 mg	
Average substrate temperature:	34.97 °C	
Average air flow rate:	181.50 SLPM	
Average air temperature above drop:	34.68 °C	
Mass % recovery in vapor:	101.7 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	101.7 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.1	0.37%	Go
1.4	0.76%	Go
0.1	0.26%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
5.47	3.27E-01	97.92%
9.02	3.03E-01	95.32%
16.57	3.16E-01	89.88%
24.10	3.21E-01	84.30%
31.65	3.16E-01	78.71%
39.20	3.18E-01	73.14%
46.73	3.15E-01	67.59%
54.28	3.10E-01	62.10%
61.83	3.15E-01	56.60%
69.38	3.04E-01	51.16%
76.92	3.04E-01	45.83%
84.47	3.00E-01	40.53%
92.02	2.83E-01	35.41%
99.57	2.59E-01	30.66%
107.10	2.34E-01	26.34%
114.65	2.18E-01	22.37%
122.20	2.12E-01	18.59%
129.75	1.90E-01	15.06%
133.30	1.85E-01	13.51%
136.83	1.77E-01	12.02%
139.38	1.69E-01	10.99%
141.93	1.65E-01	10.00%
145.73	1.50E-01	8.61%
150.77	1.76E-01	6.70%
155.82	1.20E-01	4.96%
160.87	1.09E-01	3.62%
168.40	8.80E-02	1.90%
178.45	6.19E-02	0.15%
191.00	2.51E-02	-1.12%
208.55	1.37E-03	-1.66%

0% RH

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20061211_3c_180

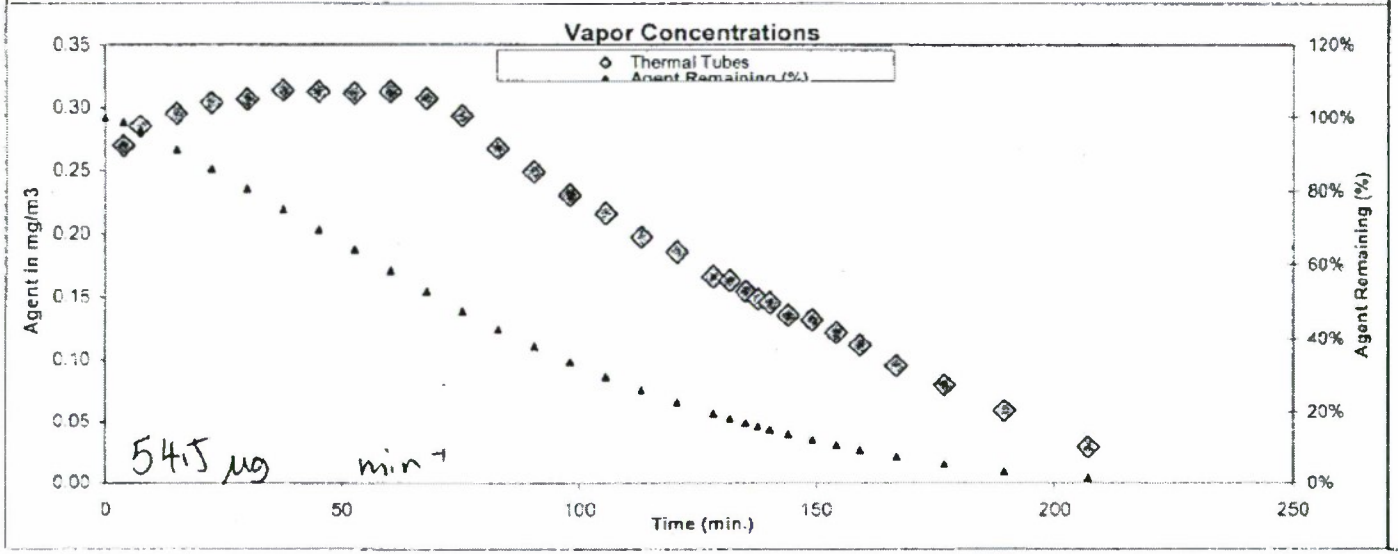
20061212_3a_144

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3a	
Instruments:	VTS#8/GCMSD	
Date/Experiment #:	12/12/05	144
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.92 mg	
Corrected mass on 100% agent purity:	7.71 mg	
Average substrate temperature:	33.62 °C	
Average air flow rate:	181.75 SLPM	
Average air temperature above drop:	34.83 °C	
Mass % recovery in vapor:	98.5 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	98.5 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
1.0	2.89%	Go
1.9	1.03%	Go
0.1	0.40%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
3.88	2.70E-01	98.77%
7.43	2.85E-01	96.45%
14.98	2.95E-01	91.29%
22.53	3.03E-01	85.96%
30.08	3.06E-01	80.54%
37.63	3.13E-01	75.02%
45.18	3.12E-01	69.46%
52.72	3.11E-01	63.93%
60.27	3.12E-01	58.38%
67.82	3.07E-01	52.87%
75.37	2.93E-01	47.54%
82.92	2.67E-01	42.55%
90.47	2.48E-01	37.97%
98.02	2.30E-01	33.71%
105.57	2.16E-01	29.74%
113.12	1.97E-01	26.07%
120.67	1.85E-01	22.68%
128.22	1.66E-01	19.55%
131.77	1.63E-01	18.18%
135.32	1.54E-01	16.85%
137.85	1.48E-01	15.95%
140.40	1.45E-01	15.07%
144.20	1.35E-01	13.81%
149.25	1.32E-01	12.22%
154.30	1.21E-01	10.71%
159.35	1.12E-01	9.32%
166.90	9.55E-02	7.47%
176.95	8.06E-02	5.39%
189.48	5.98E-02	3.32%
207.03	3.00E-02	1.46%

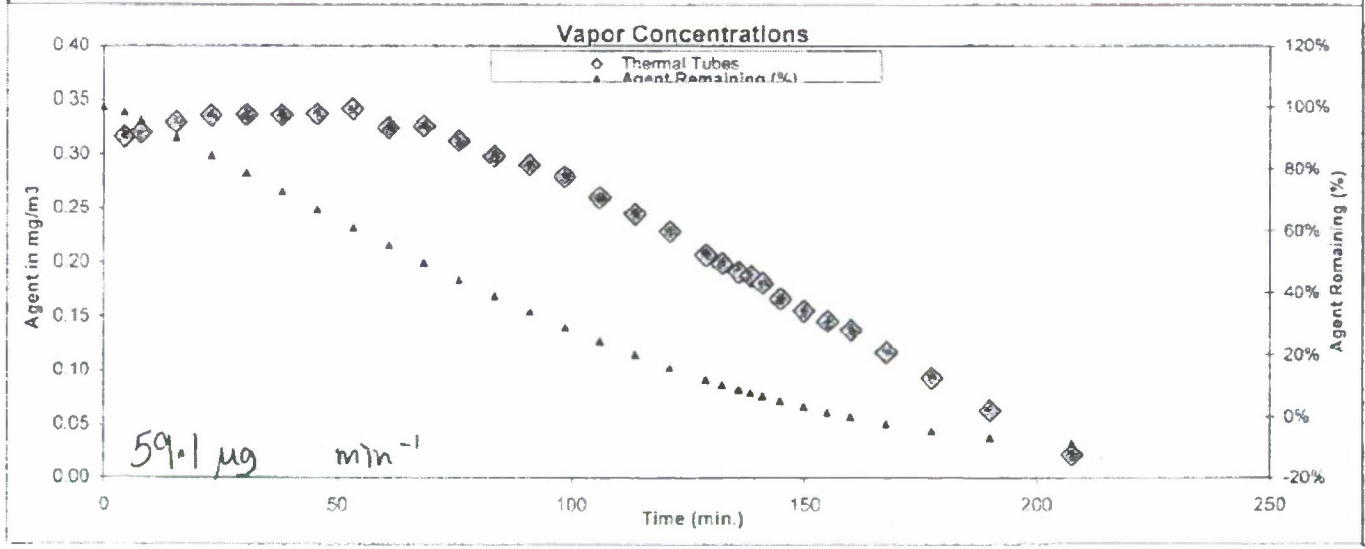
G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20061212_3a_144

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3c	
Instruments:	VTS#9/GCMSD	
Date/Experiment #:	12/12/06	181
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6	µL
Mass of agent disseminated:	8.14	mg
Corrected mass on 100% agent purity:	7.92	mg
Average substrate temperature:	34.34	°C
Average air flow rate:	181.55	SLPM
Average air temperature above drop:	34.62	°C
Mass % recovery in vapor:	108.6	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	108.6	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.1	0.39%	Go
1.5	0.82%	Go
0.1	0.20%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
4.50	3.16E-01	98.37%
8.05	3.20E-01	95.78%
15.60	3.29E-01	90.16%
23.13	3.35E-01	84.43%
30.68	3.36E-01	78.62%
38.23	3.36E-01	72.81%
45.78	3.37E-01	67.00%
53.32	3.41E-01	61.14%
60.87	3.24E-01	55.39%
68.42	3.25E-01	49.77%
75.97	3.12E-01	44.26%
83.50	2.98E-01	39.00%
91.05	2.90E-01	33.92%
98.60	2.79E-01	29.00%
106.15	2.60E-01	24.34%
113.70	2.45E-01	19.98%
121.23	2.28E-01	15.90%
128.78	2.06E-01	12.14%
132.33	1.99E-01	10.49%
135.88	1.91E-01	8.91%
138.42	1.87E-01	7.81%
140.97	1.80E-01	6.74%
144.77	1.66E-01	5.23%
149.82	1.55E-01	3.38%
154.85	1.45E-01	1.65%
159.90	1.37E-01	0.02%
167.45	1.17E-01	-2.18%
177.48	9.34E-02	-4.59%
190.03	6.32E-02	-6.84%
207.58	2.18E-02	-8.55%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20061212_3c_181

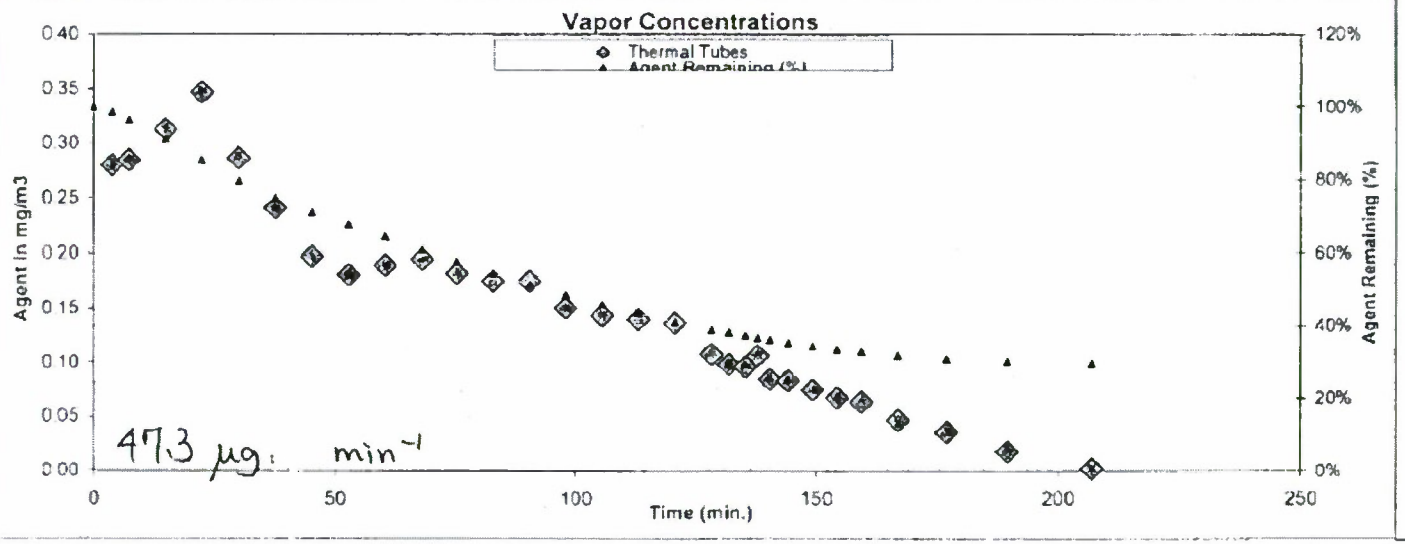
20061213_3a_145

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3a	
Instruments:	VTS#08/GCMSD	
Date/Experiment #:	12/13/06	145
Type of substrate :	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6	µL
Mass of agent disseminated:	7.96	mg
Corrected mass on 100% agent purity:	7.76	mg
Average substrate temperature:	34.68	°C
Average air flow rate:	181.81	SLPM
Average air temperature above drop:	34.75	°C
Mass % recovery in vapor:	70.3	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	70.3	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.0	0.14%	Go
2.2	1.22%	Go
0.1	0.40%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
3.90	2.80E-01	98.72%
7.45	2.85E-01	96.37%
14.98	3.13E-01	91.10%
22.53	3.46E-01	85.27%
30.08	2.86E-01	79.67%
37.63	2.41E-01	75.01%
45.18	1.97E-01	71.13%
52.73	1.81E-01	67.78%
60.28	1.89E-01	64.51%
67.83	1.95E-01	61.11%
75.37	1.82E-01	57.78%
82.92	1.75E-01	54.62%
90.47	1.75E-01	51.52%
98.02	1.50E-01	48.65%
105.57	1.43E-01	46.05%
113.12	1.40E-01	43.55%
120.67	1.36E-01	41.11%
128.22	1.07E-01	38.95%
131.77	9.81E-02	38.10%
135.32	9.59E-02	37.29%
137.87	1.06E-01	36.69%
140.42	8.45E-02	36.12%
144.20	8.29E-02	35.38%
149.25	7.46E-02	34.44%
154.30	6.73E-02	33.60%
159.35	6.32E-02	32.83%
166.90	4.67E-02	31.86%
176.95	3.57E-02	30.89%
189.50	1.81E-02	30.10%
207.05	2.15E-03	29.68%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20061213_3a_145

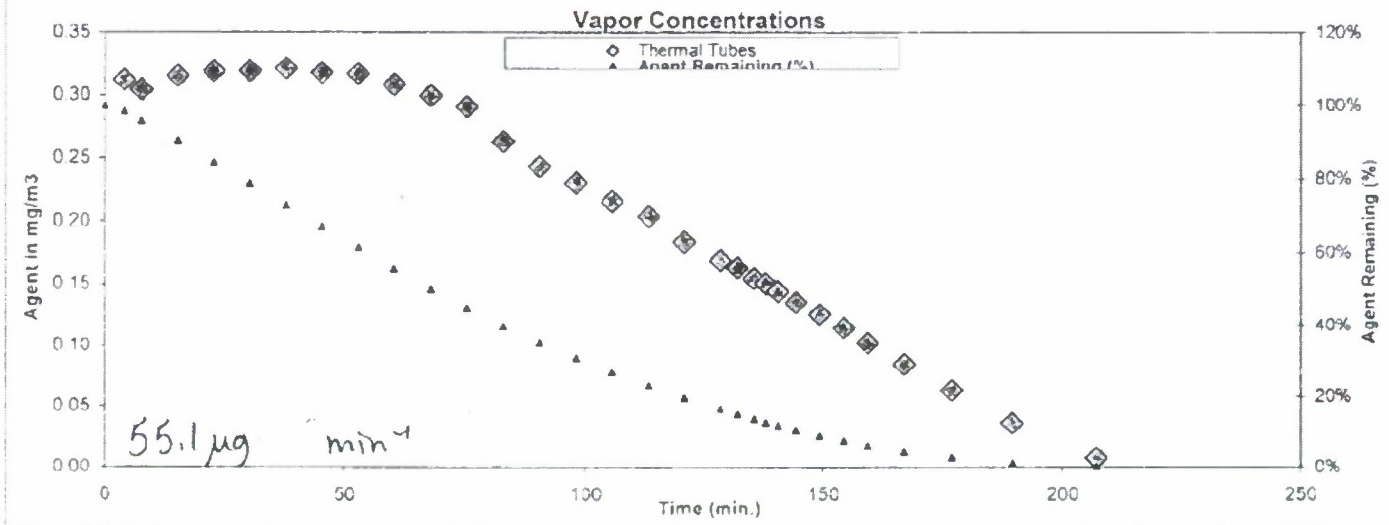
20061213_3c_182

Data Evaluation Grade: Modeling Grade

Tunnel:	3c	
Instruments:	VTS#09/GCMSD	
Date/Experiment #:	12/13/06	182
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6	µL
Mass of agent disseminated:	7.75	mg
Corrected mass on 100% agent purity:	7.54	mg
Average substrate temperature:	34.63	°C
Average air flow rate:	181.59	SLPM
Average air temperature above drop:	34.39	°C
Mass % recovery in vapor:	99.9	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	99.9	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2005
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.1	0.41%	Go
1.5	0.60%	Go
0.1	0.29%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
4.03	3.12E-01	98.48%
7.58	3.04E-01	95.85%
15.13	3.16E-01	90.22%
22.68	3.19E-01	84.45%
30.22	3.19E-01	78.66%
37.77	3.21E-01	72.85%
45.32	3.18E-01	67.04%
52.87	3.17E-01	61.28%
60.40	3.08E-01	55.61%
67.95	2.99E-01	50.09%
75.50	2.91E-01	44.72%
83.03	2.63E-01	39.71%
90.58	2.43E-01	35.11%
98.13	2.30E-01	30.82%
105.68	2.16E-01	26.77%
113.23	2.03E-01	22.96%
120.77	1.83E-01	19.46%
128.32	1.69E-01	16.26%
131.87	1.63E-01	14.84%
135.42	1.54E-01	13.49%
137.95	1.51E-01	12.56%
140.50	1.44E-01	11.65%
144.30	1.35E-01	10.38%
149.33	1.26E-01	8.80%
154.38	1.14E-01	7.34%
159.43	1.02E-01	6.02%
166.98	8.45E-02	4.32%
177.02	6.33E-02	2.54%
189.57	3.62E-02	1.04%
207.12	7.44E-03	0.12%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20061213_3c_182

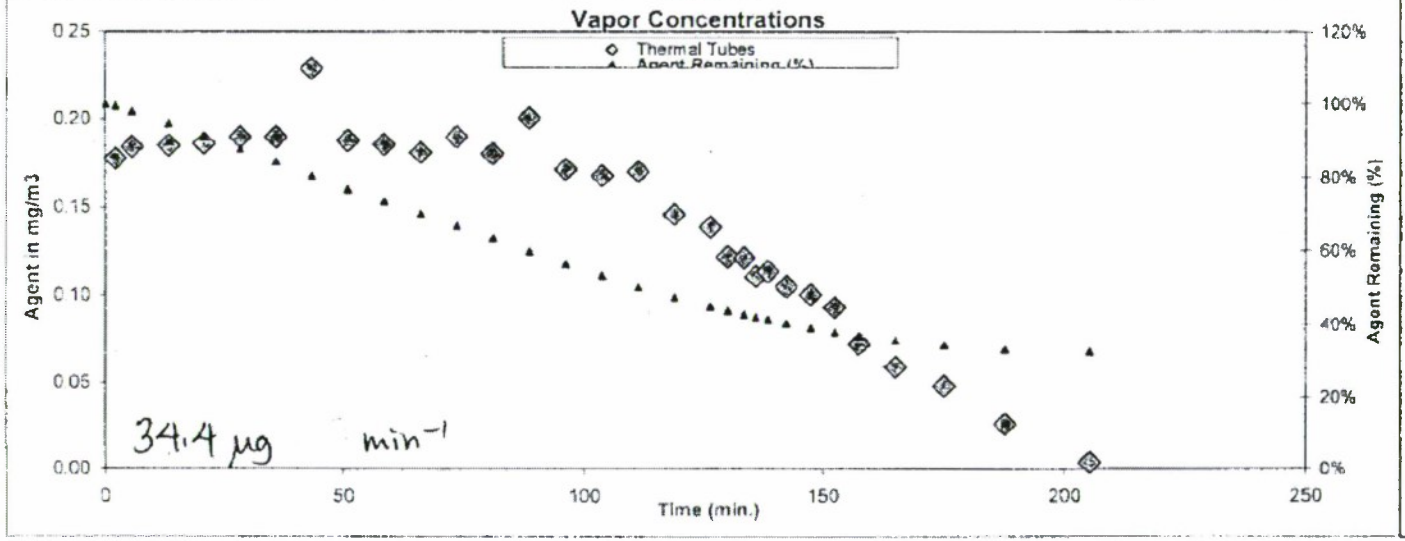
20061213_3k_042

Data Evaluation Grade: Modeling Grade

Tunnel:	3K	
Instruments:	VTS#10/GCMSD	
Date/Experiment #:	12/13/06	42
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.75 mg	
Corrected mass on 100% agent purity:	7.54 mg	
Average substrate temperature:	34.70 °C	
Average air flow rate:	181.89 SLPM	
Average air temperature above drop:	34.84 °C	
Mass % recovery in vapor:	67.4 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	67.4 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2005

Data Evaluation		
SD	%SD	Status
0.2	0.45%	Go
1.1	0.61%	Go
0.1	0.21%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
2.03	1.78E-01	99.56%
5.58	1.84E-01	98.02%
13.13	1.85E-01	94.65%
20.68	1.86E-01	91.27%
28.23	1.90E-01	87.85%
35.78	1.90E-01	84.40%
43.33	2.29E-01	80.59%
50.87	1.88E-01	76.80%
58.42	1.85E-01	73.41%
65.97	1.81E-01	70.07%
73.52	1.90E-01	66.70%
81.07	1.80E-01	63.33%
88.62	2.01E-01	59.87%
96.17	1.71E-01	56.48%
103.72	1.68E-01	53.39%
111.27	1.70E-01	50.32%
118.82	1.46E-01	47.45%
126.37	1.38E-01	44.86%
129.92	1.22E-01	43.75%
133.47	1.21E-01	42.71%
136.02	1.11E-01	42.00%
136.57	1.13E-01	41.31%
142.37	1.05E-01	40.31%
147.42	1.00E-01	39.06%
152.47	9.31E-02	37.88%
157.52	7.23E-02	36.87%
165.07	5.92E-02	35.68%
175.12	4.83E-02	34.38%
187.67	2.63E-02	33.25%
205.22	3.83E-03	32.61%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20061213_3k_042

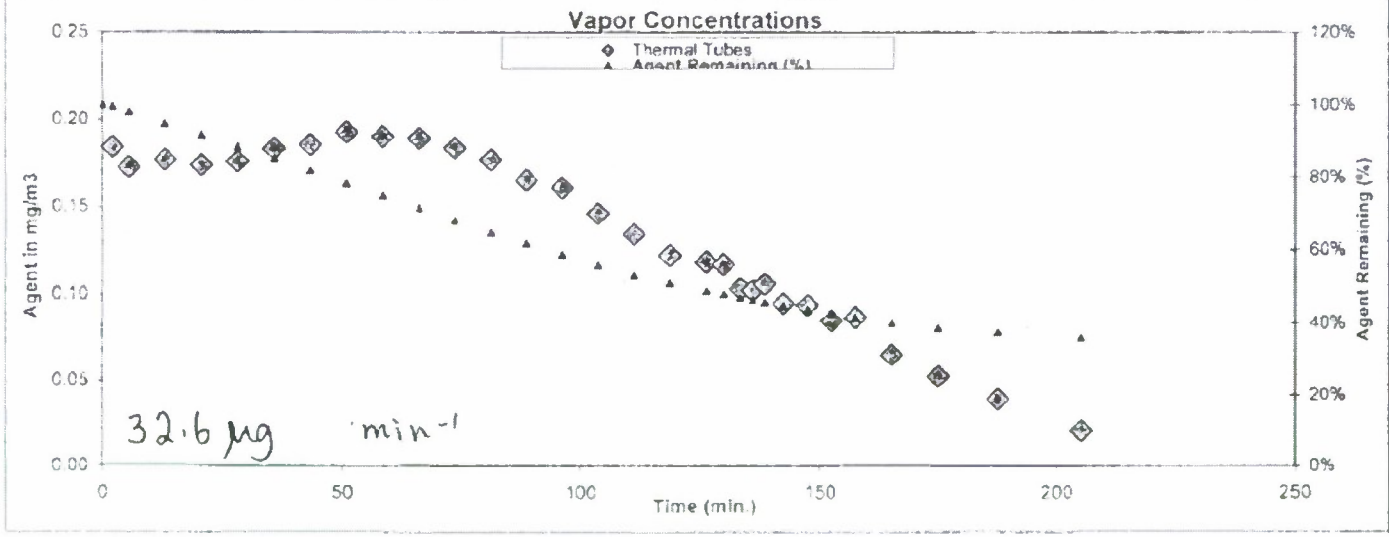
20061213_3L_040

Data Evaluation Grade: Modeling Grade

Tunnel:	3L	
Instruments:	VTS#11/GCMSD	
Date/Experiment #:	12/13/06	40
Type of substrate :	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6	µL
Mass of agent disseminated:	7.75	mg
Corrected mass on 100% agent purity:	7.54	mg
Average substrate temperature:	35.17	°C
Average air flow rate:	181.71	SLPM
Average air temperature above drop:	35.02	°C
Mass % recovery in vapor:	64.0	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	64.0	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.1	0.42%	Go
1.1	0.59%	Go
0.1	0.23%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
2.03	1.84E-01	99.55%
5.57	1.73E-01	98.03%
13.12	1.77E-01	94.85%
20.67	1.74E-01	91.68%
28.22	1.76E-01	88.48%
35.77	1.83E-01	85.21%
43.32	1.86E-01	81.85%
50.87	1.93E-01	78.42%
58.42	1.90E-01	74.94%
65.97	1.89E-01	71.50%
73.52	1.84E-01	68.11%
81.07	1.77E-01	64.83%
88.62	1.65E-01	61.72%
96.17	1.61E-01	58.76%
103.72	1.46E-01	55.97%
111.27	1.34E-01	53.42%
118.82	1.22E-01	51.09%
126.37	1.18E-01	48.91%
129.92	1.17E-01	47.90%
133.47	1.03E-01	46.96%
136.02	1.02E-01	46.33%
138.57	1.06E-01	45.69%
142.37	9.46E-02	44.78%
147.42	9.35E-02	43.63%
152.47	8.47E-02	42.55%
157.52	8.65E-02	41.51%
165.07	6.51E-02	40.13%
175.12	5.26E-02	38.71%
187.67	3.93E-02	37.32%
205.22	2.10E-02	36.04%

G:\Agent\FateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20061213_3L_040

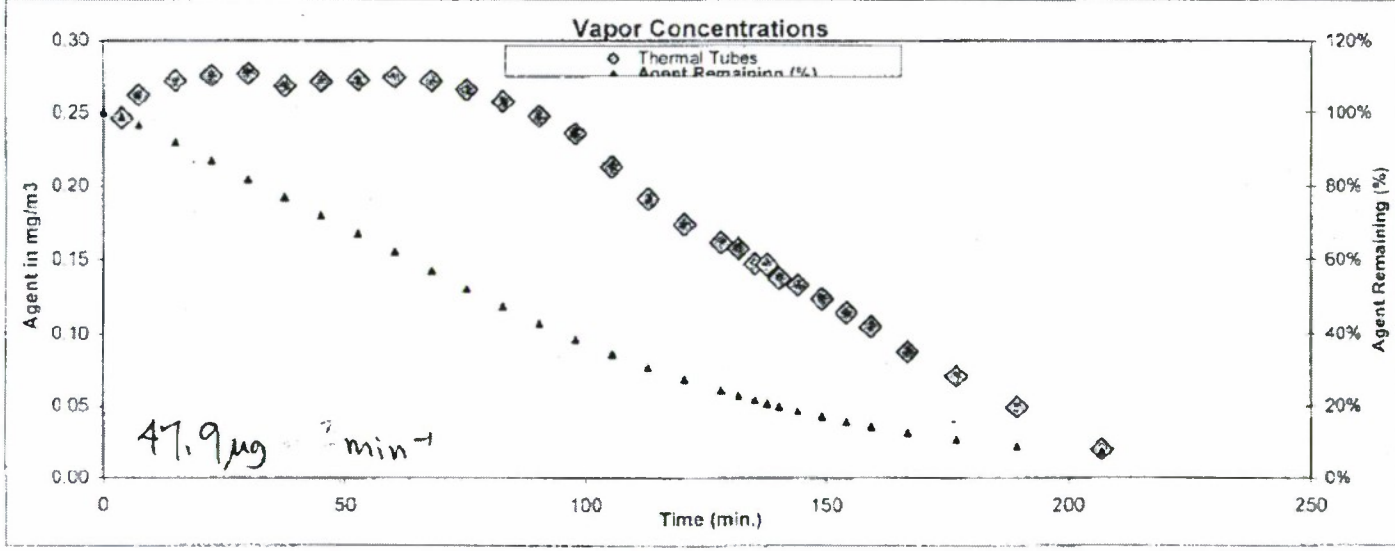
20061215_3a_146

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3a	
Instruments:	VTS#08/GCMSD	
Date/Experiment #:	12/15/06	146
Type of substrate :	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.75 mg	
Corrected mass on 100% agent purity:	7.54 mg	
Average substrate temperature:	34.78 °C	
Average air flow rate:	181.77 SLPM	
Average air temperature above drop:	34.82 °C	
Mass % recovery in vapor:	92.7 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	92.7 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.1	0.31%	Go
1.4	0.78%	Go
0.1	0.26%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
3.83	2.46E-01	98.86%
7.38	2.62E-01	96.69%
14.92	2.72E-01	91.84%
22.47	2.76E-01	86.86%
30.02	2.77E-01	81.83%
37.57	2.69E-01	76.87%
45.12	2.72E-01	71.96%
52.67	2.73E-01	67.01%
60.22	2.74E-01	62.04%
67.77	2.72E-01	57.07%
75.30	2.66E-01	52.19%
82.85	2.58E-01	47.43%
90.40	2.48E-01	42.84%
97.95	2.36E-01	38.44%
105.50	2.13E-01	34.36%
113.05	1.91E-01	30.68%
120.60	1.74E-01	27.36%
128.15	1.62E-01	24.31%
131.70	1.57E-01	22.95%
135.25	1.47E-01	21.64%
137.80	1.47E-01	20.74%
140.35	1.38E-01	19.87%
144.13	1.33E-01	18.63%
149.18	1.24E-01	17.07%
154.23	1.14E-01	15.62%
159.28	1.05E-01	14.29%
166.83	8.76E-02	12.54%
176.88	7.06E-02	10.62%
189.43	4.92E-02	8.81%
206.98	2.00E-02	7.35%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20061215_3a_146

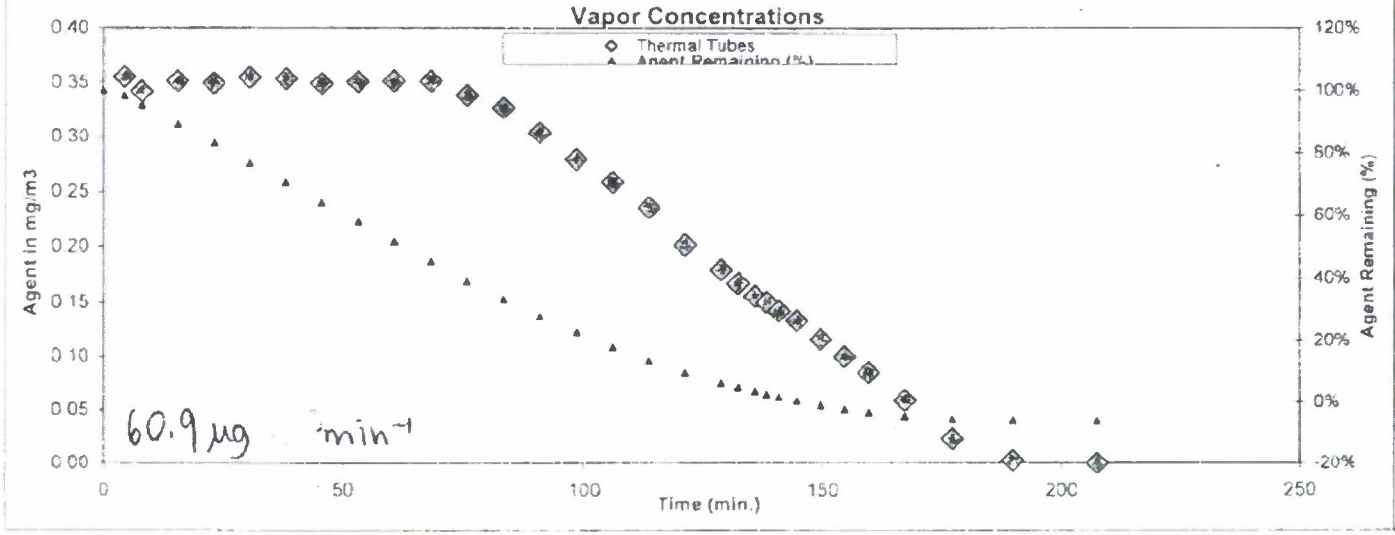
20061215_3c_183

Data Evaluation Grade: Modeling Grade

Tunnel:	3c	
Instruments:	VTS#09/GCMSD	
Date/Experiment #:	12/15/06	183
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6	µL
Mass of agent disseminated:	7.93	mg
Corrected mass on 100% agent purity:	7.72	mg
Average substrate temperature:	34.65	°C
Average air flow rate:	181.53	SLPM
Average air temperature above drop:	34.58	°C
Mass % recovery in vapor:	106.0	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	106.0	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.1	0.33%	Go
1.4	0.79%	Go
0.1	0.26%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem (%)
4.43	3.55E-01	98.15%
7.98	3.42E-01	95.24%
15.52	3.51E-01	89.11%
23.07	3.49E-01	82.89%
30.62	3.54E-01	76.65%
38.17	3.53E-01	70.37%
45.70	3.49E-01	64.15%
53.25	3.51E-01	57.95%
60.80	3.51E-01	51.72%
68.35	3.51E-01	45.49%
75.88	3.38E-01	39.39%
83.43	3.27E-01	33.49%
90.98	3.04E-01	27.90%
98.52	2.79E-01	22.73%
106.07	2.59E-01	17.96%
113.62	2.36E-01	13.57%
121.17	2.02E-01	9.69%
128.72	1.79E-01	6.32%
132.27	1.67E-01	4.87%
135.80	1.55E-01	3.53%
138.35	1.50E-01	2.62%
140.90	1.42E-01	1.75%
144.68	1.33E-01	0.52%
149.73	1.16E-01	-0.96%
154.78	9.99E-02	-2.24%
159.83	8.51E-02	-3.33%
167.37	5.93E-02	-4.61%
177.42	2.29E-02	-5.58%
189.97	2.59E-03	-5.96%
207.52	0.00E+00	-6.02%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20061215_3c_183

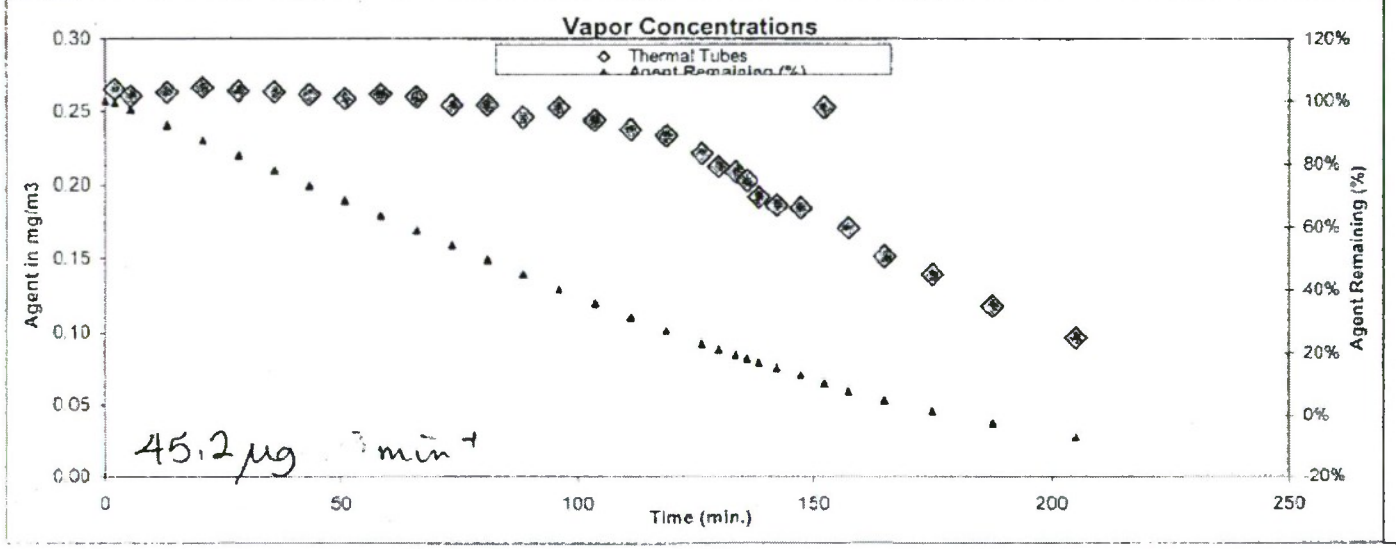
20061215_3k_043

Data Evaluation Grade: Modeling Grade

Tunnel:	3K	
Instruments:	VTS#10/GCMSD	
Date/Experiment #:	12/15/06	43
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6	µL
Mass of agent disseminated:	7.75	mg
Corrected mass on 100% agent purity:	7.54	mg
Average substrate temperature:	35.01	°C
Average air flow rate:	181.81	SLPM
Average air temperature above drop:	34.58	°C
Mass % recovery in vapor:	107.1	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	107.1	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.2	0.59%	Go
1.1	0.60%	Go
0.1	0.30%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
1.95	2.65E-01	99.38%
5.50	2.60E-01	97.13%
13.05	2.63E-01	92.37%
20.60	2.66E-01	87.55%
28.15	2.64E-01	82.73%
35.70	2.63E-01	77.93%
43.25	2.62E-01	73.15%
50.80	2.59E-01	68.41%
58.35	2.62E-01	63.68%
65.90	2.60E-01	58.93%
73.45	2.54E-01	54.25%
81.00	2.55E-01	49.61%
88.55	2.46E-01	45.06%
96.10	2.53E-01	40.52%
103.65	2.44E-01	36.00%
111.20	2.38E-01	31.62%
118.75	2.34E-01	27.33%
126.30	2.22E-01	23.19%
129.85	2.12E-01	21.33%
133.40	2.09E-01	19.53%
135.95	2.03E-01	18.26%
138.50	1.92E-01	17.05%
142.30	1.86E-01	15.32%
147.35	1.85E-01	13.06%
152.40	2.53E-01	10.40%
157.45	1.71E-01	7.82%
165.00	1.51E-01	4.89%
175.05	1.40E-01	1.37%
187.60	1.18E-01	-2.52%
205.15	9.65E-02	-7.06%

G:\Agent\FateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20061215_3k_043

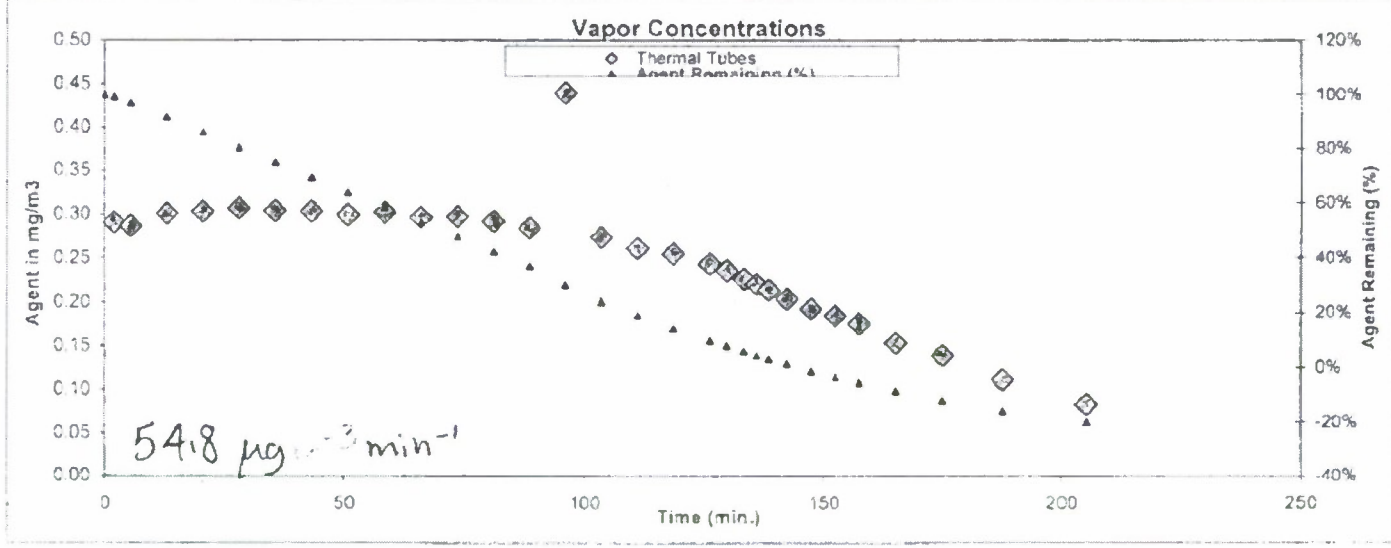
20061215_3L_041

Data Evaluation Grade: Modeling Grade

Tunnel:	3L	
Instruments:	VTS#11/GCMSD	
Date/Experiment #:	12/15/06	41
Type of substrate :	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6	µL
Mass of agent disseminated:	7.75	mg
Corrected mass on 100% agent purity:	7.54	mg
Average substrate temperature:	35.29	°C
Average air flow rate:	181.64	SLPM
Average air temperature above drop:	35.08	°C
Mass % recovery in vapor:	120.0	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	120.0	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.1	0.20%	Go
1.1	0.62%	Go
0.0	0.12%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
1.98	2.91E-01	99.31%
5.53	2.86E-01	96.84%
13.08	3.01E-01	91.50%
20.63	3.03E-01	86.02%
28.18	3.07E-01	80.48%
35.73	3.04E-01	74.93%
43.28	3.03E-01	69.41%
50.83	2.99E-01	63.94%
58.38	3.02E-01	58.47%
65.93	2.96E-01	53.04%
73.48	2.97E-01	47.55%
81.03	2.92E-01	42.30%
88.58	2.84E-01	37.06%
96.13	4.39E-01	30.48%
103.68	2.74E-01	24.00%
111.23	2.61E-01	19.14%
118.78	2.55E-01	14.45%
126.33	2.44E-01	9.92%
129.88	2.36E-01	7.87%
133.43	2.26E-01	5.89%
135.98	2.21E-01	4.52%
138.53	2.13E-01	3.19%
142.33	2.03E-01	1.28%
147.38	1.92E-01	-1.12%
152.43	1.84E-01	-3.41%
157.48	1.75E-01	-5.59%
165.03	1.53E-01	-8.57%
175.08	1.39E-01	-12.11%
187.63	1.11E-01	-15.89%
205.18	8.30E-02	-19.99%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20061215_3L_041

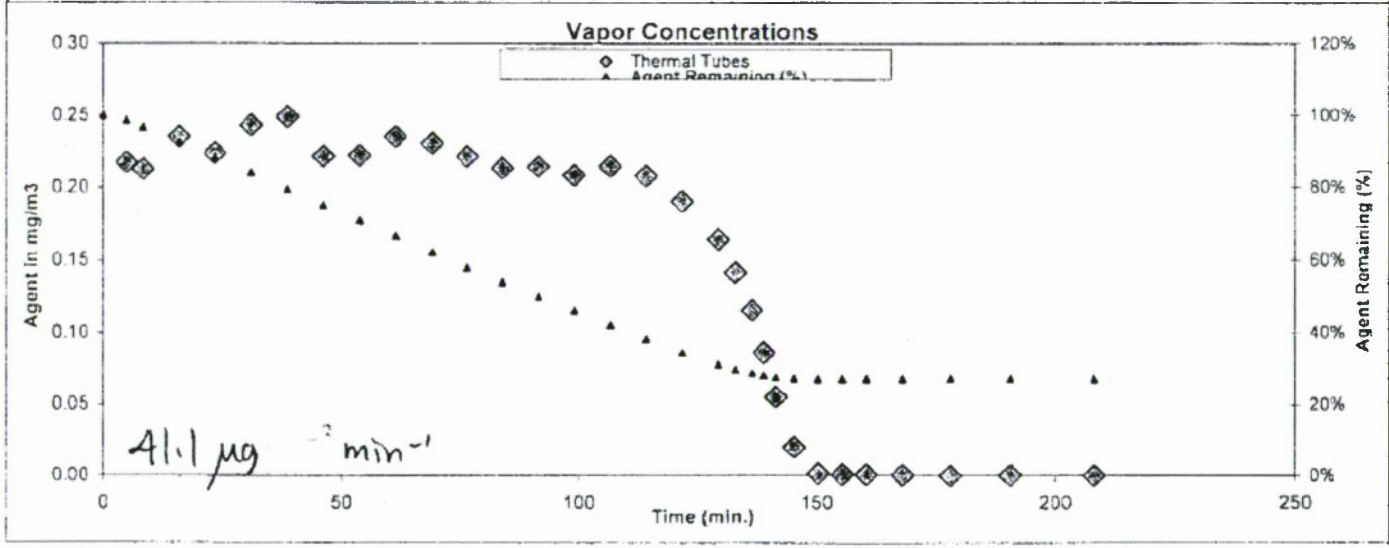
20061219_3a_147

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3a	
Instruments:	VTS#08/GCMSD	
Date/Experiment #:	12/19/06	147
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	5	µL
Mass of agent disseminated:	7.56	mg
Corrected mass on 100% agent purity:	7.37	mg
Average substrate temperature:	34.86	°C
Average air flow rate:	181.77	SLPM
Average air temperature above drop:	34.78	°C
Mass % recovery in vapor:	72.9	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	72.9	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.1	0.34%	Go
1.9	1.04%	Go
0.2	0.53%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
5.02	2.18E-01	98.65%
8.57	2.13E-01	96.77%
16.10	2.35E-01	92.61%
23.65	2.24E-01	88.33%
31.20	2.43E-01	83.98%
38.75	2.49E-01	79.39%
46.30	2.22E-01	75.01%
53.85	2.22E-01	70.87%
61.40	2.35E-01	66.61%
68.95	2.31E-01	62.27%
76.50	2.21E-01	58.06%
84.03	2.13E-01	54.02%
91.58	2.14E-01	50.04%
99.13	2.08E-01	46.10%
106.68	2.15E-01	42.16%
114.23	2.08E-01	38.22%
121.78	1.90E-01	34.52%
129.33	1.64E-01	31.22%
132.88	1.42E-01	29.86%
136.43	1.16E-01	28.75%
138.98	8.62E-02	28.12%
141.53	5.55E-02	27.67%
145.33	2.01E-02	27.31%
150.37	1.67E-03	27.18%
155.42	9.21E-04	27.16%
160.47	9.28E-04	27.15%
168.02	5.11E-04	27.14%
178.07	0.00E+00	27.13%
190.62	2.82E-04	27.13%
208.17	2.40E-04	27.12%

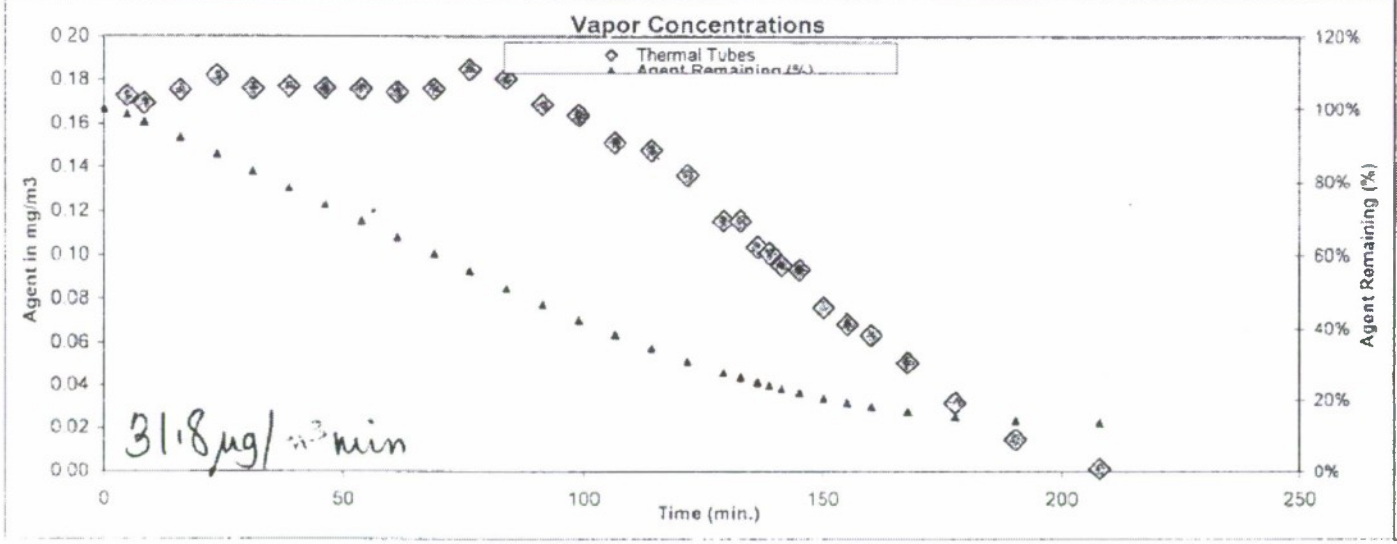
G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20061219_3a_147

Data Evaluation Grade: Modeling Grade

Tunnel:	3c	
Instruments:	VTS#09/GCMSD	
Date/Experiment #:	12/19/06	184
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6	µL
Mass of agent disseminated:	5.50	mg
Corrected mass on 100% agent purity:	5.35	mg
Average substrate temperature:	34.91	°C
Average air flow rate:	181.52	SLPM
Average air temperature above drop:	34.72	°C
Mass % recovery in vapor:	86.2	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	86.2	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.2	0.56%	Go
1.4	0.78%	Go
0.1	0.35%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
4.92	1.73E-01	98.56%
8.47	1.69E-01	96.50%
16.02	1.76E-01	92.09%
23.55	1.82E-01	87.52%
31.10	1.76E-01	82.93%
38.65	1.77E-01	78.41%
46.20	1.77E-01	73.88%
53.73	1.76E-01	69.38%
61.28	1.75E-01	64.89%
68.83	1.76E-01	60.40%
76.38	1.85E-01	55.78%
83.92	1.81E-01	51.11%
91.47	1.69E-01	46.63%
99.02	1.64E-01	42.37%
106.55	1.51E-01	38.35%
114.12	1.48E-01	34.51%
121.65	1.37E-01	30.87%
129.20	1.16E-01	27.64%
132.75	1.16E-01	26.25%
136.30	1.04E-01	24.93%
138.83	1.01E-01	24.05%
141.38	9.55E-02	23.20%
145.18	9.36E-02	21.98%
150.22	7.65E-02	20.53%
155.27	6.89E-02	19.29%
160.32	6.38E-02	18.15%
167.87	5.10E-02	16.68%
177.90	3.21E-02	15.27%
190.45	1.51E-02	14.26%
208.00	1.64E-03	13.77%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20061219_3c_184

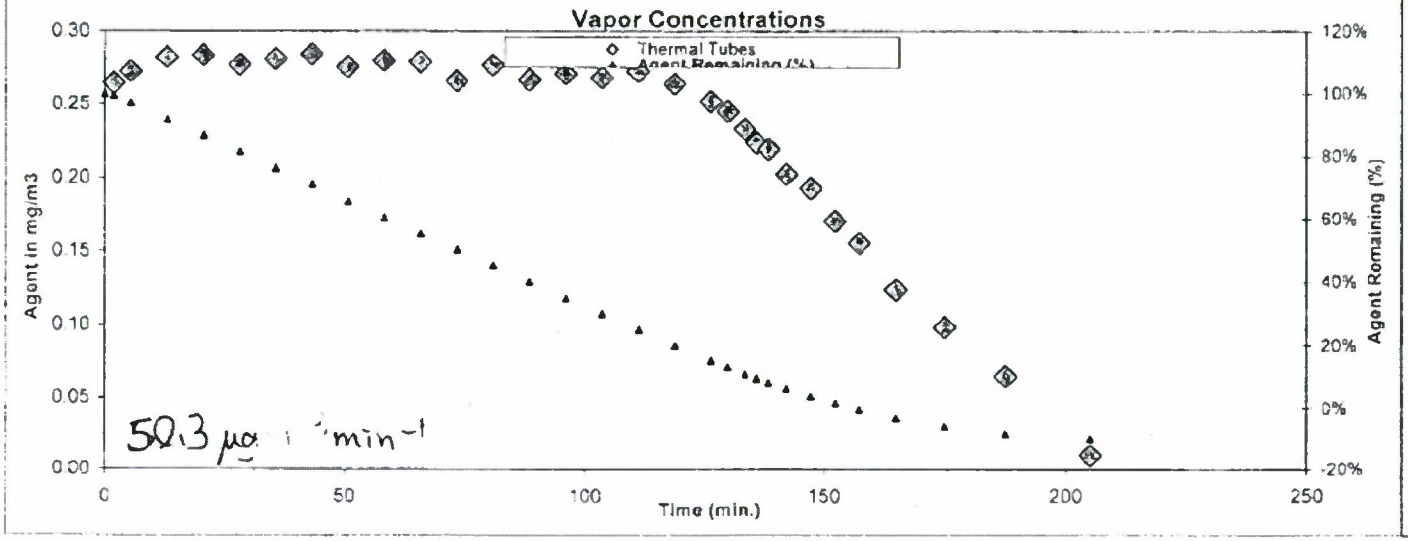
20061219_3k_044

Data Evaluation Grade: Modeling Grade

Tunnel:	3K	
Instruments:	VTS#11/GCMSD	
Date/Experiment #:	12/19/06	44
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6	µL
Mass of agent disseminated:	7.61	mg
Corrected mass on 100% agent purity:	7.41	mg
Average substrate temperature:	35.02	°C
Average air flow rate:	182.42	SLPM
Average air temperature above drop:	34.77	°C
Mass % recovery in vapor:	109.8	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	109.8	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.1	0.39%	Go
1.2	0.63%	Go
0.1	0.23%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
1.98	2.65E-01	99.35%
5.53	2.72E-01	97.01%
13.08	2.82E-01	91.85%
20.63	2.83E-01	86.60%
28.18	2.77E-01	81.39%
35.73	2.81E-01	76.21%
43.28	2.84E-01	70.96%
50.83	2.76E-01	65.75%
58.38	2.80E-01	60.59%
65.93	2.79E-01	55.40%
73.48	2.66E-01	50.34%
81.03	2.77E-01	45.30%
88.58	2.67E-01	40.25%
96.13	2.71E-01	35.25%
103.68	2.68E-01	30.24%
111.23	2.73E-01	25.22%
118.78	2.64E-01	20.23%
126.33	2.52E-01	15.44%
129.88	2.45E-01	13.27%
133.43	2.33E-01	11.16%
135.98	2.24E-01	9.75%
138.53	2.19E-01	8.36%
142.32	2.02E-01	6.39%
147.37	1.93E-01	3.94%
152.42	1.70E-01	1.68%
157.47	1.55E-01	-0.34%
165.02	1.24E-01	-2.94%
175.07	9.85E-02	-5.69%
187.62	6.50E-02	-8.21%
205.17	9.95E-03	-9.83%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20061219_3k_044

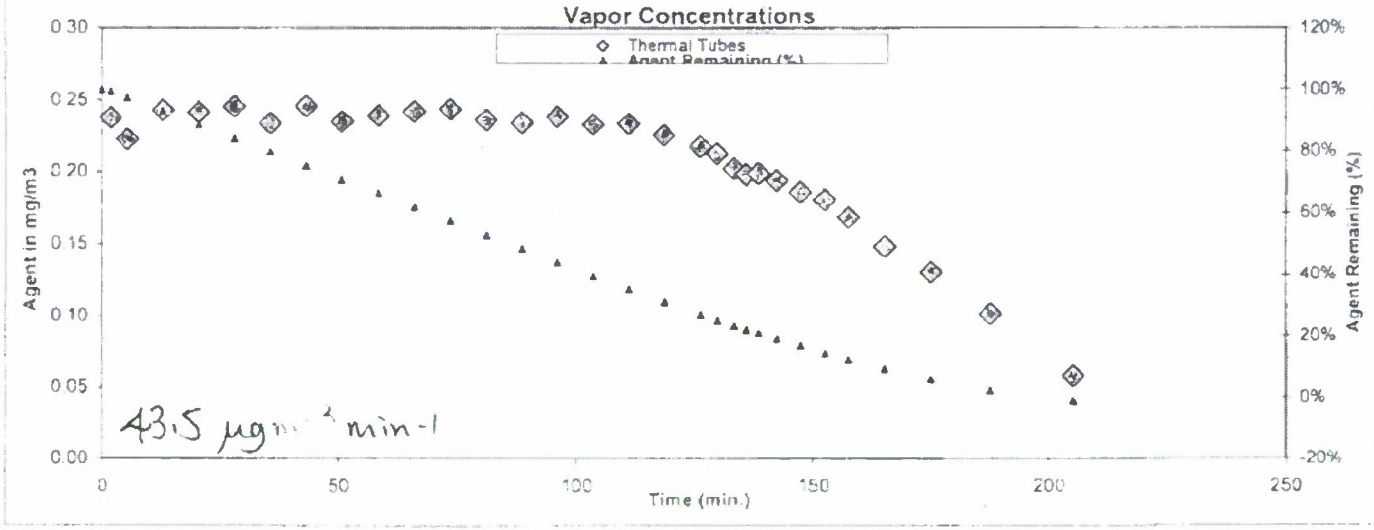
20061219_3L_042

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3L	
Instruments:	VTS#10/GCMSD	
Date/Experiment #:	12/19/06	42
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6	uL
Mass of agent disseminated:	7.61	mg
Corrected mass on 100% agent purity:	7.41	mg
Average substrate temperature:	35.14	°C
Average air flow rate:	182.30	SLPM
Average air temperature above drop:	34.98	°C
Mass % recovery in vapor:	101.1	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	101.1	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.1	0.34%	Go
1.2	0.64%	Go
0.1	0.34%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
1.97	2.38E-01	99.43%
5.52	2.23E-01	97.41%
13.07	2.43E-01	93.09%
20.62	2.42E-01	88.59%
28.17	2.46E-01	84.07%
35.72	2.34E-01	79.62%
43.27	2.46E-01	75.16%
50.82	2.35E-01	70.69%
58.37	2.39E-01	66.28%
65.92	2.42E-01	61.81%
73.47	2.44E-01	57.31%
81.02	2.36E-01	52.85%
88.57	2.34E-01	48.49%
96.12	2.38E-01	44.10%
103.67	2.33E-01	39.73%
111.22	2.33E-01	35.40%
118.77	2.25E-01	31.14%
126.32	2.17E-01	27.03%
129.87	2.12E-01	25.16%
133.42	2.02E-01	23.35%
135.97	1.98E-01	22.10%
138.52	1.98E-01	20.86%
142.32	1.94E-01	19.02%
147.37	1.85E-01	16.67%
152.42	1.80E-01	14.40%
157.47	1.68E-01	12.24%
165.02	1.48E-01	9.30%
175.07	1.30E-01	5.85%
187.62	1.01E-01	2.28%
205.17	5.79E-02	-1.15%

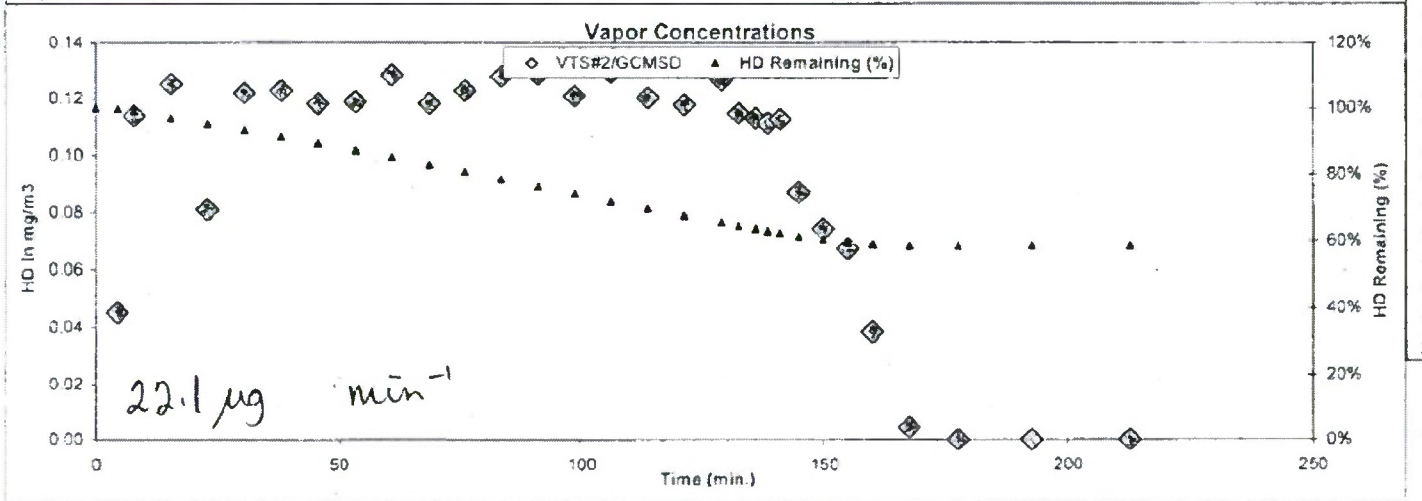
G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000-)\20061219_3L_042

20060629_3a_099

Tunnel:	3a		Date:	06/29/06
Parameters:	VTS#2	GCMSD	Exp. #:	99
type of substrate:	Glass	Dutch Galss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem:	KS	2/28/2006
number of drops:	1			
nominal drop volume:	6	µL		
mass of agent disseminated:	8.06	mg		
corrected mass on 100% agent purity:	7.85	mg	SD	P/F
Miller Nelson temperature:	0.00	°C	0.0	Pass
transition section wall temperature:	35.10	°C	0.3	Pass
fetch section wall temperature:	35.46	°C	0.5	Pass
post-test section wall temperature:	35.24	°C	0.4	Pass
mixing box wall temperature:	36.77	°C	0.5	Pass
sampling duct wall temperature:	36.00	°C	0.21	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			

Substrate @ 35.9°C

182 SLPM



Time (min)	Conc. mg/m³	HD rem. (%)
4.53	4.52E-02	99.76%
8.08	1.14E-01	99.11%
15.63	1.25E-01	97.02%
23.18	8.10E-02	95.22%
30.73	1.22E-01	93.44%
38.28	1.23E-01	91.31%
45.83	1.18E-01	89.20%
53.38	1.19E-01	87.13%
60.93	1.29E-01	84.97%
68.48	1.18E-01	82.81%
76.02	1.23E-01	80.71%
83.57	1.28E-01	78.52%
91.12	1.29E-01	76.28%
98.67	1.21E-01	74.10%
106.22	1.29E-01	71.91%
113.77	1.20E-01	69.73%
121.32	1.18E-01	67.65%
128.87	1.27E-01	65.51%
132.42	1.15E-01	64.52%
135.97	1.13E-01	63.59%
138.52	1.11E-01	62.92%
141.07	1.13E-01	62.26%
144.85	8.70E-02	61.39%
149.90	7.42E-02	60.45%
154.95	6.74E-02	59.62%
160.00	3.85E-02	59.00%
167.55	4.60E-03	58.62%
177.60	0.00E+00	58.57%
192.65	0.00E+00	58.57%
212.70	0.00E+00	58.57%

48.2%RH

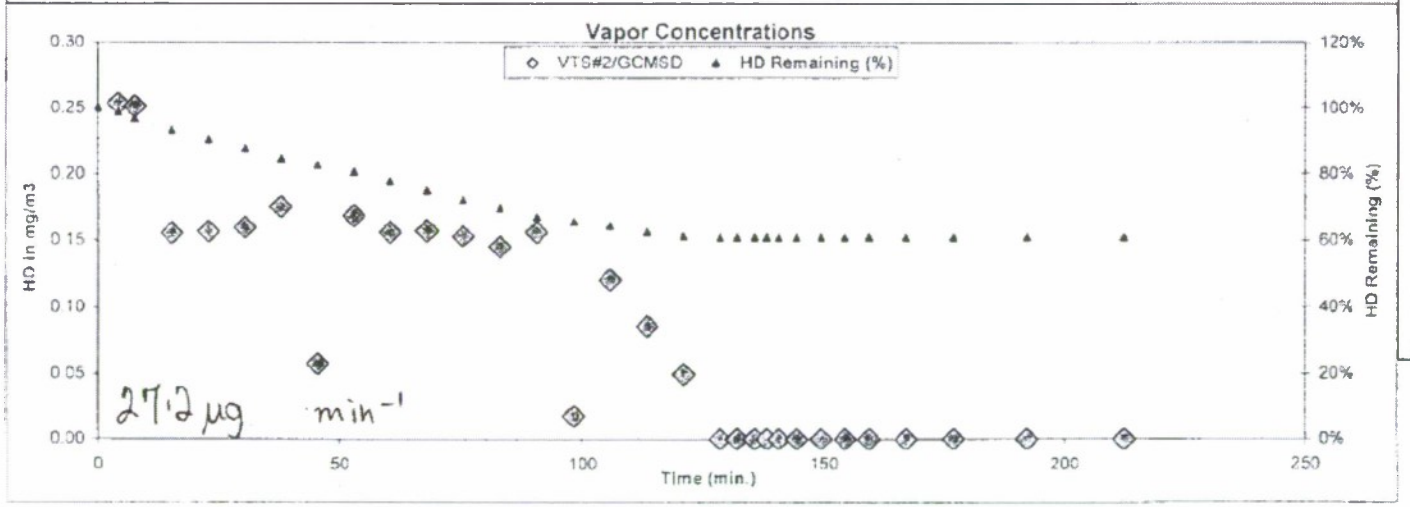
G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000+)\20060629_3a_099

20060706_3a_101

Tunnel:	3a		Date:	07/06/06
Parameters:	VTS#2	GCMSD	Exp. #:	101
type of substrate:	Glass	Dutch Gaiss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem:	KS	2/28/2006
number of drops:	1			
nominal drop volume:	6	µL		
mass of agent disseminated:	8.03	mg		
corrected mass on 100% agent purity:	7.82	mg	SD	P/F
Miller Nelson temperature:	0.00	°C	0.0	Pass
transition section wall temperature:	35.09	°C	0.4	Pass
fetch section wall temperature:	35.04	°C	0.2	Pass
post-test section wall temperature:	35.02	°C	0.1	Pass
mixing box wall temperature:	36.05	°C	0.3	Pass
sampling duct wall temperature:	35.60	°C	0.49	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			

Substr = 34.3°C

181.9 SLPM



27.2 µg min⁻¹

Time (min)	Conc. mg/m³	HD rem. (%)
4.17	2.53E-01	98.77%
7.70	2.51E-01	96.70%
15.25	1.55E-01	93.13%
22.80	1.57E-01	90.39%
30.35	1.60E-01	87.61%
37.90	1.75E-01	84.67%
45.45	5.77E-02	82.83%
53.00	1.69E-01	80.64%
60.55	1.56E-01	77.79%
68.10	1.57E-01	75.04%
75.63	1.53E-01	72.32%
83.18	1.45E-01	69.71%
90.73	1.56E-01	67.07%
98.28	1.79E-02	65.54%
105.83	1.21E-01	64.32%
113.38	8.59E-02	62.51%
120.93	4.98E-02	61.32%
128.48	0.00E+00	60.88%
132.03	0.00E+00	60.88%
135.58	0.00E+00	60.88%
138.13	0.00E+00	60.88%
140.68	0.00E+00	60.88%
144.48	0.00E+00	60.88%
149.52	0.00E+00	60.88%
154.57	0.00E+00	60.88%
159.62	0.00E+00	60.88%
167.17	0.00E+00	60.88%
177.22	0.00E+00	60.88%
192.27	0.00E+00	60.88%
212.32	0.00E+00	60.88%

59.34% RH

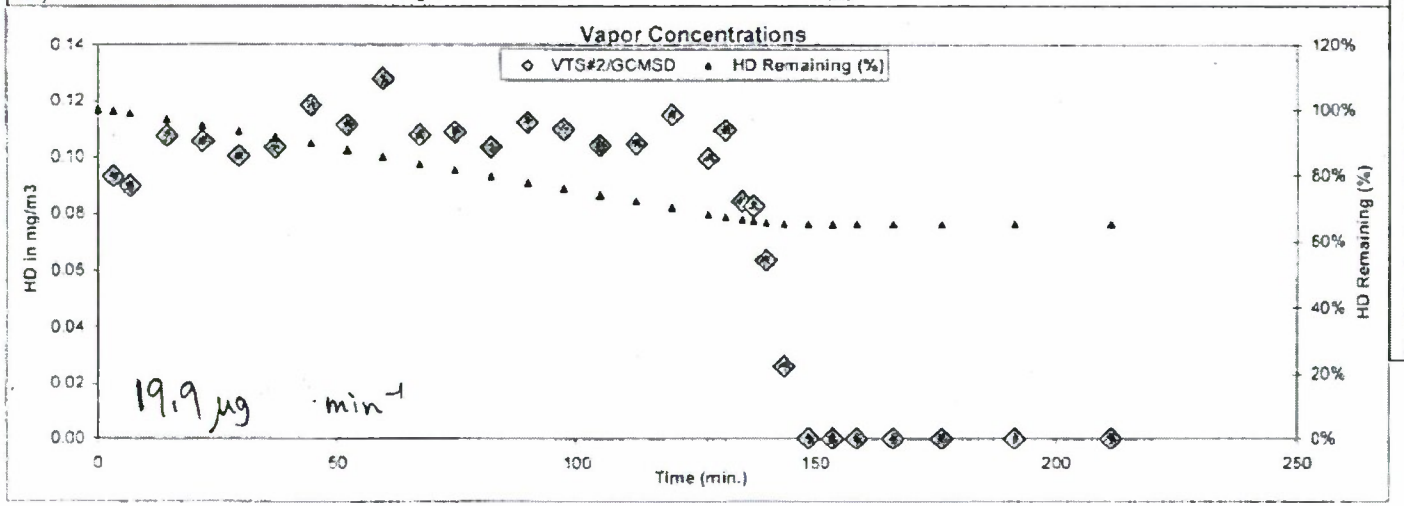
G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000+)\20060706_3a_101

20060711_3a_103

Tunnel:	3a		Date:	07/11/06
Parameters:	VTS#2	GCMSD	Exp. #:	103
type of substrate:	Glass	Dutch Galss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem:	KS	2/28/2006
number of drops	1			
nominal drop volume:	6	µL		
mass of agent disseminated:	8.04	mg		
corrected mass on 100% agent purity:	7.83	mg	SD	P/F
Miller Nelson temperature:	0.00	°C	0.0	Pass
transition section wall temperature:	35.20	°C	0.4	Pass
fetch section wall temperature:	35.56	°C	0.5	Pass
post-test section wall temperature:	35.32	°C	0.5	Pass
mixing box wall temperature:	36.77	°C	0.5	Pass
sampling duct wall temperature:	36.01	°C	0.18	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			

34.9°C Substrate

181.3 SLPM



19.9 µg · min⁻¹

Time (min)	Conc. mg/m³	HD rem. (%)
3.27	9.33E-02	99.65%
6.82	8.98E-02	98.89%
14.37	1.08E-01	97.16%
21.92	1.06E-01	95.29%
29.45	1.00E-01	93.49%
37.00	1.03E-01	91.70%
44.55	1.18E-01	89.76%
52.10	1.11E-01	87.74%
59.65	1.28E-01	85.64%
67.20	1.08E-01	83.57%
74.75	1.09E-01	81.67%
82.30	1.03E-01	79.81%
89.83	1.12E-01	77.92%
97.38	1.10E-01	75.98%
104.93	1.04E-01	74.10%
112.50	1.05E-01	72.27%
120.03	1.15E-01	70.34%
127.58	9.94E-02	68.46%
131.13	1.09E-01	67.60%
134.68	8.43E-02	66.80%
137.23	8.27E-02	66.31%
139.78	6.36E-02	65.88%
143.58	2.63E-02	65.48%
148.63	1.46E-04	65.32%
153.67	0.00E+00	65.32%
158.72	0.00E+00	65.32%
166.27	0.00E+00	65.32%
176.32	0.00E+00	65.32%
191.37	0.00E+00	65.32%
211.42	0.00E+00	65.32%

58.5%RH

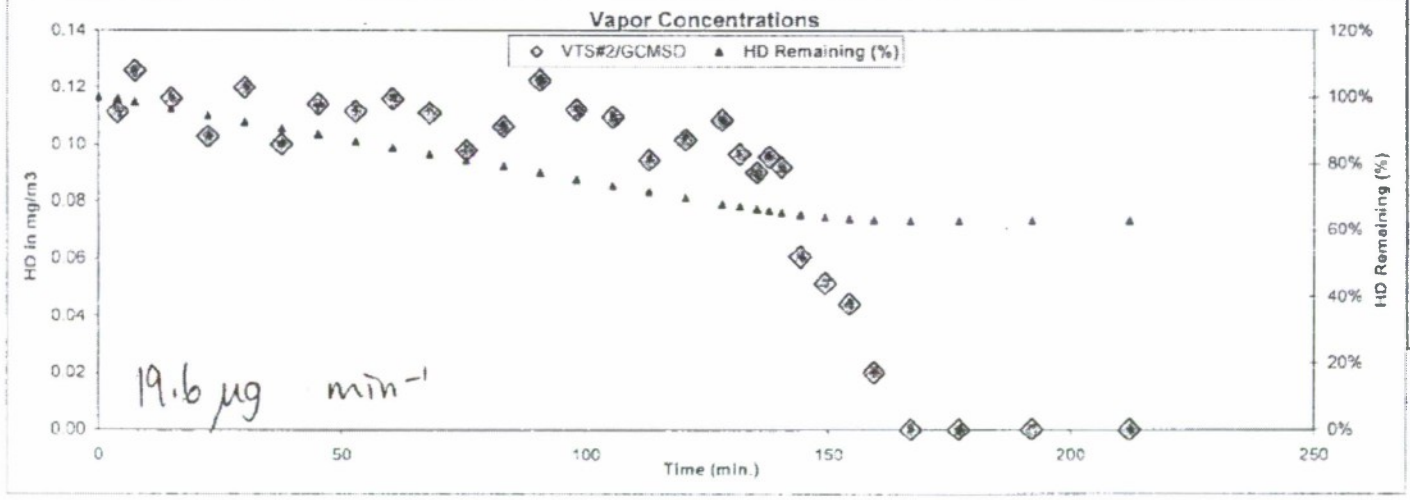
G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000+)\20060711_3a_103

20060713_3a_104

Tunnel:	3a		Date:	07/13/06
Parameters:	VTS#2	GCMSD	Exp. #:	104
type of substrate:	Glass	Dutch Galss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem	KS	2/28/2006
number of drops:	1			
nominal drop volume:	6 µL			
mass of agent disseminated:	8.06 mg			
corrected mass on 100% agent purity:	7.85 mg		SD	P/F
Miller Nelson temperature:	0.00 °C		0.0	Pass
transition section wall temperature:	35.05 °C		0.3	Pass
fetch section wall temperature:	35.12 °C		0.3	Pass
post-test section wall temperature:	35.02 °C		0.1	Pass
mixing box wall temperature:	36.13 °C		0.4	Pass
sampling duct wall temperature:	35.80 °C		0.40	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			

Substrate 34.8°C

181.8 SLPM



19.6 µg min⁻¹

Time (min)	Conc. mg/m³	HD rem. (%)
3.97	1.12E-01	99.49%
7.52	1.26E-01	98.51%
15.07	1.16E-01	96.39%
22.62	1.03E-01	94.47%
30.15	1.20E-01	92.53%
37.70	1.00E-01	90.60%
45.25	1.14E-01	88.73%
52.80	1.12E-01	86.75%
60.35	1.16E-01	84.76%
67.90	1.11E-01	82.77%
75.45	9.60E-02	80.95%
83.00	1.06E-01	79.16%
90.55	1.23E-01	77.16%
98.08	1.12E-01	75.11%
105.63	1.10E-01	73.17%
113.20	9.46E-02	71.38%
120.75	1.02E-01	69.66%
128.28	1.09E-01	67.83%
131.83	9.67E-02	66.98%
135.38	9.02E-02	66.21%
137.93	9.58E-02	65.66%
140.48	9.20E-02	65.11%
144.28	6.06E-02	64.44%
149.33	5.14E-02	63.78%
154.38	4.41E-02	63.22%
159.42	2.02E-02	62.85%
166.97	0.00E+00	62.67%
177.02	0.00E+00	62.67%
192.07	0.00E+00	62.67%
212.12	0.00E+00	62.67%

58.7% RH

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(000+)\20060713_3a_104

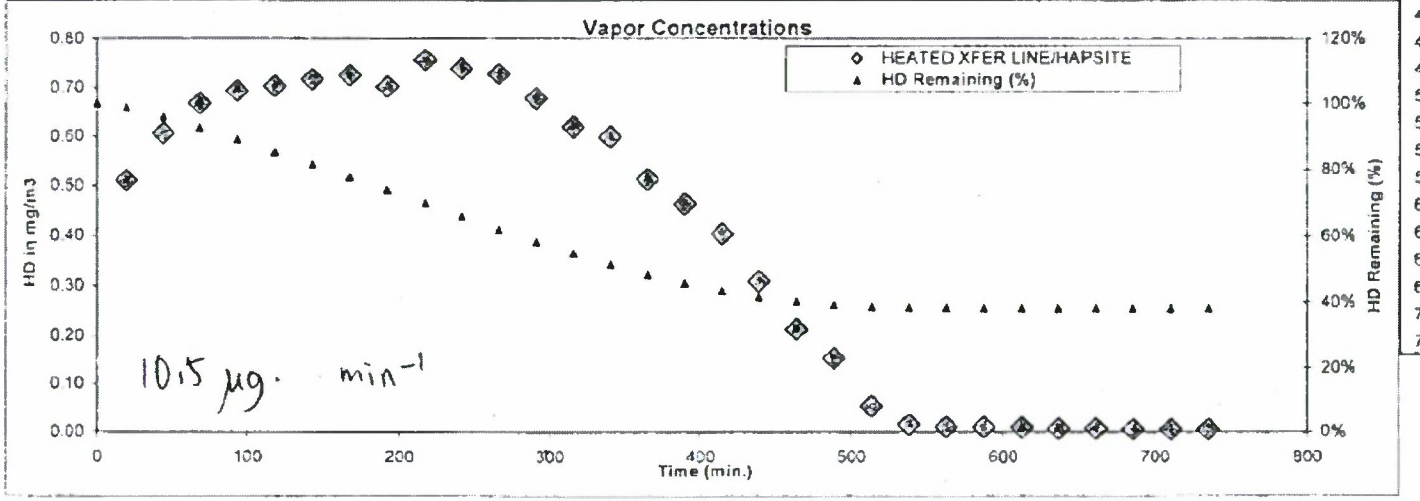
20050405_3a_01

Tunnel:	3a		Date:	04/05/05
Parameters:	HEATED XFER LINE	HAPSITE	Exp. #:	1
type of substrate:	Glass	Dutch Gaiss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem:	KS	1/24/2005
number of drops:	1			
nominal drop volume:	6 µL			
mass of agent disseminated:	7.08 mg			
corrected mass on 100% agent purity:	6.89 mg		SD	P/F
Miller Nelson temperature:	35.16 °C		0.3	Pass
transition section wall temperature:	35.00 °C		0.0	Pass
fetch section wall temperature:	35.00 °C		0.1	Pass
post-test section wall temperature:	35.00 °C		0.0	Pass
mixing box wall temperature:	35.51 °C		0.5	Pass
sampling duct wall temperature:	35.14 °C		0.35	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			

Substrate: 35.2° C

14.9 slpm

Time (min)	Conc. mg/m³	HD rem. (%)
19.77	5.11E-01	98.91%
44.40	6.07E-01	95.92%
69.03	5.67E-01	92.52%
93.70	6.92E-01	88.89%
118.38	7.03E-01	85.16%
143.06	7.17E-01	81.37%
167.78	7.25E-01	77.51%
192.50	7.02E-01	73.69%
217.22	7.57E-01	69.79%
241.95	7.38E-01	65.78%
266.67	7.28E-01	61.86%
291.38	6.77E-01	58.10%
316.08	6.19E-01	54.63%
340.78	5.99E-01	51.37%
365.47	5.13E-01	48.40%
390.15	4.63E-01	45.79%
414.82	4.04E-01	43.47%
439.48	3.10E-01	41.56%
464.15	2.12E-01	40.17%
488.82	1.53E-01	39.19%
513.48	5.35E-02	38.64%
538.15	1.54E-02	38.45%
562.82	1.09E-02	38.38%
587.47	1.03E-02	38.33%
612.43	9.83E-03	38.27%
636.75	7.15E-03	38.23%
661.40	6.78E-03	38.19%
686.05	5.60E-03	38.16%
710.70	5.62E-03	38.13%
735.35	5.43E-03	38.10%



10.5 µg · min⁻¹

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(00--)\20050405_3a_01

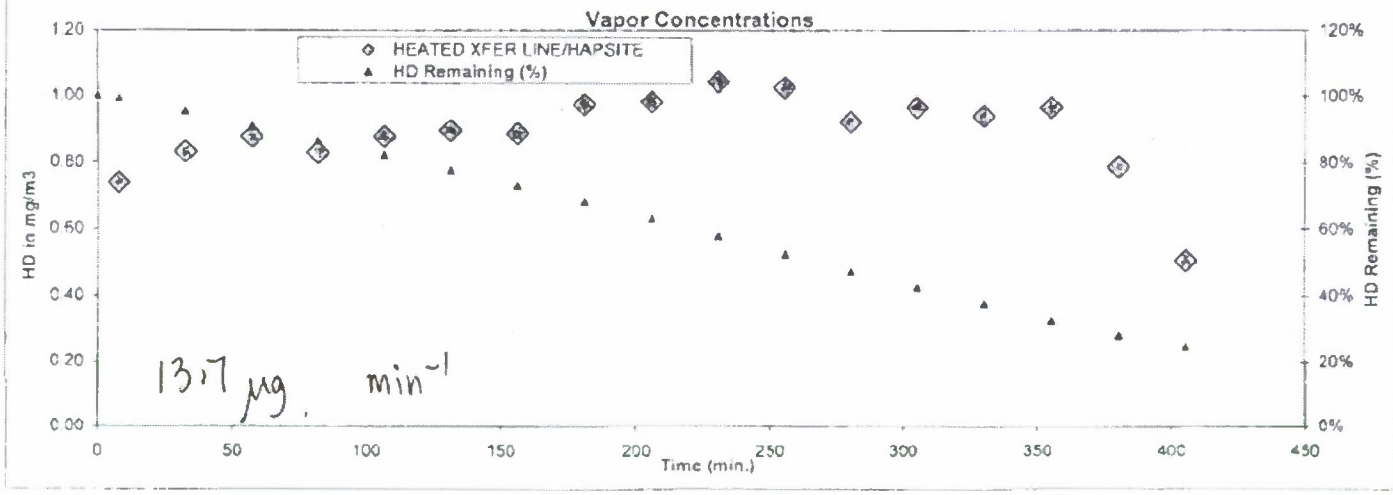
20050406_3a_02

Data Evaluation Grade: Modeling Grade

Tunnel:	3a	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	04/06/05	2
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6	µL
Mass of agent disseminated:	7.17	mg
Corrected mass on 100% agent purity:	6.98	mg
Average substrate temperature:	36.05	°C
Average air flow rate:	14.55	SLPM
Average air temperature above drop:	35.21	°C
Mass % recovery in vapor:	75.3	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	75.3	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.4	1.02%	Go
0.6	4.41%	Go
0.7	1.99%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
8.12	7.40E-01	99.37%
32.75	8.33E-01	95.34%
57.42	8.78E-01	90.94%
82.12	8.29E-01	86.54%
106.83	8.78E-01	82.15%
131.57	8.96E-01	77.58%
156.33	8.87E-01	72.98%
181.13	9.74E-01	68.17%
205.97	9.83E-01	63.10%
230.82	1.04E+00	57.86%
255.68	1.03E+00	52.50%
280.65	9.22E-01	47.43%
305.50	9.65E-01	42.54%
330.45	9.39E-01	37.59%
355.40	9.65E-01	32.64%
380.37	7.57E-01	28.08%
405.35	5.06E-01	24.72%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(00--)\20050406_3a_02

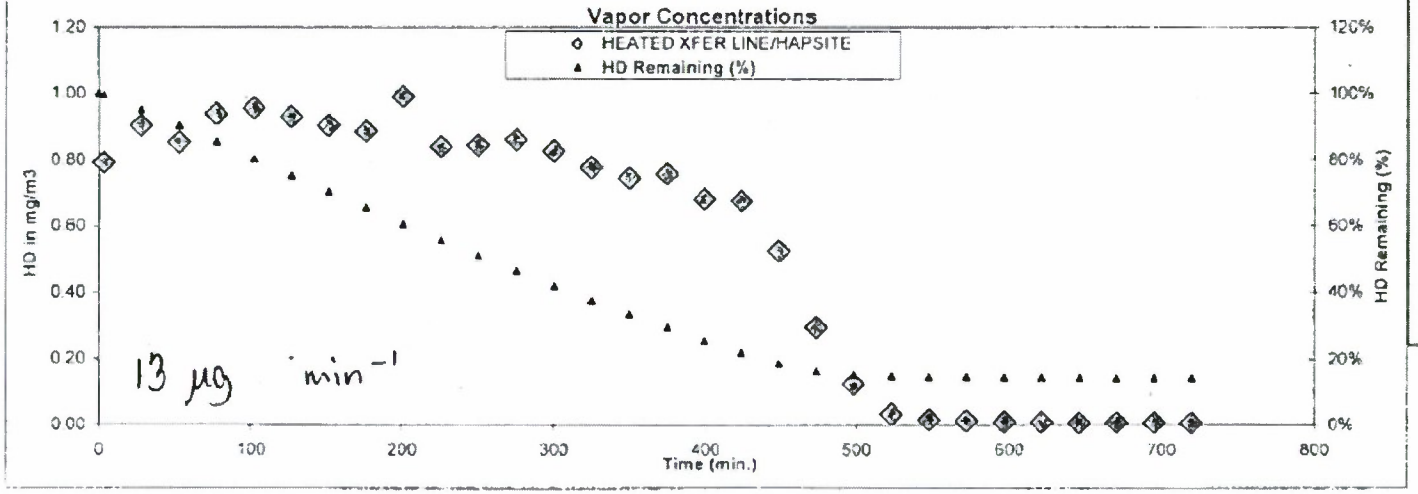
20050407_3a_03

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3a	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	04/07/05	3
Type of substrate :	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.06 mg	
Corrected mass on 100% agent purity:	6.88 mg	
Average substrate temperature:	35.13 °C	
Average air flow rate:	14.96 SLPM	
Average air temperature above drop:	34.96 °C	
Mass % recovery in vapor:	85.6 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	85.6 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.4	1.27%	Go
0.4	2.85%	Go
0.4	1.01%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
3.45	7.93E-01	99.70%
28.10	9.04E-01	95.15%
52.78	8.54E-01	90.43%
77.50	9.39E-01	85.61%
102.23	9.57E-01	80.51%
126.98	9.30E-01	75.43%
151.72	9.04E-01	70.49%
176.48	8.87E-01	65.66%
201.28	9.91E-01	60.60%
226.08	8.40E-01	55.66%
250.88	8.45E-01	51.11%
275.72	8.61E-01	46.50%
300.53	8.27E-01	41.94%
325.33	7.77E-01	37.62%
350.12	7.45E-01	33.51%
374.90	7.58E-01	29.46%
399.65	6.82E-01	25.58%
424.38	6.77E-01	21.92%
449.10	5.24E-01	18.70%
473.80	2.97E-01	16.49%
498.47	1.26E-01	15.36%
523.12	3.35E-02	14.93%
547.75	1.68E-02	14.79%
572.37	1.37E-02	14.71%
596.98	9.65E-03	14.65%
621.60	9.48E-03	14.60%
646.22	7.57E-03	14.55%
670.83	8.00E-03	14.51%
695.45	7.78E-03	14.47%
720.07	6.39E-03	14.43%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(00--)\20050407_3a_03

20050408_3a_04

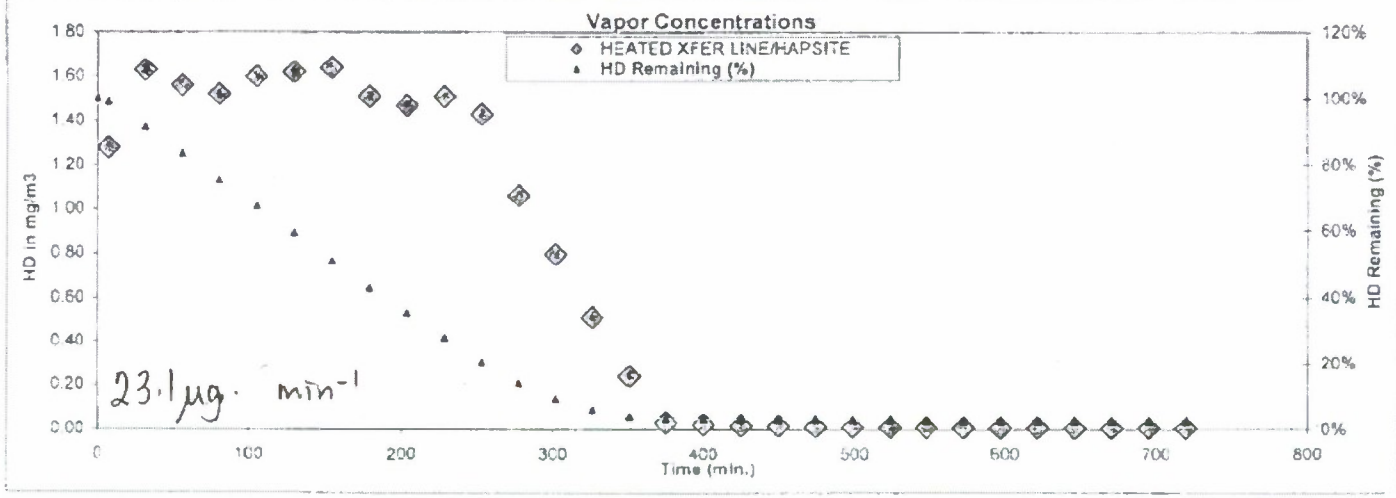
Data Evaluation Grade: Modeling Grade

Tunnel:	3a	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	04/08/05	4
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6	µL
Mass of agent disseminated:	7.23	mg
Corrected mass on 100% agent purity:	7.04	mg
Average substrate temperature:	35.11	°C
Average air flow rate:	14.62	SLPM
Average air temperature above drop:	34.98	°C
Mass % recovery in vapor:	98.0	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	98.0	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.3	0.95%	Go
0.2	1.71%	Go
0.2	0.57%	Go
-	-	Go

Time (min)	Conc. mg/m³	HD rem. (%)
7.37	1.28E+00	99.02%
31.92	1.63E+00	91.60%
55.48	1.56E+00	83.47%
81.07	1.52E+00	75.61%
105.63	1.60E+00	67.65%
130.22	1.62E+00	59.43%
154.77	1.64E+00	51.12%
179.33	1.51E+00	43.09%
203.90	1.47E+00	35.49%
228.48	1.51E+00	27.88%
253.08	1.43E+00	20.37%
277.67	1.06E+00	14.02%
302.25	7.96E-01	9.28%
326.83	5.12E-01	5.94%
351.42	2.42E-01	4.02%
376.02	3.10E-02	3.32%
400.60	2.31E-02	3.18%
425.20	1.82E-02	3.07%
449.78	1.73E-02	2.98%
474.38	1.35E-02	2.91%
498.97	1.19E-02	2.84%
523.55	1.18E-02	2.78%
548.15	1.07E-02	2.72%
572.73	9.86E-03	2.67%
597.32	8.79E-03	2.62%
621.92	8.35E-03	2.58%
646.50	5.95E-03	2.54%
671.08	7.79E-03	2.50%
695.67	7.57E-03	2.46%
720.25	6.65E-03	2.43%



G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(00--)\20050408_3a_04

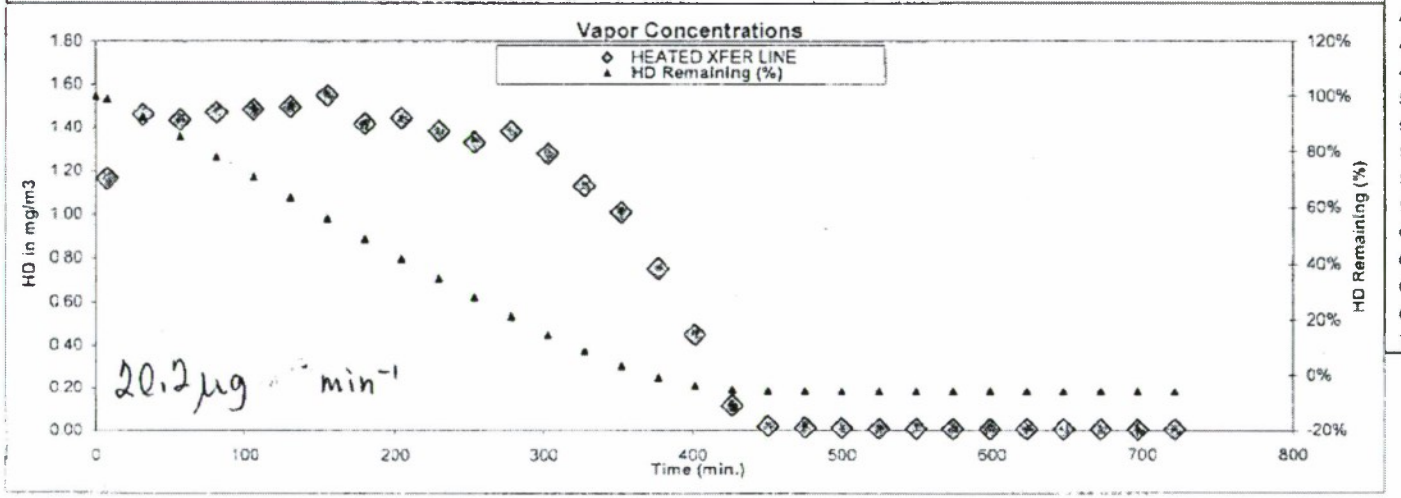
20050418_3a_08

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3a	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	04/18/05	8
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6	µL
Mass of agent disseminated:	7.13	mg
Corrected mass on 100% agent purity:	6.94	mg
Average substrate temperature:	35.02	°C
Average air flow rate:	13.92	SLPM
Average air temperature above drop:	35.13	°C
Mass % recovery in vapor:	106.0	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	106.0	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.2	0.66%	Go
0.2	1.73%	Go
0.2	0.52%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
7.70	1.17E+00	99.10%
32.27	1.46E+00	92.63%
56.87	1.43E+00	85.49%
81.47	1.47E+00	78.33%
106.08	1.48E+00	71.05%
130.68	1.50E+00	63.70%
155.30	1.55E+00	56.19%
179.92	1.42E+00	48.87%
204.55	1.44E+00	41.81%
229.18	1.38E+00	34.83%
253.82	1.33E+00	28.13%
278.45	1.38E+00	21.43%
303.10	1.28E+00	14.86%
327.73	1.13E+00	8.91%
352.37	1.01E+00	3.63%
377.00	7.52E-01	-0.72%
401.63	4.50E-01	-3.69%
426.27	1.19E-01	-5.10%
450.90	2.26E-02	-5.45%
475.53	1.54E-02	-5.54%
500.17	1.30E-02	-5.61%
524.80	9.91E-03	-5.67%
549.43	9.04E-03	-5.71%
574.07	7.27E-03	-5.75%
598.70	6.69E-03	-5.79%
623.33	5.68E-03	-5.82%
647.97	4.90E-03	-5.85%
672.60	4.51E-03	-5.87%
697.25	4.06E-03	-5.89%
721.90	4.01E-03	-5.91%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(00--)\20050418_3a_08

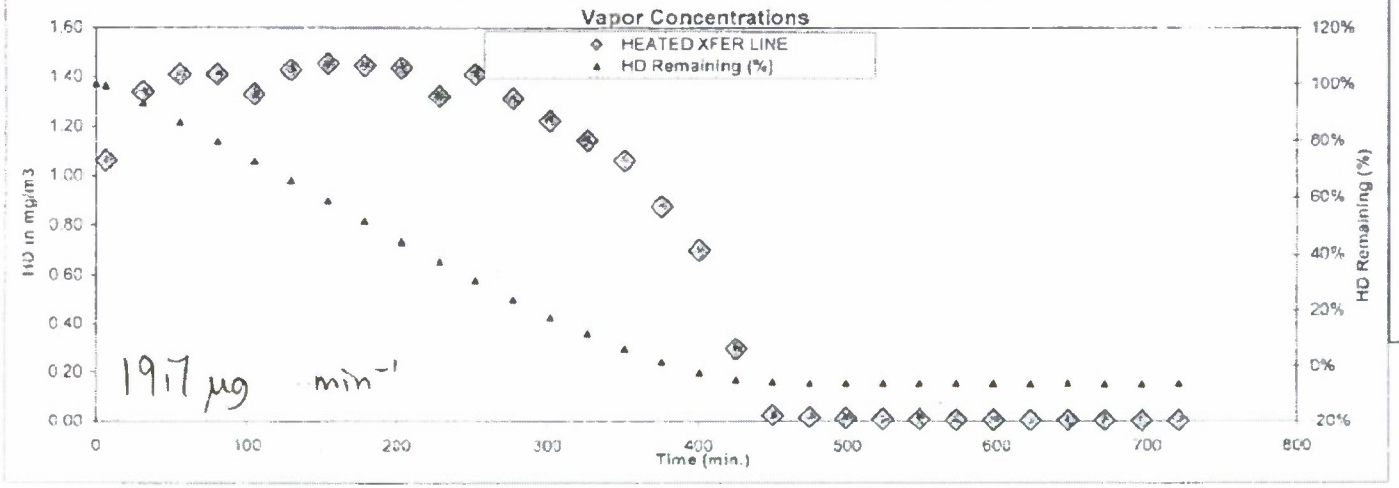
20050419_3a_09

Data Evaluation Grade: Modeling Grade

Tunnel:	3a	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	04/19/05	9
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.13 mg	
Corrected mass on 100% agent purity:	6.94 mg	
Average substrate temperature:	35.23 °C	
Average air flow rate:	14.00 SLPM	
Average air temperature above drop:	35.15 °C	
Mass % recovery in vapor:	106.6 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	106.6 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.2	0.51%	Go
0.2	1.53%	Go
0.1	0.34%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
6.65	1.06E+00	99.29%
31.23	1.34E+00	93.33%
55.83	1.41E+00	86.51%
80.45	1.41E+00	79.51%
105.08	1.33E+00	72.70%
129.72	1.43E+00	65.85%
154.35	1.46E+00	58.69%
178.98	1.45E+00	51.48%
203.60	1.44E+00	44.32%
228.23	1.32E+00	37.47%
252.88	1.41E+00	30.68%
277.53	1.31E+00	23.91%
302.18	1.22E+00	17.61%
326.83	1.14E+00	11.73%
351.48	1.06E+00	6.25%
376.13	8.77E-01	1.43%
400.78	7.00E-01	-2.49%
425.43	3.00E-01	-4.97%
450.08	2.76E-02	-5.79%
474.73	1.89E-02	-5.90%
499.38	1.46E-02	-5.99%
524.03	1.21E-02	-6.05%
548.68	1.07E-02	-6.11%
573.33	8.63E-03	-6.16%
598.00	7.42E-03	-6.20%
622.65	6.46E-03	-6.23%
647.30	6.01E-03	-6.26%
671.95	5.23E-03	-6.29%
696.60	3.80E-03	-6.31%
721.25	4.05E-03	-6.33%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(00--)\20050419_3a_09

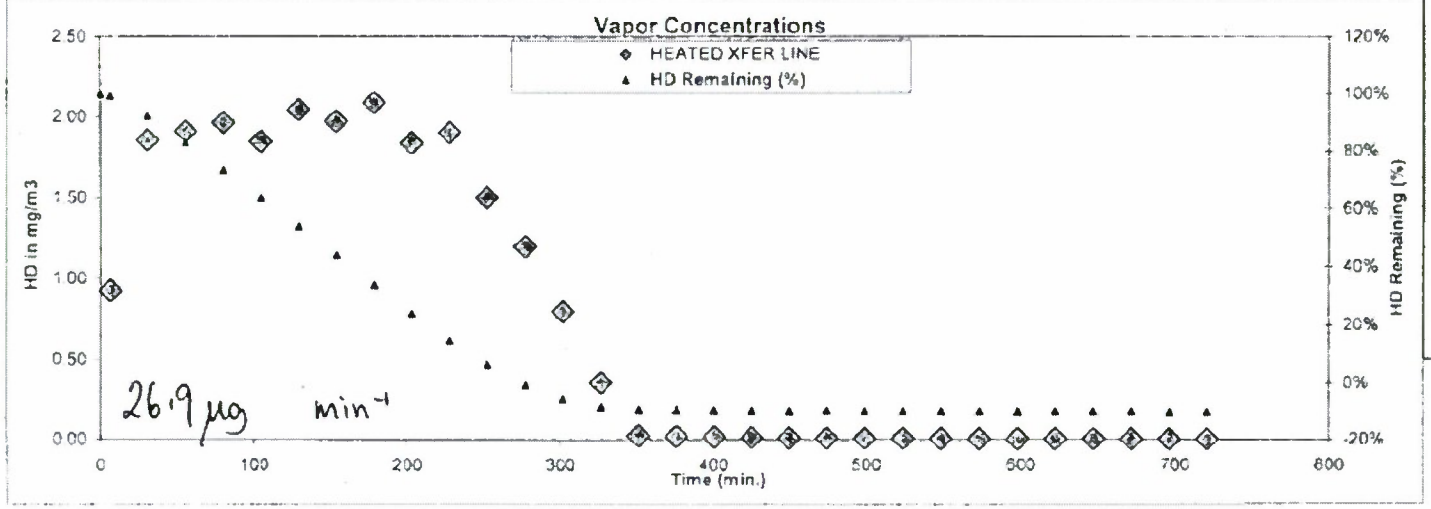
20050420_3a_10

Data Evaluation Grade: Modeling Grade

Tunnel:	3a	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	04/20/05	10
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.17 mg	
Corrected mass on 100% agent purity:	6.98 mg	
Average substrate temperature:	35.39 °C	
Average air flow rate:	14.16 SLPM	
Average air temperature above drop:	35.01 °C	
Mass % recovery in vapor:	110.1 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	110.1 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.3	0.88%	Go
0.2	1.75%	Go
0.1	0.38%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
6.47	9.29E-01	99.39%
31.00	1.86E+00	92.45%
55.57	1.91E+00	83.07%
80.17	1.96E+00	73.40%
104.78	1.85E+00	63.89%
129.42	2.04E+00	54.16%
154.05	1.97E+00	44.12%
178.70	2.09E+00	33.97%
203.35	1.84E+00	24.14%
228.00	1.90E+00	14.79%
252.65	1.50E+00	6.29%
277.30	1.20E+00	-0.46%
301.97	7.99E-01	-5.45%
326.63	3.61E-01	-8.35%
351.30	2.71E-02	-9.32%
375.97	2.24E-02	-9.44%
400.63	1.86E-02	-9.55%
425.30	1.37E-02	-9.63%
449.97	1.24E-02	-9.69%
474.63	9.64E-03	-9.75%
499.30	9.20E-03	-9.79%
523.98	7.66E-03	-9.84%
548.65	7.26E-03	-9.87%
573.33	5.75E-03	-9.91%
598.00	5.26E-03	-9.93%
622.67	5.20E-03	-9.96%
647.33	4.21E-03	-9.98%
672.02	3.83E-03	-10.00%
696.70	3.95E-03	-10.02%
721.38	2.57E-03	-10.04%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(00--)\20050420_3a_10

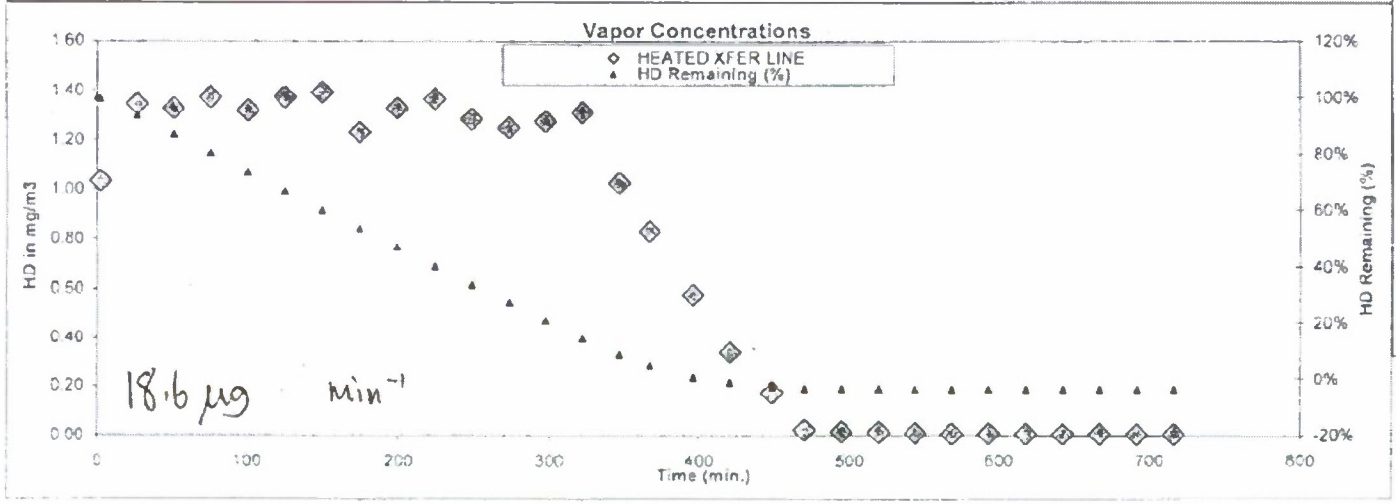
20050421_3a_11

Data Evaluation Grade: Modeling Grade

Tunnel:	3a	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	04/21/05	11
Type of substrate:	Glass	
Test agent/purity:	0	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.16 mg	
Corrected mass on 100% agent purity:	6.98 mg	
Average substrate temperature:	35.17 °C	
Average air flow rate:	14.12 SLPM	
Average air temperature above drop:	35.11 °C	
Mass % recovery in vapor:	103.9 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	103.9 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.2	0.54%	Go
0.4	2.99%	Go
0.3	0.72%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
2.50	1.04E+00	99.74%
27.03	1.35E+00	93.82%
51.62	1.33E+00	87.16%
76.20	1.38E+00	80.43%
100.80	1.32E+00	73.72%
125.40	1.38E+00	67.01%
150.00	1.39E+00	60.12%
174.62	1.23E+00	53.58%
199.23	1.33E+00	47.20%
223.85	1.37E+00	40.48%
248.47	1.29E+00	33.88%
273.08	1.25E+00	27.57%
297.70	1.28E+00	21.27%
322.33	1.31E+00	14.82%
346.97	1.03E+00	8.99%
367.62	8.30E-01	5.11%
396.27	5.76E-01	1.03%
420.92	3.40E-01	-1.25%
445.55	1.77E-01	-2.70%
470.20	2.47E-02	-3.14%
494.83	1.71E-02	-3.24%
519.47	1.46E-02	-3.32%
544.12	1.15E-02	-3.39%
568.75	9.02E-03	-3.44%
593.38	8.51E-03	-3.48%
618.02	7.56E-03	-3.52%
642.65	6.74E-03	-3.56%
667.27	6.00E-03	-3.59%
691.90	5.01E-03	-3.62%
716.53	5.04E-03	-3.64%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(00-)\20050421_3a_11

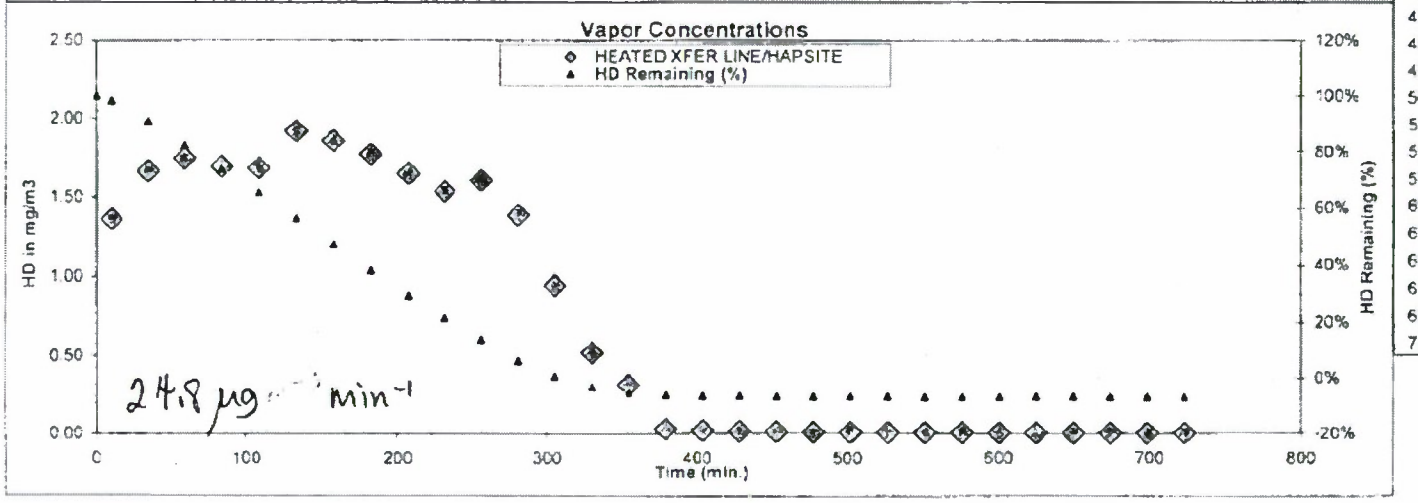
20050502_3a_14

Data Evaluation Grade: Modeling Grade

Tunnel:	3a		
Instruments:	HEATED XFER LINE/HAPSITE		
Date/Experiment #:	05/02/05	14	
Type of substrate:	Glass		
Test agent/purity:	HD		
Number of drops:	1		
Nominal drop volume:	6	µL	
Mass of agent disseminated:	7.08	mg	
Corrected mass on 100% agent purity:	6.90	mg	
Average substrate temperature:	36.09	°C	
Average air flow rate:	13.98	SLPM	
Average air temperature above drop:	34.88	°C	
Mass % recovery in vapor:	106.7	%	
Mass % recovery by extraction:	n/a	%	
Total agent % mass recovery:	106.7	%	
Tube #s consistant:	Yes		
Daily CCV < +/- 15%:	Yes		
Comments:	n/a		

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.3	0.73%	Go
0.7	5.21%	Go
0.2	0.58%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
10.35	1.36E+00	98.57%
34.92	1.67E+00	91.04%
59.50	1.75E+00	82.55%
84.08	1.69E+00	73.98%
108.68	1.68E+00	65.57%
133.27	1.92E+00	56.59%
157.87	1.86E+00	47.17%
182.47	1.77E+00	38.12%
207.40	1.65E+00	29.48%
231.67	1.54E+00	21.66%
256.27	1.61E+00	13.83%
280.88	1.39E+00	6.37%
305.48	9.47E-01	0.56%
330.10	5.23E-01	-3.11%
354.72	3.14E-01	-5.19%
379.32	3.03E-02	-6.05%
403.92	2.05E-02	-6.18%
428.52	1.53E-02	-6.27%
453.12	1.32E-02	-6.34%
477.72	1.07E-02	-6.40%
502.32	8.32E-03	-6.44%
526.92	7.35E-03	-6.48%
551.52	6.09E-03	-6.52%
576.12	5.93E-03	-6.55%
600.72	4.83E-03	-6.57%
625.32	4.58E-03	-6.60%
649.92	3.76E-03	-6.62%
674.40	3.66E-03	-6.64%
699.00	3.42E-03	-6.65%
723.60	3.05E-03	-6.67%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(00--)\20050502_3a_14

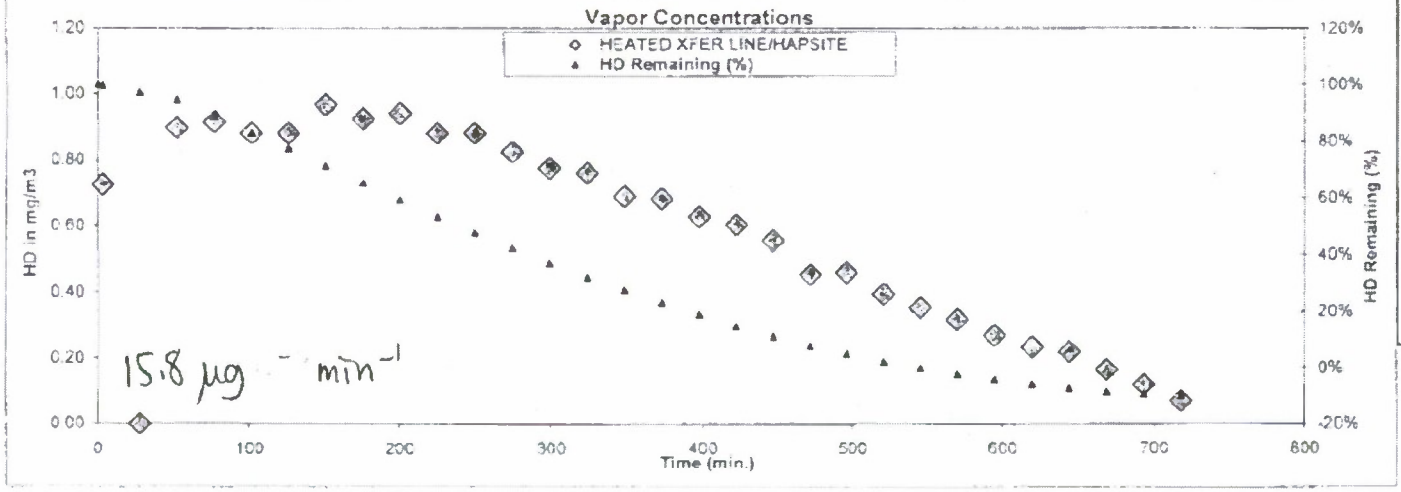
20050727_3a_37

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3a	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	07/27/05	37
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.12 mg	
Corrected mass on 100% agent purity:	6.93 mg	
Average substrate temperature:	34.67 °C	
Average air flow rate:	18.06 SLPM	
Average air temperature above drop:	33.85 °C	
Mass % recovery in vapor:	110.1 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	110.1 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.2	0.60%	Go
0.2	0.87%	Go
0.2	0.49%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
3.27	7.25E-01	99.69%
27.88	0.00E+00	97.37%
52.50	8.98E-01	94.49%
77.15	9.15E-01	88.67%
101.82	8.81E-01	82.89%
126.50	8.81E-01	77.23%
151.20	9.66E-01	71.29%
175.92	9.24E-01	65.20%
200.63	9.41E-01	59.20%
225.35	8.81E-01	53.34%
250.05	8.81E-01	47.67%
274.73	8.24E-01	42.19%
299.38	7.75E-01	37.06%
324.03	7.61E-01	32.12%
348.68	6.90E-01	27.47%
373.32	6.83E-01	23.06%
397.95	6.28E-01	18.86%
422.58	6.04E-01	14.90%
447.22	5.57E-01	11.18%
471.85	4.54E-01	7.94%
496.47	4.61E-01	5.00%
521.10	3.96E-01	2.25%
545.72	3.55E-01	-0.15%
570.35	3.19E-01	-2.31%
594.98	2.70E-01	-4.20%
619.62	2.36E-01	-5.83%
644.25	2.21E-01	-7.29%
668.87	1.66E-01	-8.53%
693.50	1.20E-01	-9.45%
718.12	6.97E-02	-10.06%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(00--)\20050727_3a_37

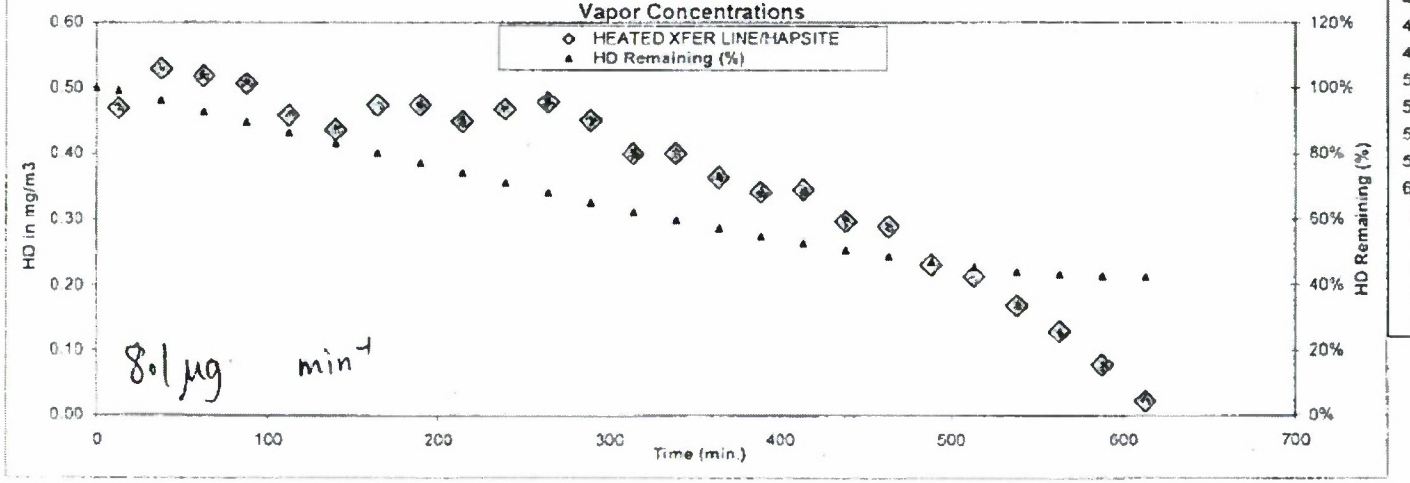
20050727_3c_02

Data Evaluation Grade: Modeling Grade

Tunnel:	3c	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #	07/27/05	2
Type of substrate :	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.13 mg	
Corrected mass on 100% agent purity:	6.94 mg	
Average substrate temperature:	35.81 °C	
Average air flow rate:	18.05 SLPM	
Average air temperature above drop:	34.69 °C	
Mass % recovery in vapor:	57.6 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	57.6 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%	No	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.3	0.83%	Go
0.0	0.22%	Go
0.3	0.79%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
12.85	4.69E-01	99.22%
37.70	5.29E-01	96.00%
62.58	5.18E-01	92.61%
87.50	5.06E-01	89.30%
112.43	4.57E-01	86.17%
139.63	4.36E-01	83.02%
164.60	4.73E-01	80.07%
189.57	4.74E-01	77.00%
214.53	4.48E-01	74.00%
239.50	4.67E-01	71.03%
264.45	4.77E-01	67.97%
289.37	4.50E-01	64.97%
314.27	3.99E-01	62.22%
339.15	4.00E-01	59.64%
364.03	3.63E-01	57.17%
388.92	3.41E-01	54.89%
413.78	3.44E-01	52.68%
438.67	2.96E-01	50.61%
463.55	2.89E-01	48.72%
488.43	2.31E-01	47.03%
513.32	2.14E-01	45.59%
538.18	1.69E-01	44.36%
563.05	1.28E-01	43.40%
587.92	7.78E-02	42.73%
612.78	2.21E-02	42.41%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(00--)\20050727_3c_02

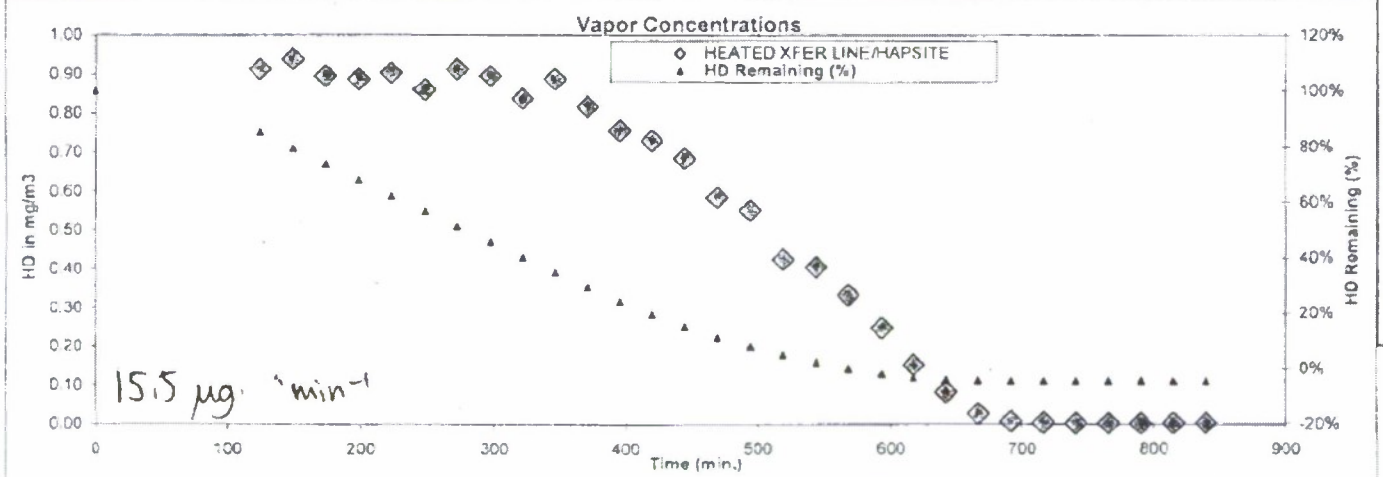
20050728_3a_38

Data Evaluation Grade: Modeling Grade

Tunnel:	3a		
Instruments:	HEATED XFER LINE/HAPSITE		
Date/Experiment #:	07/28/05	38	
Type of substrate:	Glass		
Test agent/purity:	HD		
Number of drops:	1		
Nominal drop volume:	6	µL	
Mass of agent disseminated:	7.26	mg	
Corrected mass on 100% agent purity:	7.07	mg	
Average substrate temperature:	34.23	°C	
Average air flow rate:	18.06	SLPM	
Average air temperature above drop:	33.77	°C	
Mass % recovery in vapor:	104.6	%	
Mass % recovery by extraction:	n/a	%	
Total agent % mass recovery:	104.6	%	
Tube #s consistant:	Yes		
Daily CCV < +/- 15%:	No		
Comments:	n/a		

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.2	0.67%	Go
0.1	0.57%	Go
0.1	0.37%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
125.18	9.14E-01	85.39%
149.75	9.40E-01	79.57%
174.32	8.97E-01	73.81%
198.90	8.88E-01	68.21%
223.50	9.05E-01	62.57%
248.12	8.61E-01	57.02%
272.75	9.14E-01	51.43%
297.40	8.97E-01	45.73%
322.05	8.38E-01	40.27%
346.70	8.88E-01	34.84%
371.35	8.18E-01	29.47%
396.00	7.56E-01	24.51%
420.65	7.31E-01	19.83%
445.30	6.84E-01	15.37%
469.95	5.84E-01	11.38%
494.60	5.52E-01	7.80%
519.25	4.24E-01	4.73%
543.90	4.05E-01	2.12%
568.57	3.33E-01	-0.21%
593.22	2.47E-01	-2.04%
617.88	1.53E-01	-3.30%
642.55	8.21E-02	-4.04%
667.20	2.74E-02	-4.38%
691.87	7.15E-03	-4.49%
716.53	4.19E-03	-4.52%
741.20	2.86E-03	-4.55%
765.85	2.17E-03	-4.56%
790.52	1.67E-03	-4.58%
815.17	1.72E-03	-4.59%
839.80	1.77E-03	-4.60%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(00--)\20050728_3a_38

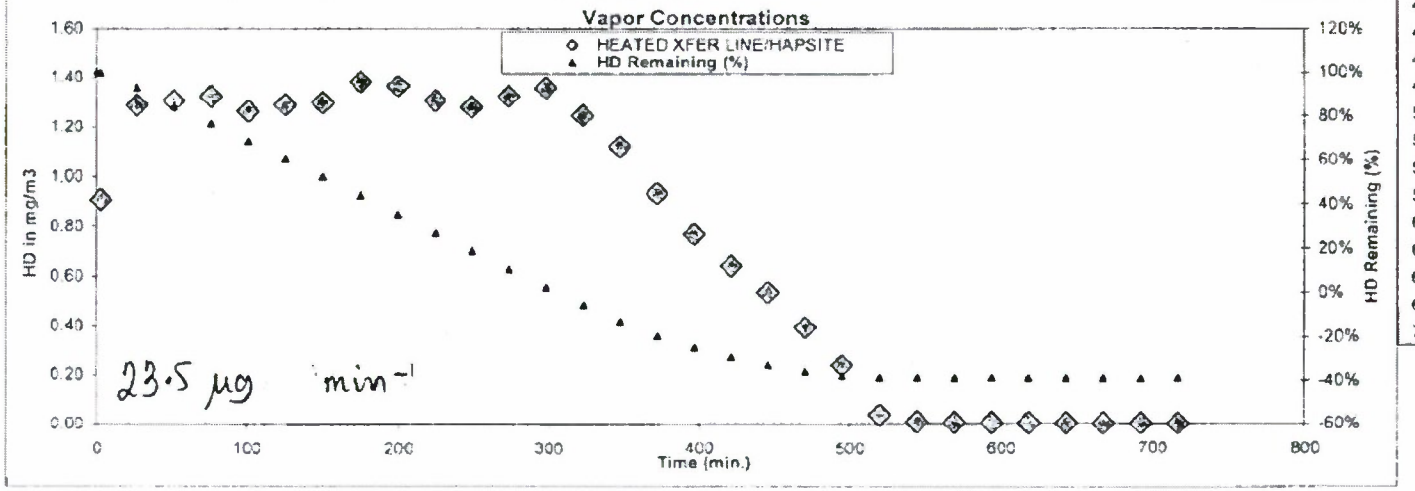
20050801_3c_04

Data Evaluation Grade: **Test Grade (requires further evaluation)**

Tunnel:	3c	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	08/01/05	4
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6	µL
Mass of agent disseminated:	7.29	mg
Corrected mass on 100% agent purity:	7.10	mg
Average substrate temperature:	35.62	°C
Average air flow rate:	18.05	SLPM
Average air temperature above drop:	34.64	°C
Mass % recovery in vapor:	139.0	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	139.0	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	No	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.3	0.86%	Go
0.2	0.88%	Go
0.2	0.57%	Go
-	-	Flag



Time (min)	Conc. mg/m³	HD rem. (%)
2.77	9.07E-01	99.68%
27.37	1.29E+00	92.82%
52.00	1.31E+00	84.71%
76.65	1.32E+00	76.48%
101.32	1.26E+00	68.38%
125.98	1.29E+00	60.39%
150.65	1.30E+00	52.29%
175.30	1.38E+00	43.91%
199.95	1.36E+00	35.31%
224.58	1.31E+00	26.95%
249.22	1.28E+00	18.87%
273.83	1.32E+00	10.73%
298.45	1.36E+00	2.36%
323.07	1.25E+00	-5.78%
347.68	1.12E+00	-13.17%
372.28	9.32E-01	-19.58%
396.88	7.68E-01	-24.89%
421.48	6.42E-01	-29.30%
446.08	5.34E-01	-32.97%
470.68	3.93E-01	-35.87%
495.28	2.40E-01	-37.84%
519.90	3.58E-02	-38.71%
544.50	7.89E-03	-38.84%
569.10	5.07E-03	-38.88%
593.72	3.76E-03	-38.91%
618.33	2.69E-03	-38.93%
642.95	1.70E-03	-38.94%
667.58	1.53E-03	-38.95%
692.22	1.35E-03	-38.96%
716.85	0.00E+00	-38.97%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(00--)\20050801_3c_04

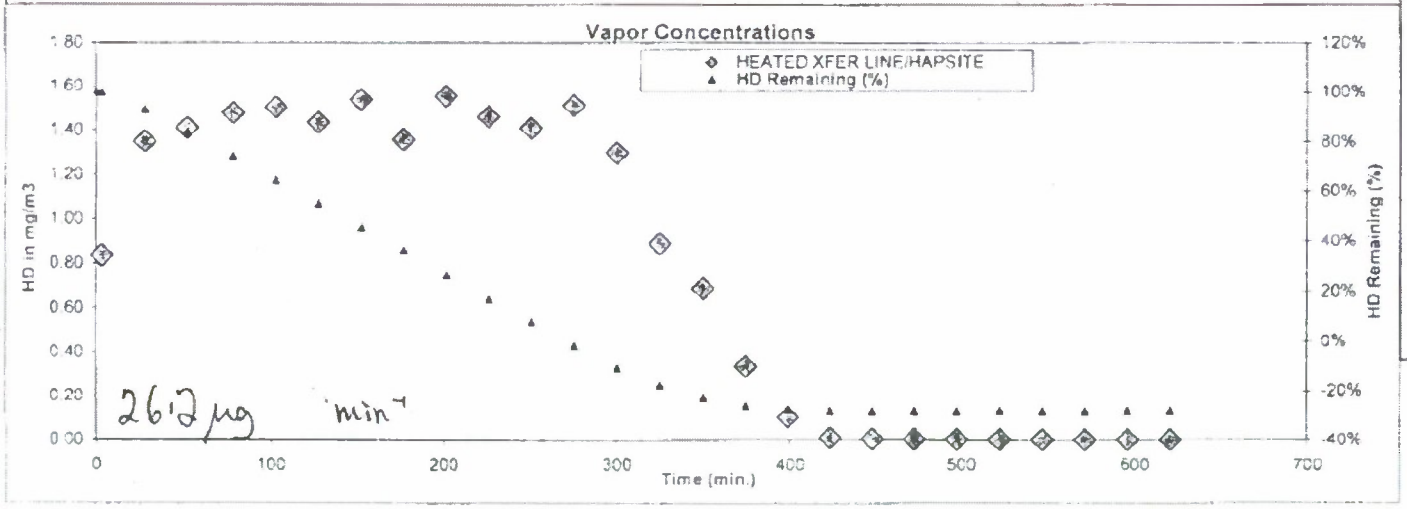
20050803_3c_05

Data Evaluation Grade: Modeling Grade

Tunnel:	3c	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	08/03/05	5
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.11 mg	
Corrected mass on 100% agent purity:	6.93 mg	
Average substrate temperature:	34.99 °C	
Average air flow rate:	18.05 SLPM	
Average air temperature above drop:	34.49 °C	
Mass % recovery in vapor:	128.1 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	128.1 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	No	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.3	0.77%	Go
0.2	0.69%	Go
0.3	0.81%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
3.00	8.35E-01	99.67%
27.57	1.35E+00	92.68%
52.17	1.41E+00	83.83%
78.53	1.48E+00	73.90%
103.17	1.50E+00	64.33%
127.82	1.44E+00	54.88%
152.48	1.54E+00	45.32%
177.13	1.36E+00	36.02%
201.80	1.56E+00	26.65%
226.45	1.46E+00	16.96%
251.12	1.41E+00	7.73%
275.77	1.51E+00	-1.66%
300.42	1.30E+00	-10.69%
325.05	8.89E-01	-17.72%
349.68	6.89E-01	-22.78%
374.33	3.38E-01	-26.08%
398.97	1.08E-01	-27.51%
423.60	1.19E-02	-27.90%
448.23	7.50E-03	-27.96%
472.87	5.20E-03	-28.00%
497.50	3.85E-03	-28.03%
522.13	2.97E-03	-28.05%
546.78	2.33E-03	-28.07%
571.42	1.10E-03	-28.08%
596.05	1.07E-03	-28.08%
620.68	0.00E+00	-28.09%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(00--)\20050803_3c_05

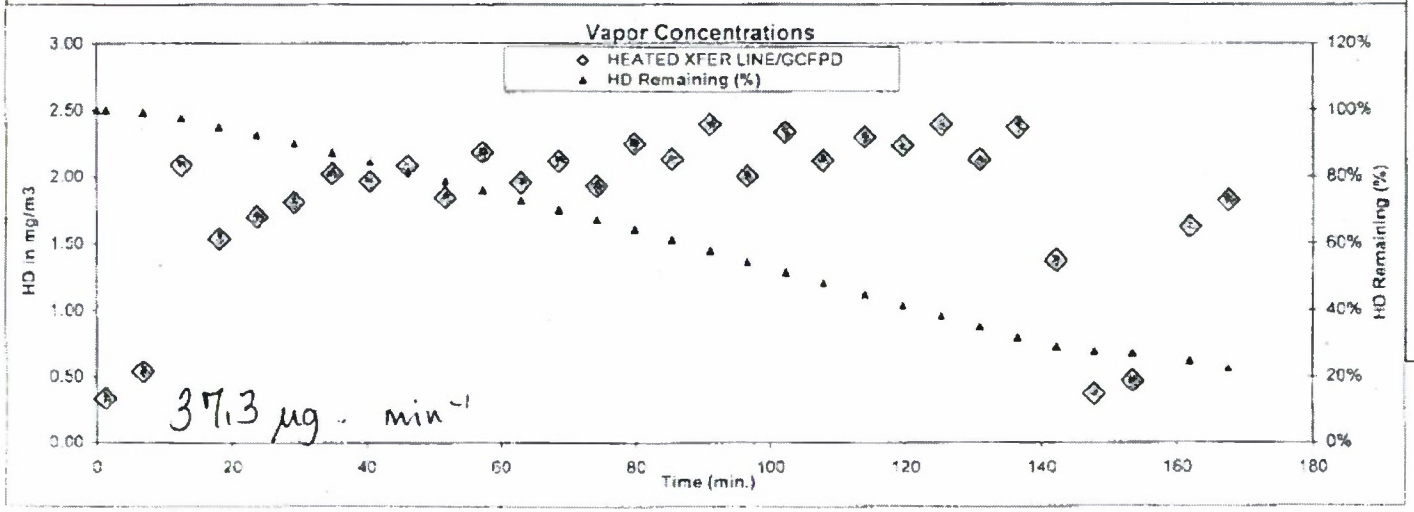
20050804_3a_41

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3a	
Instruments:	HEATED XFER LINE/GCFPD	
Date/Experiment #:	08/04/05	41
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.22 mg	
Corrected mass on 100% agent purity:	7.03 mg	
Average substrate temperature:	33.85 °C	
Average air flow rate:	17.96 SLPM	
Average air temperature above drop:	34.15 °C	
Mass % recovery in vapor:	77.6 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	77.6 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	No	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.2	0.45%	Go
0.4	2.26%	Go
0.3	0.85%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
1.30	3.36E-01	99.94%
6.88	5.40E-01	99.32%
12.47	2.09E+00	97.45%
18.07	1.54E+00	94.86%
23.67	1.70E+00	92.54%
29.27	1.81E+00	90.03%
34.88	2.02E+00	87.28%
40.50	1.97E+00	84.42%
46.12	2.08E+00	81.52%
51.73	1.84E+00	78.71%
57.33	2.18E+00	75.83%
62.95	1.96E+00	72.86%
68.57	2.12E+00	69.94%
74.18	1.93E+00	67.04%
79.80	2.25E+00	64.04%
85.42	2.13E+00	60.90%
91.03	2.39E+00	57.66%
96.65	2.06E+00	54.50%
102.27	2.33E+00	51.39%
107.88	2.12E+00	48.20%
114.08	2.30E+00	44.70%
119.70	2.23E+00	41.46%
125.32	2.39E+00	38.14%
130.93	2.13E+00	34.90%
136.55	2.37E+00	31.68%
142.17	1.37E+00	28.99%
147.78	3.74E-01	27.74%
153.42	4.70E-01	27.14%
161.93	1.62E+00	24.86%
167.55	1.82E+00	22.39%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(00--)\20050804_3a_41

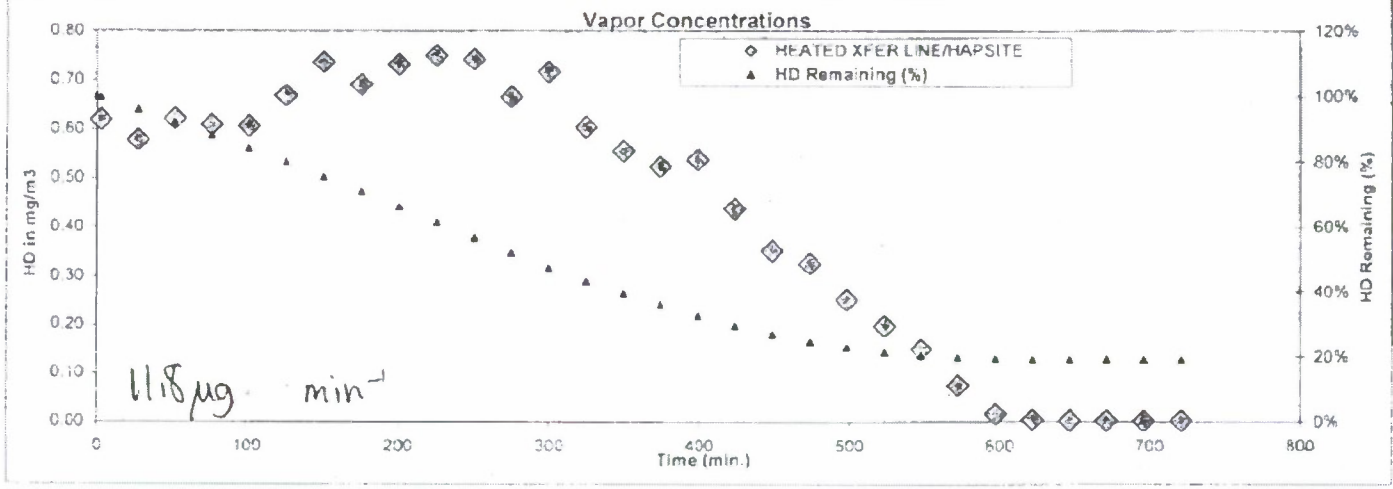
20050804_3c_06

Data Evaluation Grade: Modeling Grade

Tunnel:	3c	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	08/04/05	6
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6	µL
Mass of agent disseminated:	7.12	mg
Corrected mass on 100% agent purity:	6.93	mg
Average substrate temperature:	35.01	°C
Average air flow rate:	18.05	SLPM
Average air temperature above drop:	34.61	°C
Mass % recovery in vapor:	80.7	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	80.7	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	No	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.2	0.53%	Go
0.0	0.22%	Go
0.2	0.52%	Go
-	-	Go



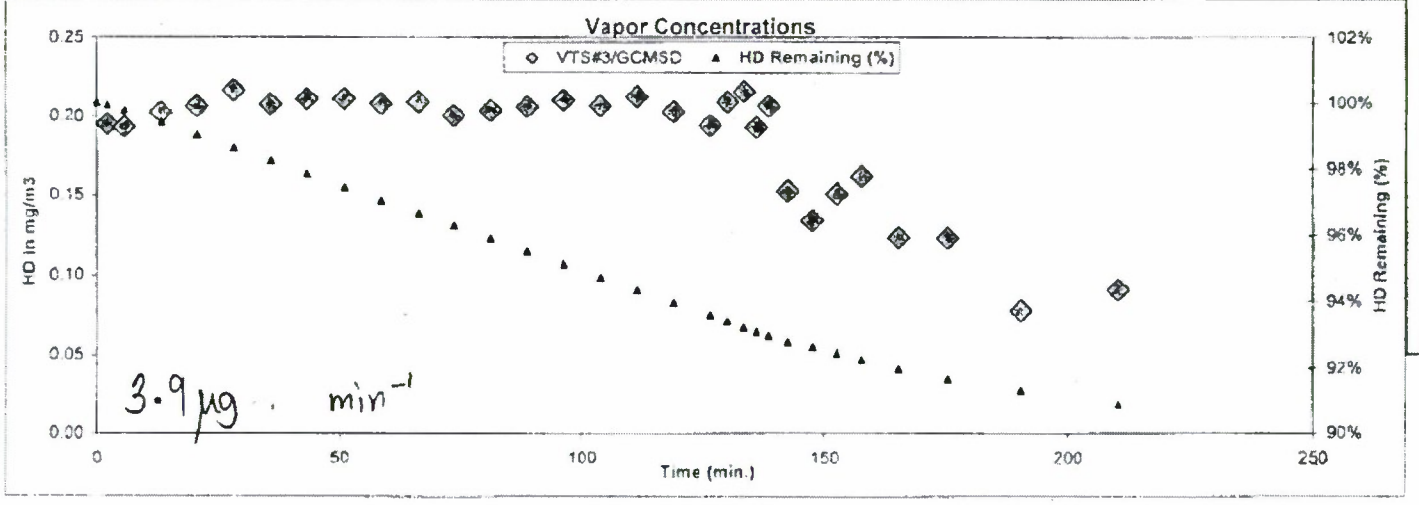
Time (min)	Conc. mg/m³	HD rem. (%)
2.83	6.19E-01	99.77%
27.55	5.78E-01	96.92%
52.28	6.22E-01	92.06%
77.03	6.09E-01	88.09%
101.78	6.07E-01	84.17%
126.55	6.69E-01	80.06%
151.32	7.37E-01	75.52%
176.10	6.91E-01	70.92%
200.88	7.32E-01	66.33%
225.67	7.50E-01	61.54%
250.46	7.42E-01	56.72%
275.28	6.66E-01	52.17%
300.08	7.17E-01	47.71%
324.88	6.04E-01	43.44%
349.68	5.56E-01	39.69%
374.48	5.24E-01	36.20%
399.28	5.38E-01	32.77%
424.07	4.38E-01	29.62%
448.85	3.53E-01	27.07%
473.63	3.27E-01	24.88%
498.42	2.52E-01	23.01%
523.20	1.97E-01	21.57%
547.97	1.50E-01	20.45%
572.72	7.53E-02	19.72%
597.47	1.67E-02	19.42%
622.22	4.63E-03	19.35%
646.98	3.08E-03	19.33%
671.75	2.52E-03	19.31%
696.52	2.20E-03	19.30%
721.28	1.97E-03	19.28%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(00--)\20050804_3c_06

20060711_3L_007

Tunnel:	3L		Date:	07/11/06
Parameters:	VTS#3	GCMSD	Exp. #:	7
type of substrate:	Glass	Dutch Galss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem:	KS	2/28/2006
number of drops:	1			
nominal drop volume:	6	µL		
mass of agent disseminated:	7.75	mg		
corrected mass on 100% agent purity:	7.54	mg	SD	P/F
Miller Nelson temperature:	0.00	°C	0.0	Pass
transition section wall temperature:	35.19	°C	0.4	Pass
fetch section wall temperature:	35.93	°C	0.3	Pass
post-test section wall temperature:	35.70	°C	0.5	Pass
mixing box wall temperature:	36.64	°C	0.5	Pass
sampling duct wall temperature:	36.36	°C	0.48	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			

18.7 SLPM



Time (min)	Conc. mg/m³	HD rem. (%)
2.20	1.95E-01	99.95%
5.75	1.93E-01	99.78%
13.30	2.02E-01	99.41%
20.85	2.06E-01	99.02%
28.40	2.16E-01	98.63%
35.95	2.07E-01	98.23%
43.50	2.11E-01	97.84%
51.05	2.11E-01	97.45%
58.60	2.08E-01	97.06%
66.15	2.09E-01	96.67%
73.70	2.00E-01	96.28%
81.25	2.03E-01	95.91%
88.80	2.06E-01	95.52%
96.35	2.10E-01	95.13%
103.90	2.07E-01	94.75%
111.47	2.12E-01	94.35%
119.02	2.03E-01	93.96%
126.55	1.94E-01	93.59%
130.10	2.09E-01	93.42%
133.65	2.15E-01	93.23%
136.20	1.93E-01	93.10%
138.75	2.06E-01	92.98%
142.55	1.53E-01	92.81%
147.60	1.34E-01	92.63%
152.65	1.51E-01	92.45%
157.70	1.62E-01	92.25%
165.25	1.24E-01	91.99%
175.30	1.23E-01	91.68%
190.35	7.79E-02	91.30%
210.40	9.08E-02	90.88%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(00--)\20060711_3L_007

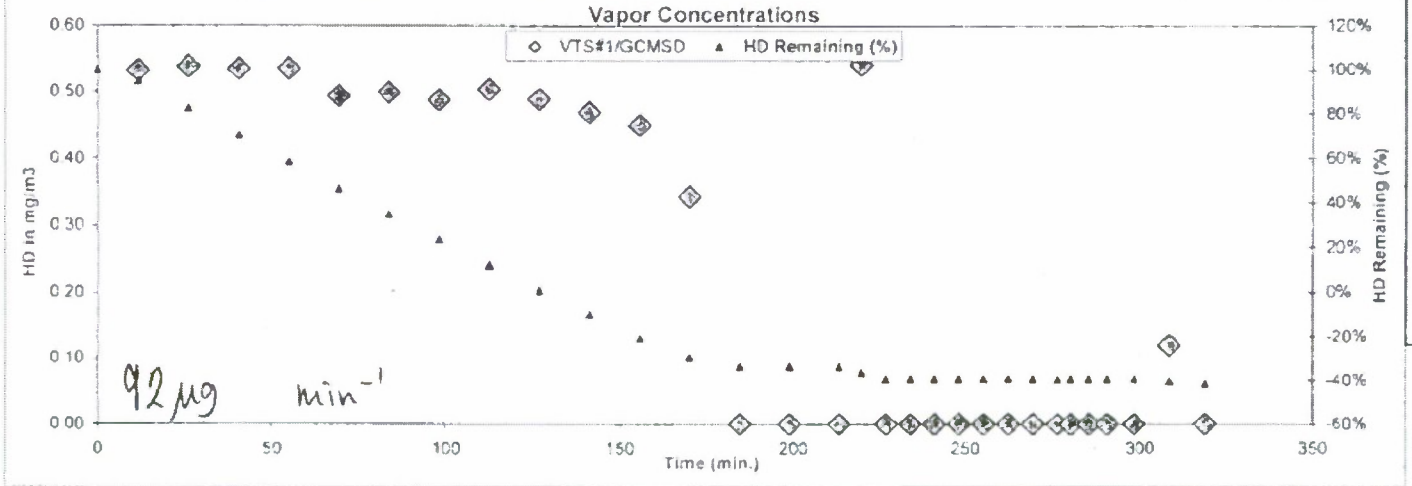
20050914_3a_68

Data Evaluation Grade: Test Grade (requires further evaluation)

Tunnel:	3a	
Instruments:	VTS#1/GCMSD	
Date/Experiment #:	09/14/05	68
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	9	µL
Mass of agent disseminated:	11.68	mg
Corrected mass on 100% agent purity:	11.38	mg
Average substrate temperature:	34.90	°C
Average air flow rate:	181.18	SLPM
Average air temperature above drop:	34.68	°C
Mass % recovery in vapor:	141.4	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	141.4	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.1	0.28%	Go
1.6	0.88%	Go
0.1	0.37%	Go
-	-	Flag



Time (min)	Conc. mg/m³	HD rem. (%)
11.83	5.33E-01	94.98%
26.22	5.39E-01	82.72%
40.62	5.35E-01	70.41%
55.02	5.35E-01	58.14%
69.42	4.94E-01	46.34%
83.82	4.99E-01	34.96%
98.20	4.88E-01	23.66%
112.60	5.04E-01	12.30%
127.00	4.89E-01	0.92%
141.40	4.69E-01	-10.06%
155.80	4.49E-01	-20.58%
170.20	3.43E-01	-29.66%
184.60	0.00E+00	-33.59%
199.00	0.00E+00	-33.59%
213.40	0.00E+00	-33.59%
219.97	5.40E-01	-36.41%
227.03	0.00E+00	-39.45%
234.10	0.00E+00	-39.45%
241.17	0.00E+00	-39.45%
248.23	0.00E+00	-39.45%
255.30	0.00E+00	-39.45%
262.37	0.00E+00	-39.45%
269.42	0.00E+00	-39.45%
276.48	0.00E+00	-39.45%
280.22	0.00E+00	-39.45%
285.45	0.00E+00	-39.45%
290.68	0.00E+00	-39.45%
298.42	0.00E+00	-39.45%
308.65	1.21E-01	-40.44%
318.88	0.00E+00	-41.42%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(0+0-)\20050914_3a_68

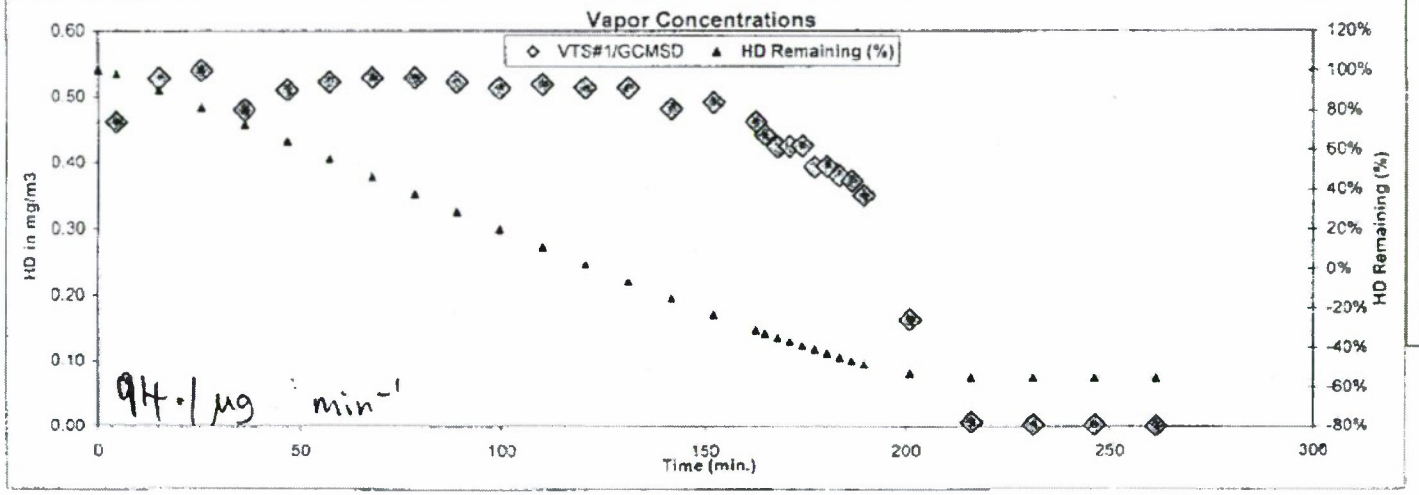
20051004_3c_30

Data Evaluation Grade: **Test Grade (requires further evaluation)**

Tunnel:	3c	
Instruments:	VTS#1/GCMSD	
Date/Experiment #:	10/04/05	30
Type of substrate :	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	9 µL	
Mass of agent disseminated:	11.65 mg	
Corrected mass on 100% agent purity:	11.38 mg	
Average substrate temperature:	35.11 °C	
Average air flow rate:	181.63 SLPM	
Average air temperature above drop:	34.97 °C	
Mass % recovery in vapor:	155.2 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	155.2 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.3	0.81%	Go
1.9	1.07%	Go
0.2	0.55%	Go
-	-	Flag



Time (min)	Conc. mg/m³	HD rem. (%)
4.42	4.62E-01	98.37%
14.98	5.28E-01	90.02%
25.55	5.40E-01	81.01%
36.12	4.81E-01	72.40%
46.68	5.11E-01	64.03%
57.27	5.23E-01	55.29%
67.82	5.30E-01	46.42%
78.40	5.29E-01	37.47%
88.97	5.23E-01	28.60%
99.53	5.14E-01	19.65%
110.10	5.19E-01	11.14%
120.67	5.14E-01	2.43%
131.23	5.14E-01	-6.24%
141.82	4.82E-01	-14.66%
152.37	4.92E-01	-22.86%
162.95	4.62E-01	-30.91%
165.27	4.42E-01	-32.59%
168.33	4.24E-01	-34.71%
171.40	4.25E-01	-36.79%
174.47	4.26E-01	-38.87%
177.55	3.94E-01	-40.89%
180.62	3.95E-01	-42.82%
183.68	3.80E-01	-44.71%
186.75	3.72E-01	-46.55%
189.82	3.50E-01	-48.32%
201.13	1.63E-01	-52.96%
216.22	6.61E-03	-55.00%
231.28	2.40E-03	-55.11%
246.35	1.92E-03	-55.16%
261.42	0.00E+00	-55.18%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(0+0-)\20051004_3c_30

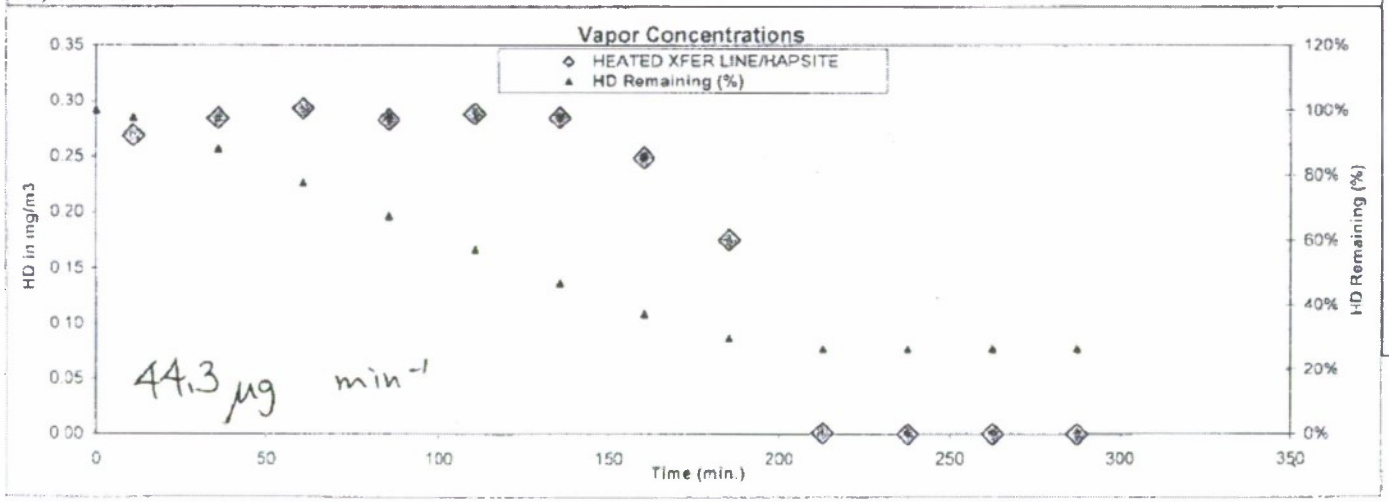
20051019_3a_75

Tunnel:	3a		Date:	10/19/05
Parameters:	HEATED XFER LINE	HAPSITE	Exp. #:	75
type of substrate:	Glass	Borofloat		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem:	KS	1/0/1900
number of drops:	1			
nominal drop volume:	9 µL			
mass of agent disseminated:	11.53 mg			
corrected mass on 100% agent purity:	11.23 mg		SD	P/F
Miller Nelson temperature:	5.99 °C		0.6	Pass
transition section wall temperature:	42.01 °C		0.1	Pass
fetch section wall temperature:	35.52 °C		0.5	Pass
post-test section wall temperature:	35.00 °C		0.1	Pass
mixing box wall temperature:	36.02 °C		0.3	Pass
sampling duct wall temperature:	35.34 °C		0.47	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			

Substrate 35.3°C

160.6 SLPM

Time (min)	Conc. mg/m³	HD rem. (%)
10.98	2.69E-01	97.89%
35.88	2.85E-01	88.04%
60.80	2.94E-01	77.74%
85.73	2.83E-01	67.46%
110.65	2.89E-01	57.26%
135.62	2.85E-01	47.03%
160.58	2.49E-01	37.50%
185.52	1.76E-01	29.93%
212.72	1.35E-03	26.49%
237.67	0.00E+00	26.47%
262.62	0.00E+00	26.47%
287.55	0.00E+00	26.47%



44.3 µg min⁻¹

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(0+0-)\20051019_3a_75

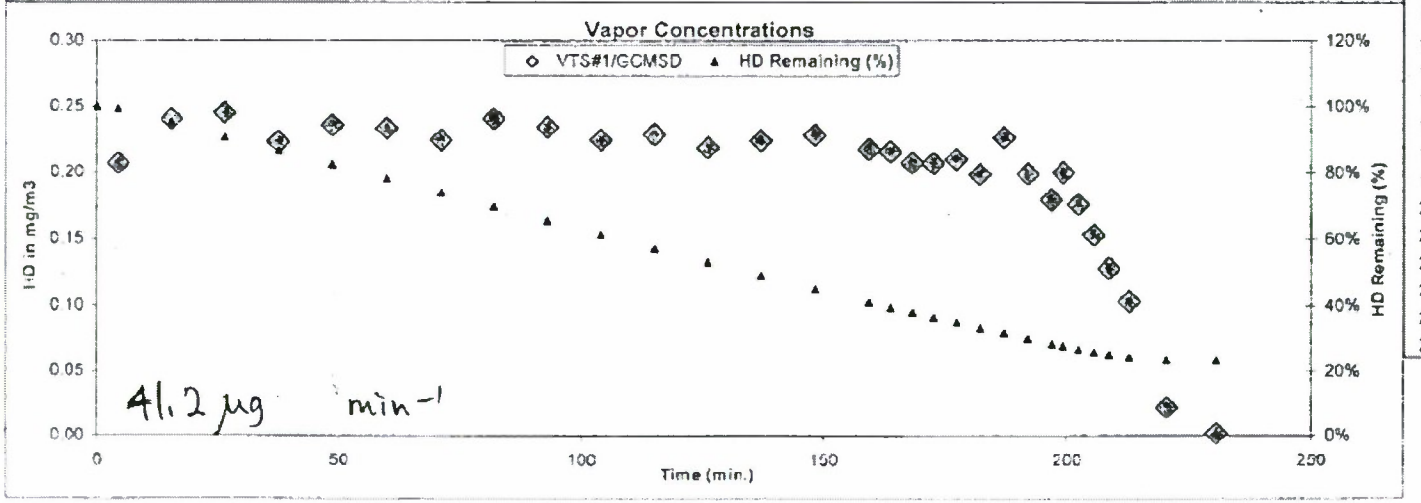
20051019_3c_37

Data Evaluation Grade: Modeling Grade

Tunnel:	3c	
Instruments:	VTS#1/GCMSD	
Date/Experiment #:	10/19/05	37
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	9 µL	
Mass of agent disseminated:	11.40 mg	
Corrected mass on 100% agent purity:	11.10 mg	
Average substrate temperature:	35.72 °C	
Average air flow rate:	181.66 SLPM	
Average air temperature above drop:	34.96 °C	
Mass % recovery in vapor:	76.8 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	76.8 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.3	0.72%	Go
1.8	1.01%	Go
0.2	0.51%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
4.45	2.07E-01	99.25%
15.52	2.41E-01	95.19%
26.60	2.45E-01	90.79%
37.67	2.24E-01	86.54%
48.74	2.36E-01	82.38%
59.80	2.33E-01	78.13%
70.87	2.25E-01	73.99%
81.93	2.41E-01	69.77%
93.00	2.34E-01	65.48%
104.07	2.25E-01	61.32%
115.15	2.29E-01	57.21%
126.22	2.19E-01	53.15%
137.28	2.24E-01	49.14%
148.35	2.29E-01	45.04%
159.42	2.18E-01	41.00%
163.82	2.16E-01	39.44%
168.23	2.07E-01	37.91%
172.63	2.07E-01	36.41%
177.28	2.10E-01	34.83%
182.18	1.99E-01	33.19%
187.08	2.27E-01	31.48%
191.98	1.99E-01	29.78%
196.88	1.79E-01	28.26%
199.28	2.00E-01	27.52%
202.43	1.76E-01	26.55%
205.58	1.53E-01	25.70%
208.73	1.28E-01	24.97%
212.88	1.03E-01	24.19%
220.53	2.16E-02	23.41%
230.68	1.66E-03	23.21%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(0+0-)\20051019_3c_37

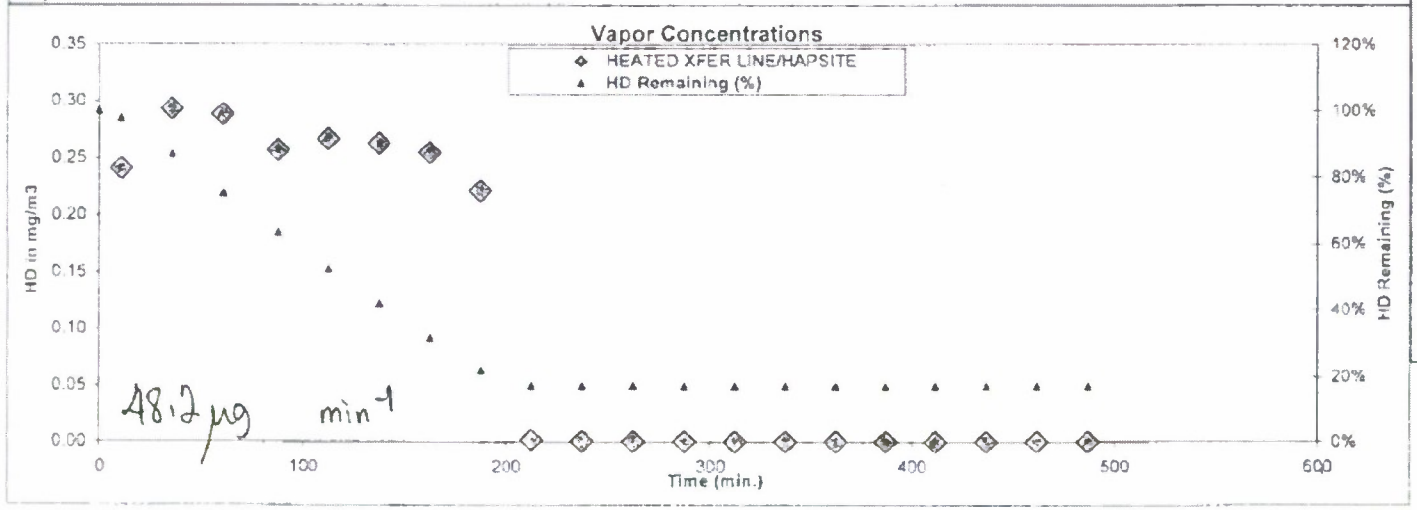
20051020_3a_76

Tunnel:	3a		Date:	10/20/05
Parameters:	HEATED XFER LINE	HAPSITE	Exp. #:	76
type of substrate:	Glass	Borofloat		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem:	KS	1/0/1900
number of drops:	1			
nominal drop volume:	9 µL			
mass of agent disseminated:	11.48 mg			
corrected mass on 100% agent purity:	11.18 mg		SD	P/F
Miller Nelson temperature:	6.00 °C		0.5	Pass
transition section wall temperature:	42.01 °C		0.1	Pass
fetch section wall temperature:	35.57 °C		0.5	Pass
post-test section wall temperature:	35.00 °C		0.1	Pass
mixing box wall temperature:	36.03 °C		0.3	Pass
sampling duct wall temperature:	35.48 °C		0.50	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			

Substrate @ 35.3°C

181.8 SLPM

Time (min)	Conc. mg/m³	HD rem. (%)
10.90	2.41E-01	97.86%
35.75	2.93E-01	87.06%
60.65	2.89E-01	75.28%
87.70	2.57E-01	63.27%
112.63	2.67E-01	52.64%
137.58	2.63E-01	41.89%
162.53	2.55E-01	31.38%
187.48	2.22E-01	21.71%
212.45	1.81E-03	17.18%
237.40	7.55E-04	17.12%
262.35	4.71E-04	17.10%
287.48	3.73E-04	17.08%
312.28	3.24E-04	17.07%
337.23	2.45E-04	17.06%
362.17	1.96E-04	17.05%
387.13	1.57E-04	17.04%
412.10	0.00E+00	17.04%
437.07	0.00E+00	17.04%
462.03	0.00E+00	17.04%
487.00	0.00E+00	17.04%



G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(0+0-)\20051020_3a_76

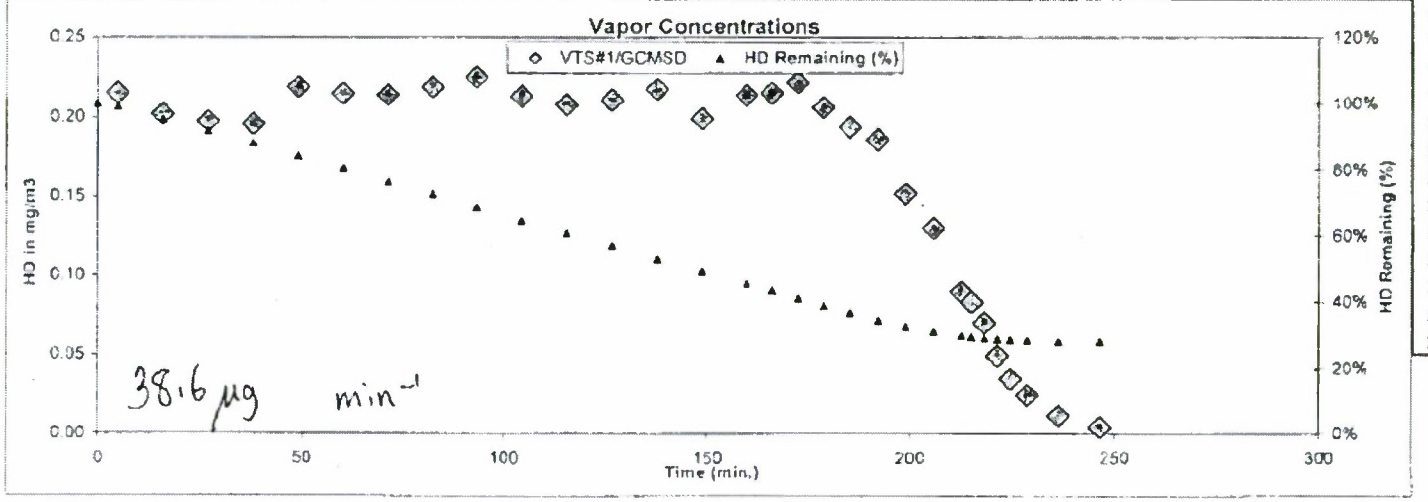
20051020_3c_38

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3c	
Instruments:	VTS#1/GCMSD	
Date/Experiment #:	10/20/05	38
Type of substrate :	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	9 µL	
Mass of agent disseminated:	11.37 mg	
Corrected mass on 100% agent purity:	11.07 mg	
Average substrate temperature:	34.20 °C	
Average air flow rate:	181.69 SLPM	
Average air temperature above drop:	35.00 °C	
Mass % recovery in vapor:	71.9 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	71.9 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.3	0.82%	Go
1.1	0.62%	Go
0.2	0.57%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
4.93	2.15E-01	99.13%
16.00	2.02E-01	95.34%
27.08	1.97E-01	91.71%
38.15	1.96E-01	88.14%
49.22	2.19E-01	84.38%
60.28	2.15E-01	80.45%
71.35	2.14E-01	76.56%
82.42	2.19E-01	72.63%
93.48	2.25E-01	68.60%
104.55	2.13E-01	64.62%
115.62	2.08E-01	60.81%
126.68	2.11E-01	57.01%
137.77	2.17E-01	53.12%
148.83	1.99E-01	49.34%
159.90	2.14E-01	45.59%
166.22	2.15E-01	43.38%
172.53	2.22E-01	41.11%
178.85	2.06E-01	38.90%
185.42	1.94E-01	36.75%
192.23	1.86E-01	34.63%
199.07	1.52E-01	32.73%
205.88	1.30E-01	31.16%
212.70	8.99E-02	29.93%
215.10	8.35E-02	29.58%
218.25	7.04E-02	29.19%
221.40	4.97E-02	28.88%
224.55	3.51E-02	28.66%
228.70	2.49E-02	28.45%
236.35	1.16E-02	28.22%
246.50	4.12E-03	28.09%

G:\Agent\FateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(0+0-)\20051020_3c_38

20050519_3a_19

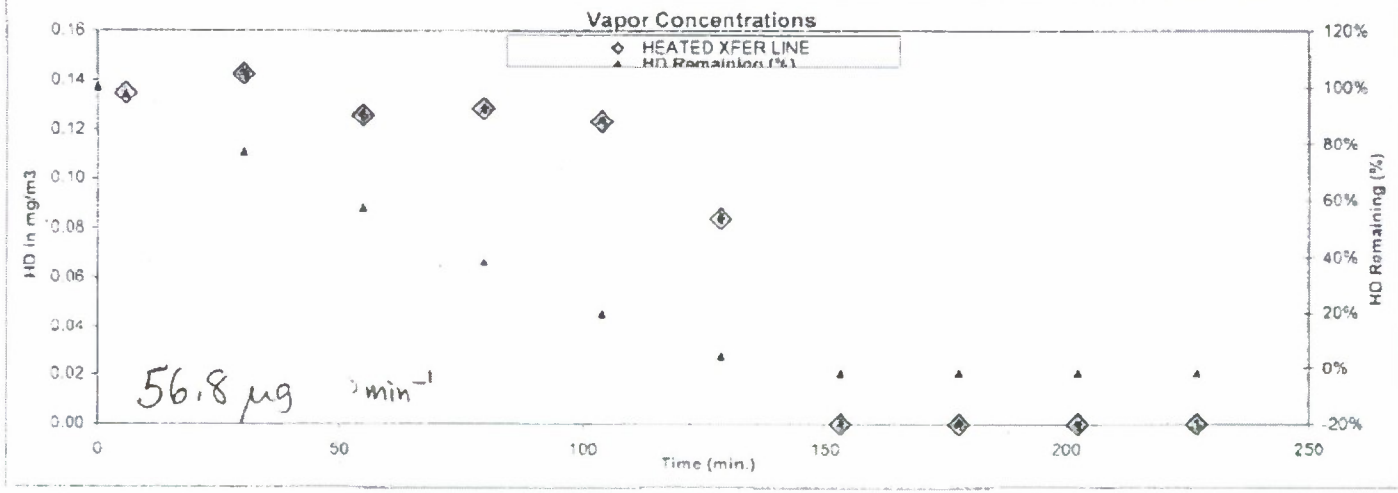
Data Evaluation Grade: **Modeling Grade**

Tunnel:	3a	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	05/19/05	19
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.37 mg	
Corrected mass on 100% agent purity:	7.18 mg	
Average substrate temperature:	35.58 °C	
Average air flow rate:	431.85 SLPM	
Average air temperature above drop:	34.14 °C	
Mass % recovery in vapor:	101.8 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	101.8 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	No	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.3	0.98%	Go
1.9	0.45%	Go
0.3	0.86%	Go
-	-	Go

Time (min)	Conc. mg/m³	HD rem. (%)
5.77	1.35E-01	97.66%
30.32	1.43E-01	77.17%
54.90	1.26E-01	57.30%
79.48	1.29E-01	38.45%
104.07	1.23E-01	19.80%
128.67	8.42E-02	4.43%
153.27	0.00E+00	-1.80%
177.87	0.00E+00	-1.80%
202.47	0.00E+00	-1.80%
227.05	0.00E+00	-1.80%



G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(00+-)\20050519_3a_19

20050519_3a_20

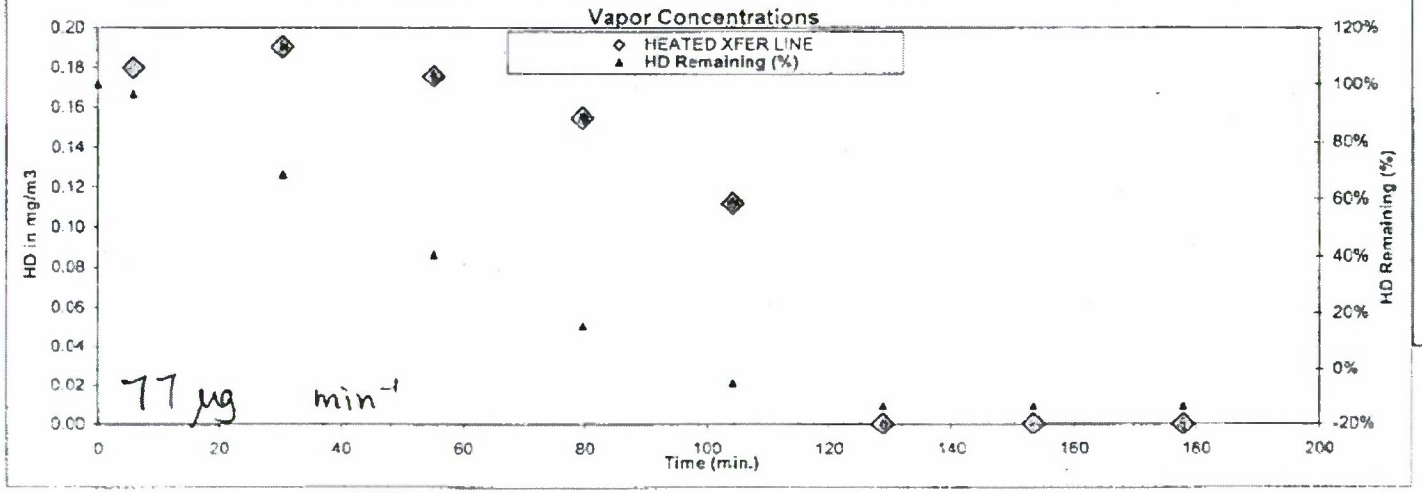
Data Evaluation Grade: **Modeling Grade**

Tunnel:	3a	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	05/19/05	20
Type of substrate :	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.15 mg	
Corrected mass on 100% agent purity:	6.96 mg	
Average substrate temperature:	35.30 °C	
Average air flow rate:	431.83 SLPM	
Average air temperature above drop:	34.17 °C	
Mass % recovery in vapor:	113.5 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	113.5 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	No	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.2	0.66%	Go
1.8	0.41%	Go
0.3	0.89%	Go
-	-	Go

Time (min)	Conc. mg/m³	HD rem. (%)
5.90	1.80E-01	96.71%
30.47	1.90E-01	68.49%
55.05	1.76E-01	40.59%
79.65	1.55E-01	15.39%
104.23	1.12E-01	-4.96%
128.82	0.00E+00	-13.51%
153.40	0.00E+00	-13.51%
177.95	0.00E+00	-13.51%



G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(00+-)\20050519_3a_20

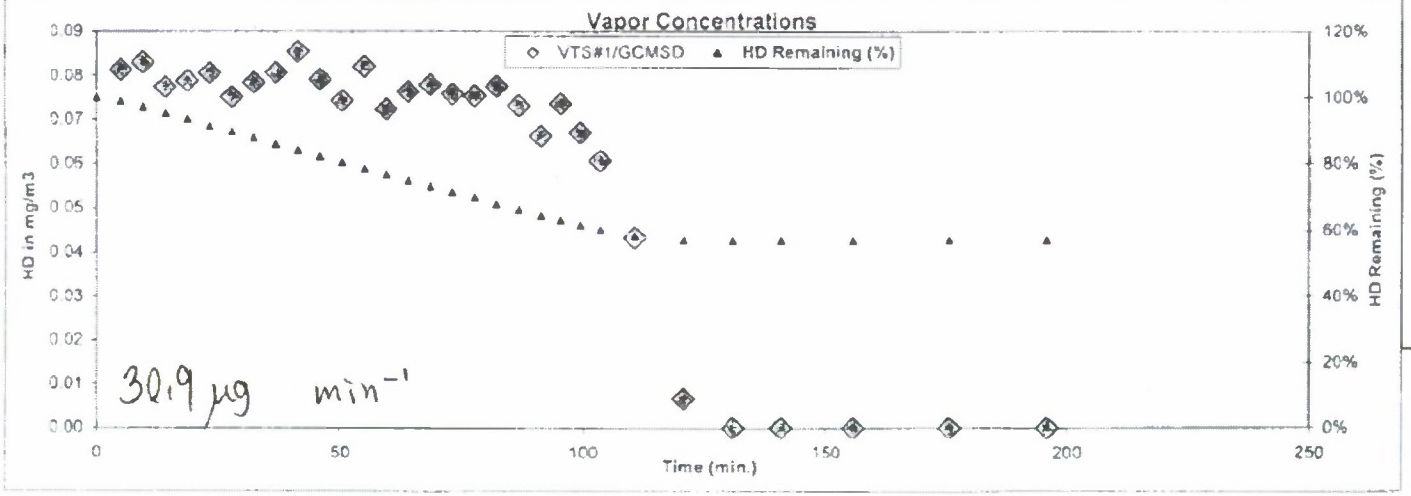
20060706_3c_145

Tunnel:	3c		Date:	07/06/06
Parameters:	VTS#1	GCMSD	Exp. #:	145
type of substrate:	Glass	Dutch Galss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem:	KS	2/28/2006
number of drops:	1			
nominal drop volume:	6	µL		
mass of agent disseminated:	8.12	mg		
corrected mass on 100% agent purity:	7.91	mg	SD	P/F
Miller Nelson temperature:	0.00	°C	0.0	Pass
transition section wall temperature:	35.08	°C	0.5	Pass
fetch section wall temperature:	35.27	°C	0.5	Pass
post-test section wall temperature:	35.35	°C	0.5	Pass
mixing box wall temperature:	36.75	°C	0.7	Pass
sampling duct wall temperature:	36.14	°C	0.54	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			

Substrate: 35.1°C

405 SLPM

Time (min)	Conc. mg/m³	HD rem. (%)
4.98	8.14E-02	98.96%
9.53	8.31E-02	97.05%
14.08	7.75E-02	95.18%
18.63	7.69E-02	93.36%
23.18	8.07E-02	91.50%
27.73	7.52E-02	89.68%
32.28	7.85E-02	87.90%
36.83	8.07E-02	86.04%
41.38	8.55E-02	84.11%
45.93	7.92E-02	82.19%
50.48	7.44E-02	80.40%
55.03	8.22E-02	78.58%
59.58	7.24E-02	76.78%
64.13	7.65E-02	75.04%
68.68	7.80E-02	73.24%
73.23	7.59E-02	71.45%
77.78	7.55E-02	69.69%
82.33	7.76E-02	67.91%
86.88	7.33E-02	66.15%
91.43	6.64E-02	64.52%
95.48	7.36E-02	63.07%
99.53	6.71E-02	61.61%
103.58	6.07E-02	60.29%
110.63	4.34E-02	58.41%
120.68	6.74E-03	57.12%
130.73	0.00E+00	56.95%
140.78	0.00E+00	56.95%
155.83	0.00E+00	56.95%
175.88	0.00E+00	56.95%
195.93	0.00E+00	56.95%



30.9 µg min⁻¹

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(00+-)\20060706_3c_145

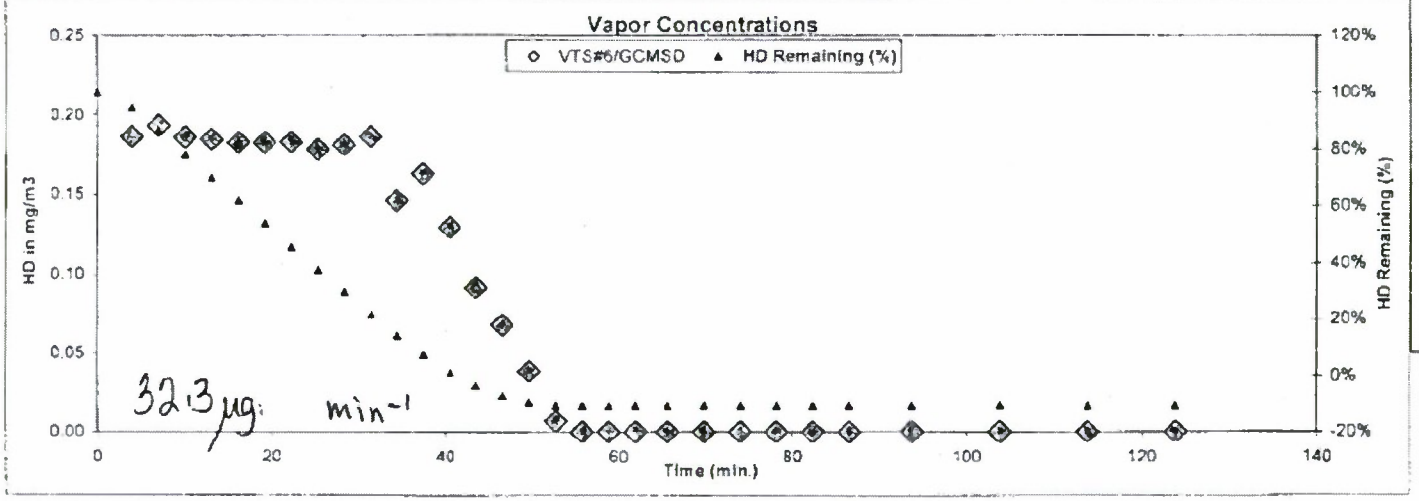
20060808_3k_017

Tunnel:	3K		Date:	08/08/06
Parameters:	VTS#6	GCMSD	Exp. #:	17
type of substrate :	Glass	Dutch Gaiss		
test agent:	HD			
agent grade::	neat			
agent purity:	97.4%	Date/Chem.	KS	2/28/2006
number of drops:	1			
nominal drop volume:	1 µL			
mass of agent disseminated:	1.29 mg			
corrected mass on 100% agent purity:	1.26 mg		SD	P/F
Miller Nelson temperature:	0.00 °C		0.0	Pass
transition section wall temperature:	35.04 °C		0.2	Pass
fetch section wall temperature:	35.94 °C		0.5	Pass
post-test section wall temperature:	36.01 °C		0.4	Pass
mixing box wall temperature:	36.37 °C		0.6	Pass
sampling duct wall temperature:	36.18 °C		0.43	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			

Substrate = 33.9°C

181 SLPm

Time (min)	Conc. mg/m³	HD rem. (%)
3.97	1.86E-01	94.66%
7.02	1.93E-01	86.31%
10.07	1.86E-01	77.97%
13.12	1.85E-01	69.81%
16.17	1.83E-01	61.73%
19.22	1.83E-01	53.69%
22.27	1.83E-01	45.63%
25.32	1.78E-01	37.68%
28.37	1.82E-01	29.76%
31.42	1.87E-01	21.66%
34.47	1.46E-01	14.34%
37.50	1.63E-01	7.58%
40.55	1.30E-01	1.14%
43.60	9.16E-02	-3.73%
46.65	6.79E-02	-7.24%
49.72	3.86E-02	-9.59%
52.77	6.80E-03	-10.59%
55.82	0.00E+00	-10.74%
58.87	0.00E+00	-10.74%
61.92	0.00E+00	-10.74%
65.53	0.00E+00	-10.74%
69.75	0.00E+00	-10.74%
73.97	0.00E+00	-10.74%
78.18	0.00E+00	-10.74%
82.40	0.00E+00	-10.74%
86.62	0.00E+00	-10.74%
93.75	0.00E+00	-10.74%
103.80	0.00E+00	-10.74%
113.85	0.00E+00	-10.74%
123.90	0.00E+00	-10.74%



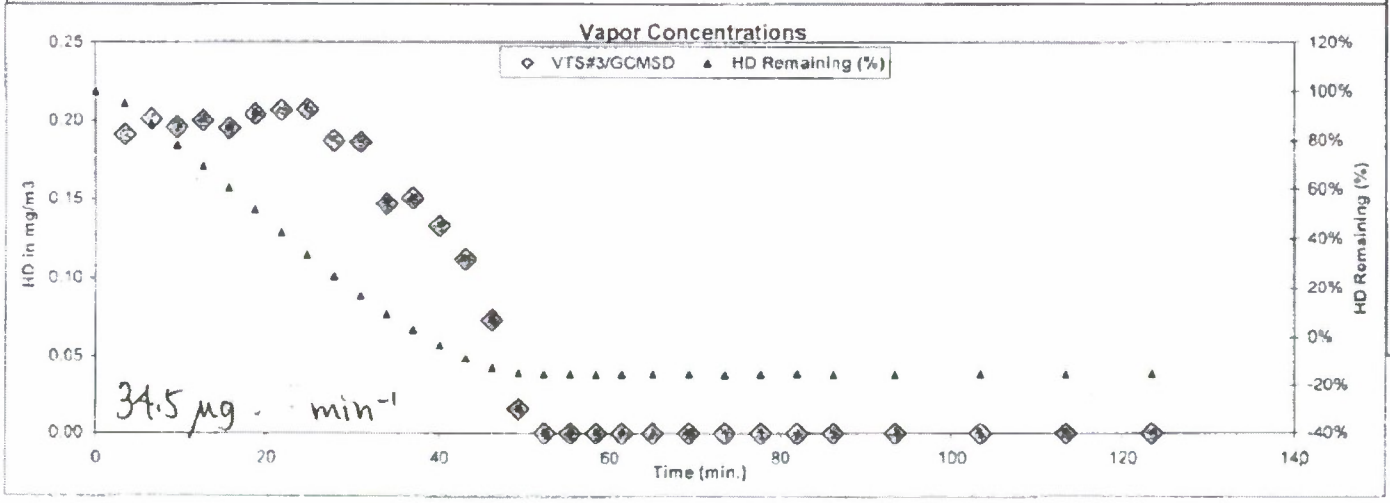
G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(0=0-)\20060808_3k_017

20060808_3L_015

Tunnel:	3L		Date:	08/08/06
Parameters:	VTS#3	GCMSD	Exp. #:	15
type of substrate:	Glass	Dutch Galss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem	KS	2/28/2006
number of drops:	1			
nominal drop volume:	1 µL			
mass of agent disseminated:	1.29 mg			
corrected mass on 100% agent purity:	1.26 mg		SD	P/F
Miller Nelson temperature:	0.00 °C		0.0	Pass
transition section wall temperature:	35.00 °C		0.0	Pass
fetch section wall temperature:	35.68 °C		0.5	Pass
post-test section wall temperature:	35.51 °C		0.5	Pass
mixing box wall temperature:	35.98 °C		0.1	Pass
sampling duct wall temperature:	35.99 °C		0.11	Pass
description:				
Tube #s consistant	YES			
Daily CCV < +/- 15%	Pass			

Substrate = 35.2°C

181 SLPM



Time (min)	Conc. mg/m³	HD rem. (%)
3.48	1.91E-01	95.21%
6.53	2.01E-01	86.59%
9.58	1.96E-01	77.86%
12.63	2.00E-01	69.16%
15.68	1.95E-01	60.47%
18.73	2.04E-01	51.69%
21.78	2.07E-01	42.66%
24.83	2.07E-01	33.56%
27.88	1.87E-01	24.88%
30.93	1.86E-01	16.67%
33.98	1.47E-01	9.34%
37.03	1.51E-01	2.79%
40.08	1.33E-01	-3.44%
43.13	1.12E-01	-8.83%
46.18	7.35E-02	-12.91%
49.23	1.59E-02	-14.87%
52.28	0.00E+00	-15.22%
55.33	0.00E+00	-15.22%
58.38	0.00E+00	-15.22%
61.43	0.00E+00	-15.22%
65.07	0.00E+00	-15.22%
69.28	0.00E+00	-15.22%
73.50	0.00E+00	-15.22%
77.72	0.00E+00	-15.22%
81.93	0.00E+00	-15.22%
86.15	0.00E+00	-15.22%
93.28	0.00E+00	-15.22%
103.33	0.00E+00	-15.22%
113.38	0.00E+00	-15.22%
123.43	0.00E+00	-15.22%

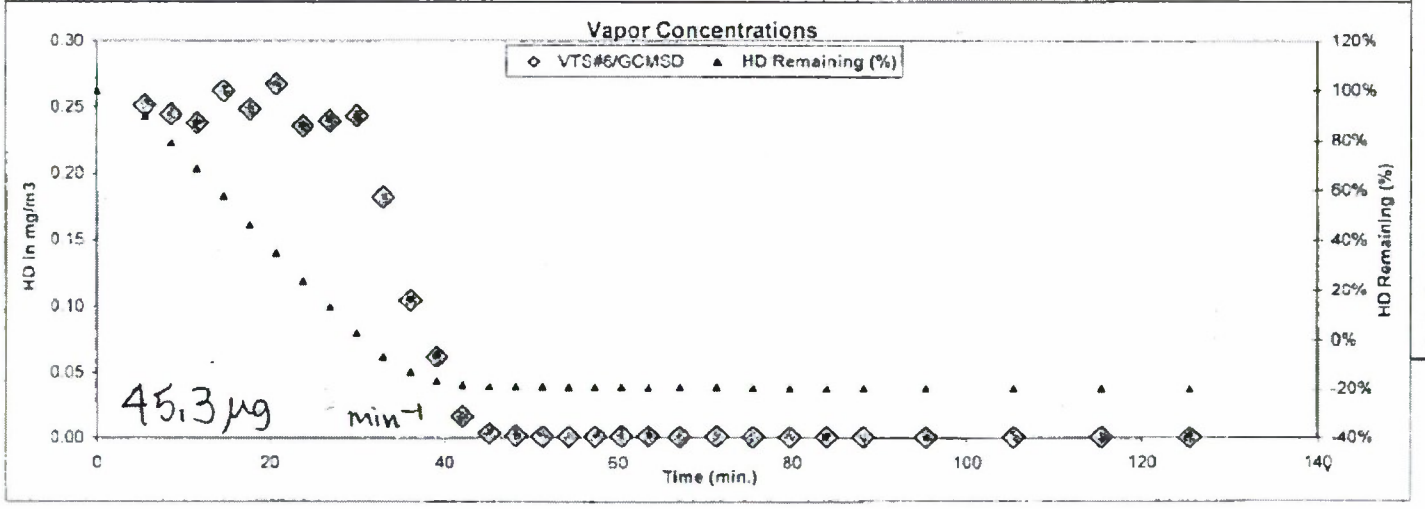
G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(0=0-)\20060808_3L_015

20060809_3k_018

Tunnel:	3K		Date:	08/09/06
Parameters:	VTS#6	GCMSD	Exp. #:	18
type of substrate:	Glass	Dutch Galss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem:	KS	2/28/2006
number of drops:	1			
nominal drop volume:	1	µL		
mass of agent disseminated:	1.29	mg		
corrected mass on 100% agent purity:	1.26	mg	SD	P/F
Miller Nelson temperature:	0.00	°C	0.0	Pass
transition section wall temperature:	35.36	°C	0.5	Pass
fetch section wall temperature:	36.17	°C	0.4	Pass
post-test section wall temperature:	36.38	°C	0.5	Pass
mixing box wall temperature:	37.19	°C	0.5	Pass
sampling duct wall temperature:	36.99	°C	0.49	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			

Substrate = 34.8°C

181 SLpm



Time (min)	Conc. mg/m³	HD rem. (%)
5.55	2.52E-01	89.94%
8.60	2.45E-01	79.03%
11.65	2.38E-01	68.41%
14.70	2.62E-01	57.41%
17.75	2.49E-01	46.18%
20.80	2.68E-01	34.83%
23.83	2.36E-01	23.82%
26.88	2.40E-01	13.36%
29.93	2.44E-01	2.74%
32.98	1.63E-01	-6.63%
36.03	1.05E-01	-12.95%
39.08	6.27E-02	-16.64%
42.13	1.68E-02	-18.39%
45.18	3.75E-03	-18.84%
48.23	1.92E-03	-18.97%
51.30	1.42E-03	-19.04%
54.33	1.27E-03	-19.10%
57.38	1.44E-03	-19.16%
60.43	1.60E-03	-19.23%
63.48	1.65E-03	-19.30%
67.12	9.86E-04	-19.37%
71.34	1.39E-03	-19.44%
75.55	8.71E-04	-19.51%
79.77	8.74E-04	-19.56%
83.99	9.14E-04	-19.62%
88.20	8.05E-04	-19.67%
95.33	5.69E-04	-19.74%
105.38	5.61E-04	-19.82%
115.43	5.33E-04	-19.90%
125.48	3.55E-04	-19.96%

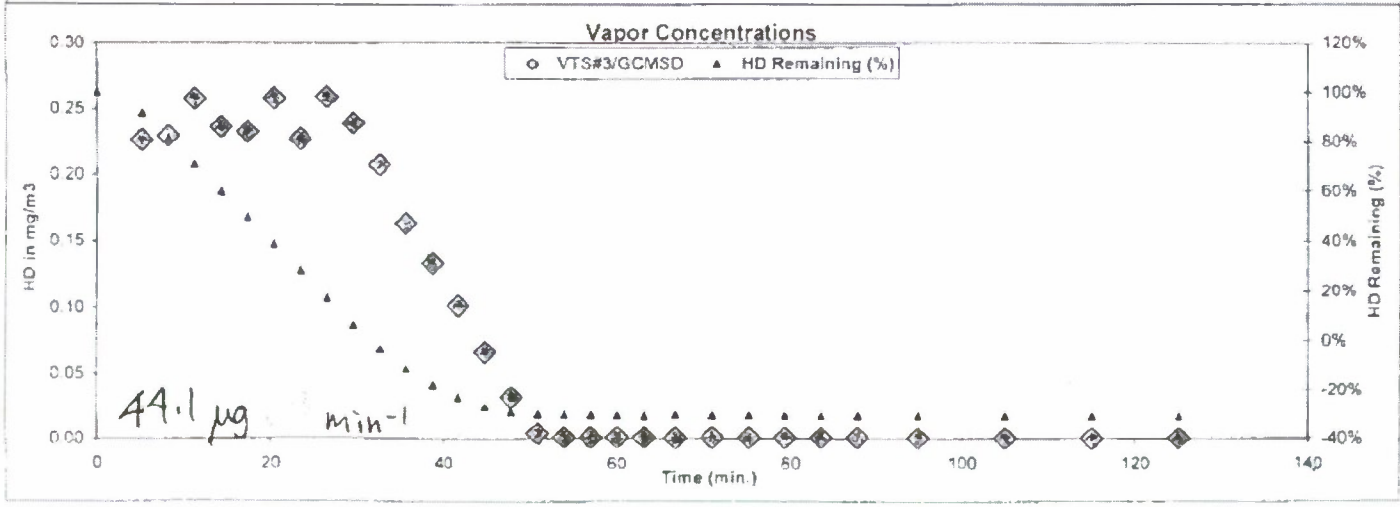
G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(0=0-)\20060809_3k_018

20060809_3L_016

Tunnel:	3L		Date:	08/09/06
Parameters:	VTS#3	GCMSD	Exp. #:	16
type of substrate:	Glass	Dutch Galss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem:	KS	2/28/2006
number of drops:	1			
nominal drop volume:	1 µL			
mass of agent disseminated:	1.29 mg			
corrected mass on 100% agent purity:	1.26 mg		SD	P/F
Miller Nelson temperature:	0.00 °C		0.0	Pass
transition section wall temperature:	35.00 °C		0.1	Pass
fetch section wall temperature:	35.39 °C		0.5	Pass
post-test section wall temperature:	35.15 °C		0.4	Pass
mixing box wall temperature:	35.90 °C		0.3	Pass
sampling duct wall temperature:	35.96 °C		0.18	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			

35.2°C

18 | SLPM



Time (min)	Conc. mg/m³	HD rem. (%)
5.15	2.26E-01	91.60%
8.20	2.29E-01	81.59%
11.23	2.58E-01	70.94%
14.28	2.36E-01	60.08%
17.33	2.33E-01	49.77%
20.38	2.58E-01	38.99%
23.43	2.27E-01	28.32%
26.48	2.59E-01	17.62%
29.53	2.39E-01	6.67%
32.58	2.08E-01	-3.16%
35.63	1.64E-01	-11.32%
38.68	1.34E-01	-17.85%
41.73	1.02E-01	-23.02%
44.78	6.69E-02	-26.73%
47.83	3.22E-02	-28.91%
50.88	4.16E-03	-29.71%
53.93	1.26E-03	-29.83%
56.98	1.35E-03	-29.89%
60.03	1.51E-03	-29.95%
63.08	1.34E-03	-30.01%
66.77	1.09E-03	-30.08%
70.94	1.14E-03	-30.14%
75.15	1.10E-03	-30.21%
79.37	9.72E-04	-30.28%
83.59	1.07E-03	-30.34%
87.80	9.25E-04	-30.40%
94.93	3.97E-04	-30.47%
104.98	4.19E-04	-30.53%
115.03	4.34E-04	-30.59%
125.08	4.68E-04	-30.65%

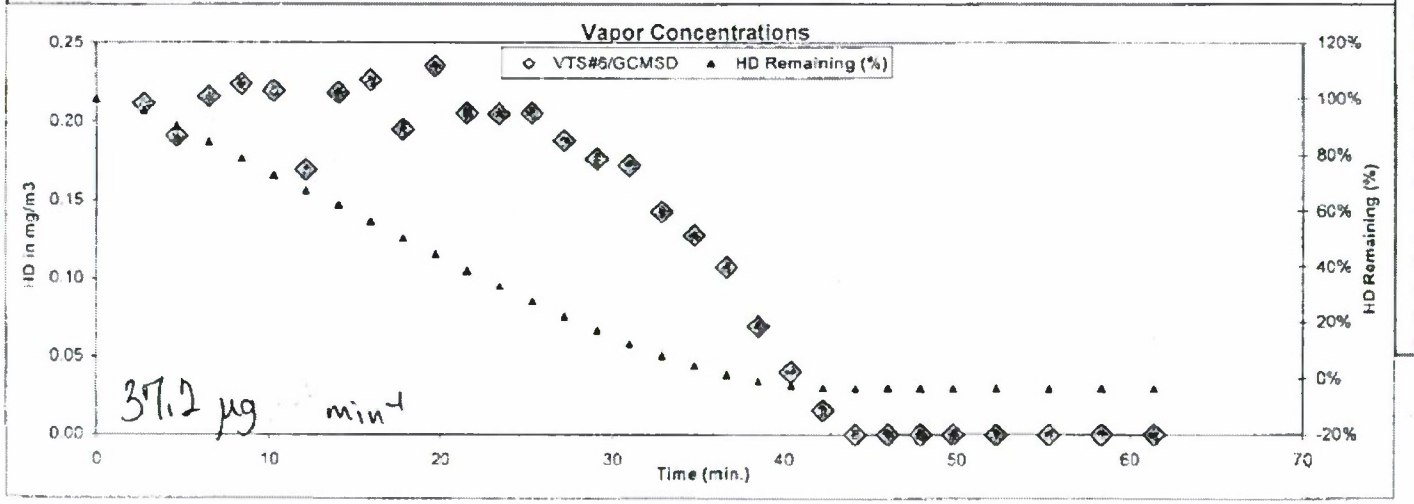
G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(0=0-)\20060809_3L_016

20060815_3K_021

Tunnel:	3K		Date:	08/15/06
Parameters:	VTS#6	GCMSD	Exp. #:	21
type of substrate:	Glass	Dutch Galss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem:	KS	2/28/2006
number of drops:	1			
nominal drop volume:	1	µL		
mass of agent disseminated:	1.29	mg		
corrected mass on 100% agent purity:	1.26	mg	SD	P/F
Miller Nelson temperature:	0.00	°C	0.0	Pass
transition section wall temperature:	36.25	°C	0.6	Pass
fetch section wall temperature:	36.00	°C	0.7	Pass
post-test section wall temperature:	36.42	°C	0.8	Pass
mixing box wall temperature:	39.31	°C	0.9	Pass
sampling duct wall temperature:	38.85	°C	0.78	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			

36.5°C Substrate

181.6 SLPM



Time (min)	Conc. mg/m³	HD rem. (%)
2.75	2.11E-01	95.80%
4.63	1.91E-01	90.33%
6.51	2.16E-01	84.80%
8.40	2.24E-01	78.83%
10.26	2.19E-01	72.85%
12.15	1.70E-01	67.56%
14.03	2.18E-01	62.29%
15.91	2.26E-01	56.24%
17.80	1.95E-01	50.51%
19.68	2.35E-01	44.67%
21.56	2.05E-01	38.68%
23.45	2.05E-01	33.11%
25.34	2.05E-01	27.52%
27.21	1.88E-01	22.19%
29.10	1.76E-01	17.24%
31.00	1.72E-01	12.46%
32.86	1.43E-01	8.21%
34.75	1.28E-01	4.53%
36.63	1.07E-01	1.34%
38.51	6.90E-02	-1.06%
40.40	3.99E-02	-2.54%
42.28	1.56E-02	-3.29%
44.16	0.00E+00	-3.51%
46.05	0.00E+00	-3.51%
47.93	0.00E+00	-3.51%
49.82	0.00E+00	-3.51%
52.28	0.00E+00	-3.51%
55.33	0.00E+00	-3.51%
58.38	0.00E+00	-3.51%
61.43	0.00E+00	-3.51%

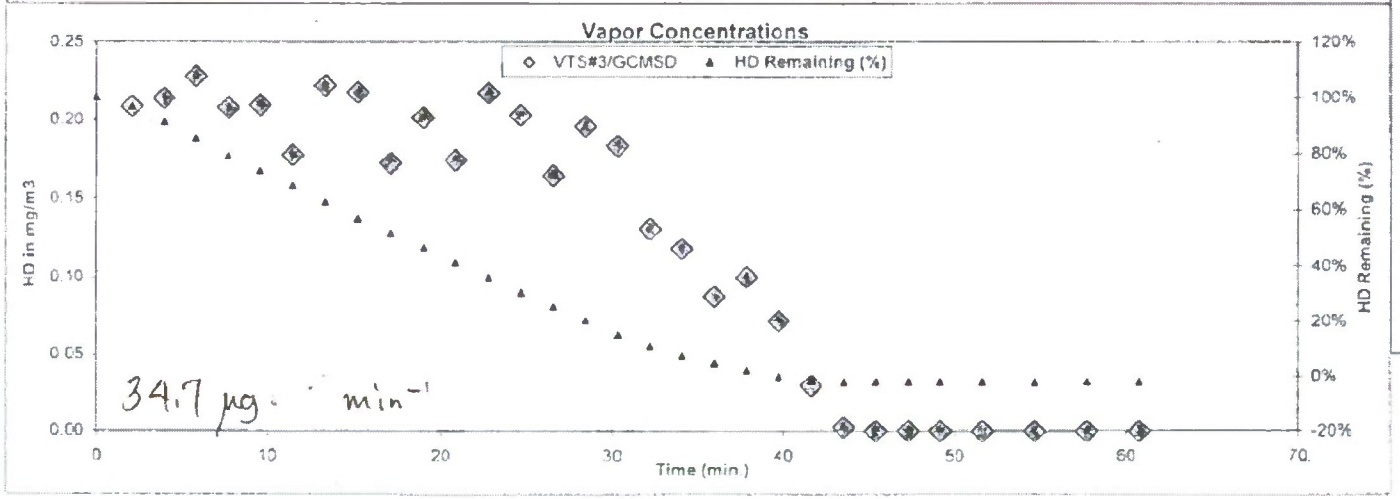
G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(0=0-)\20060815_3K_021

20060815_3L_019

Tunnel:	3L		Date:	08/15/06
Parameters:	VTS#3	GCMSD	Exp. #:	19
type of substrate:	Glass	Dutch Galss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem:	KS	2/28/2006
number of drops:	1			
nominal drop volume:	1	µL		
mass of agent disseminated:	1.29	mg		
corrected mass on 100% agent purity:	1.26	mg	SD	P/F
Miller Nelson temperature:	0.00	°C	0.0	Pass
transition section wall temperature:	35.00	°C	0.0	Pass
fetch section wall temperature:	35.29	°C	0.5	Pass
post-test section wall temperature:	35.05	°C	0.2	Pass
mixing box wall temperature:	35.83	°C	0.4	Pass
sampling duct wall temperature:	35.96	°C	0.20	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			

Substrate: 35.2°C

18L.6 SLPM



34.7 µg · min⁻¹

Time (min)	Conc. mg/m³	HD rem. (%)
2.08	2.09E-01	96.86%
3.96	2.14E-01	91.12%
5.83	2.28E-01	85.16%
7.73	2.08E-01	79.18%
9.61	2.10E-01	73.51%
11.50	1.78E-01	68.24%
13.38	2.22E-01	62.81%
15.26	2.18E-01	56.83%
17.15	1.73E-01	51.52%
19.03	2.02E-01	46.44%
20.91	1.74E-01	41.33%
22.80	2.17E-01	36.00%
24.68	2.03E-01	30.29%
26.56	1.65E-01	25.29%
28.45	1.96E-01	20.39%
30.33	1.83E-01	15.23%
32.21	1.31E-01	10.96%
34.10	1.18E-01	7.57%
35.98	8.75E-02	4.77%
37.86	1.00E-01	2.22%
39.75	7.18E-02	-0.12%
41.63	2.98E-02	-1.50%
43.51	2.43E-03	-1.94%
45.40	0.00E+00	-1.97%
47.26	0.00E+00	-1.97%
49.16	0.00E+00	-1.97%
51.63	0.00E+00	-1.97%
54.68	0.00E+00	-1.97%
57.73	0.00E+00	-1.97%
60.78	0.00E+00	-1.97%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(0=0-)\20060815_3L_019

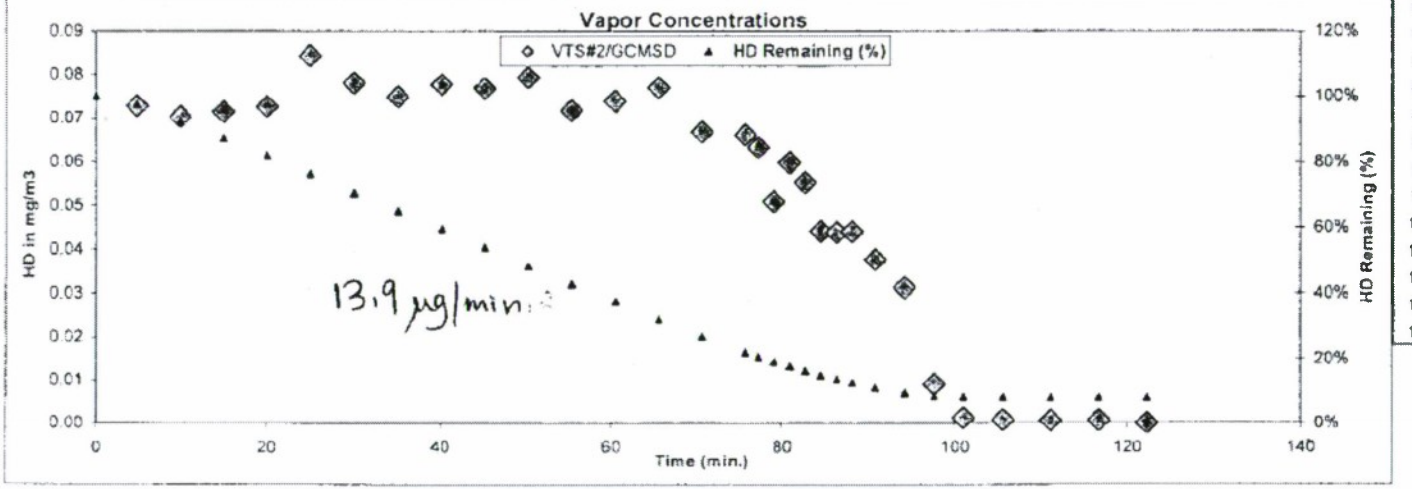
20050913_3a_66

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3a	
Instruments:	VTS#2/GCMSD	
Date/Experiment #:	09/13/05	66
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	1 µL	
Mass of agent disseminated:	1.31 mg	
Corrected mass on 100% agent purity:	1.27 mg	
Average substrate temperature:	35.12 °C	
Average air flow rate:	181.88 SLPM	
Average air temperature above drop:	34.96 °C	
Mass % recovery in vapor:	92.0 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	92.0 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	No	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.1	0.39%	Go
1.6	0.87%	Go
0.1	0.35%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
4.83	7.28E-02	97.49%
9.90	7.04E-02	92.31%
14.97	7.15E-02	87.19%
20.03	7.27E-02	81.97%
25.08	8.43E-02	76.31%
30.15	7.80E-02	70.45%
35.22	7.49E-02	64.92%
40.28	7.77E-02	59.41%
45.35	7.67E-02	53.83%
50.42	7.92E-02	48.19%
55.48	7.17E-02	42.74%
60.53	7.39E-02	37.49%
65.60	7.69E-02	32.04%
70.67	6.69E-02	26.85%
75.73	6.62E-02	22.04%
77.30	6.33E-02	20.59%
79.12	5.09E-02	19.11%
80.93	5.98E-02	17.68%
82.75	5.52E-02	16.19%
84.57	4.41E-02	14.90%
86.38	4.38E-02	13.76%
88.18	4.40E-02	12.63%
90.83	3.77E-02	11.09%
94.23	3.13E-02	9.42%
97.63	9.13E-03	8.44%
101.02	1.21E-03	8.19%
105.58	7.38E-04	8.12%
111.15	6.20E-04	8.07%
116.72	6.55E-04	8.02%
122.28	0.00E+00	7.99%

G:\Agent\FateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(0-0-)\20050913_3a_66

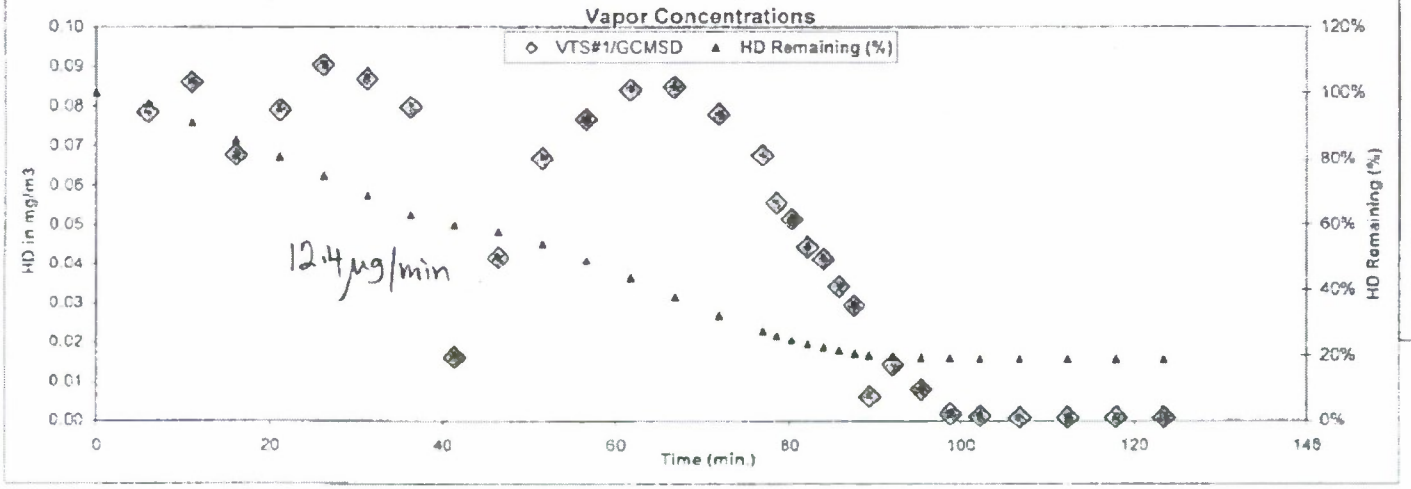
20050913_3c_21

Data Evaluation Grade: Modeling Grade

Tunnel:	3c	
Instruments:	VTS#1/GCMSD	
Date/Experiment #:	09/13/05	21
Type of substrate :	Class	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	1 µL	
Mass of agent disseminated:	1.37 mg	
Corrected mass on 100% agent purity:	1.34 mg	
Average substrate temperature:	35.19 °C	
Average air flow rate:	181.60 SLPM	
Average air temperature above drop:	35.25 °C	
Mass % recovery in vapor:	81.2 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	81.2 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	No	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.3	0.97%	Go
1.8	0.97%	Go
0.3	0.77%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
5.92	7.86E-02	96.85%
10.98	8.61E-02	91.19%
16.07	6.78E-02	85.68%
21.13	7.92E-02	80.83%
26.20	9.05E-02	74.99%
31.27	8.69E-02	68.89%
36.33	7.98E-02	63.16%
41.40	1.63E-02	59.86%
46.48	4.16E-02	57.87%
51.55	6.69E-02	54.14%
56.62	7.67E-02	49.20%
61.68	8.41E-02	43.68%
66.75	8.48E-02	37.87%
71.82	7.79E-02	32.28%
76.88	6.76E-02	27.27%
78.47	5.55E-02	25.95%
80.28	5.13E-02	24.63%
82.10	4.43E-02	23.45%
83.93	4.13E-02	22.39%
85.75	3.43E-02	21.46%
87.57	2.94E-02	20.67%
89.38	6.17E-03	20.24%
92.03	1.44E-02	19.87%
95.43	8.05E-03	19.35%
98.83	1.77E-03	19.12%
102.23	1.22E-03	19.05%
106.80	7.84E-04	18.99%
112.38	7.90E-04	18.93%
117.95	8.55E-04	18.87%
123.52	8.10E-04	18.81%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(0-0-)\20050913_3c_21.

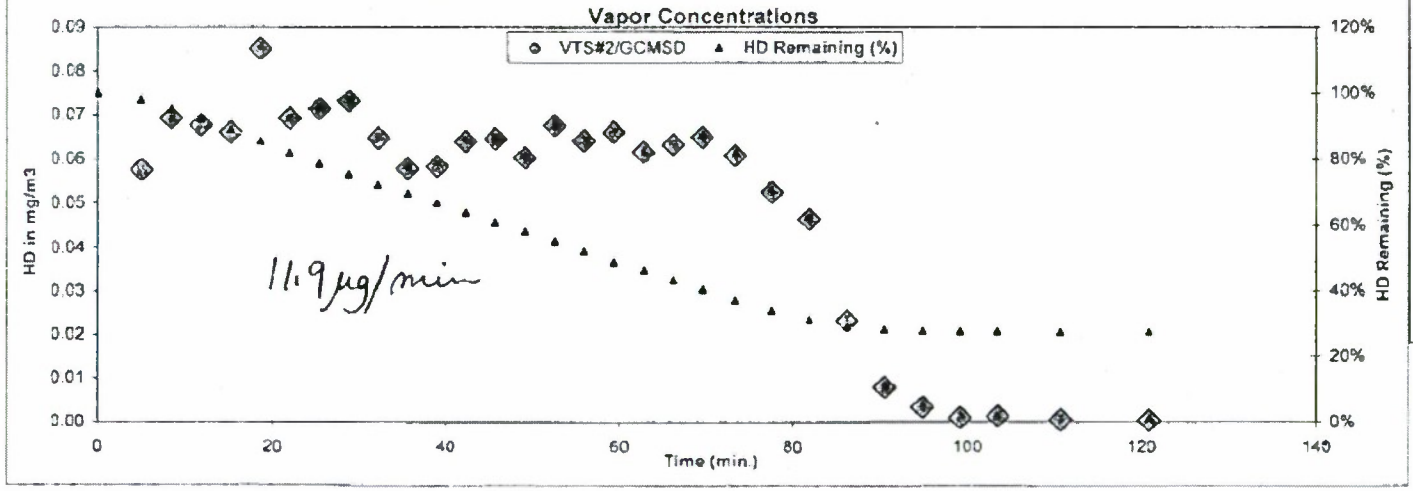
20051018_3a_74

Data Evaluation Grade: Modeling Grade

Tunnel:	3a	
Instruments:	VTS#2/GCMSD	
Date/Experiment #:	10/18/05	74
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	1 µL	
Mass of agent disseminated:	1.38 mg	
Corrected mass on 100% agent purity:	1.35 mg	
Average substrate temperature:	35.90 °C	
Average air flow rate:	181.91 SLPM	
Average air temperature above drop:	35.06 °C	
Mass % recovery in vapor:	72.5 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	72.5 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.1	0.41%	Go
1.0	0.56%	Go
0.4	1.24%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
4.98	5.76E-02	98.06%
8.38	6.92E-02	95.15%
11.78	6.77E-02	92.01%
15.18	6.61E-02	88.94%
18.58	8.52E-02	85.47%
21.98	6.92E-02	81.93%
25.38	7.14E-02	78.71%
28.78	7.31E-02	75.39%
32.18	6.48E-02	72.23%
35.58	5.78E-02	69.42%
38.98	5.83E-02	66.75%
42.38	6.40E-02	63.95%
45.78	6.46E-02	61.00%
49.18	6.02E-02	58.13%
52.58	6.76E-02	55.20%
55.98	6.42E-02	52.18%
59.38	6.61E-02	49.19%
62.78	6.16E-02	46.26%
66.18	6.32E-02	43.40%
69.58	6.49E-02	40.46%
73.32	6.08E-02	37.29%
77.64	5.25E-02	33.99%
81.94	4.64E-02	31.13%
86.27	2.32E-02	29.09%
90.59	7.92E-03	28.19%
94.89	3.38E-03	27.86%
99.22	9.74E-04	27.73%
103.52	1.34E-03	27.67%
110.75	3.95E-04	27.58%
120.90	3.54E-04	27.53%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(0-0-)\20051018_3a_74

20051122_3d_09

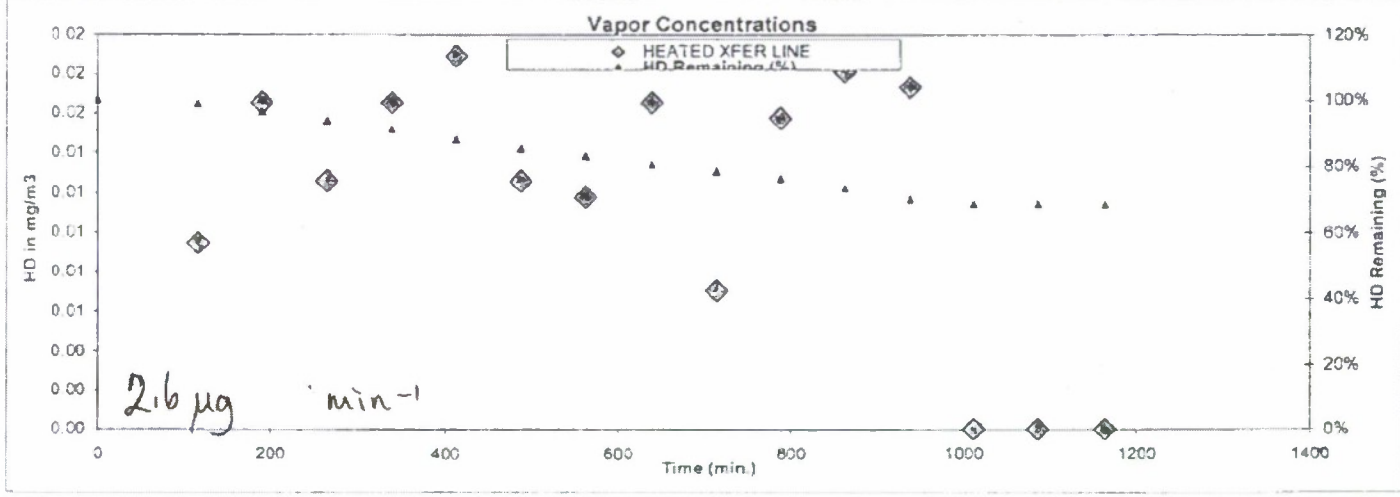
Data Evaluation Grade: Test Grade

Tunnel:	3d	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	11/22/05	9
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.80 mg	
Corrected mass on 100% agent purity:	7.60 mg	
Average substrate temperature:	15.10 °C	
Average air flow rate:	181.67 SLPM	
Average air temperature above drop:	13.82 °C	
Mass % recovery in vapor:	31.4 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	31.4 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	No	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.2	1.01%	Go
0.5	0.25%	Go
0.2	1.49%	Go
-	-	Go

Time (min)	Conc. mg/m³	HD rem. (%)
116.50	9.45E-03	98.68%
190.50	1.65E-02	96.38%
265.50	1.26E-02	93.77%
339.50	1.65E-02	91.19%
413.50	1.89E-02	88.06%
487.50	1.26E-02	85.27%
562.50	1.18E-02	83.08%
639.50	1.65E-02	80.47%
714.50	7.09E-03	78.35%
788.50	1.57E-02	76.33%
862.50	1.81E-02	73.33%
937.50	1.73E-02	70.16%
1011.50	0.00E+00	68.62%
1085.50	0.00E+00	68.62%
1163.50	0.00E+00	68.62%



G:\AgentFateTech\Wind Tunnel\Archeved Excel Sheets (NOT POLISHED)\HD GL(-00-)\20051122_3d_09

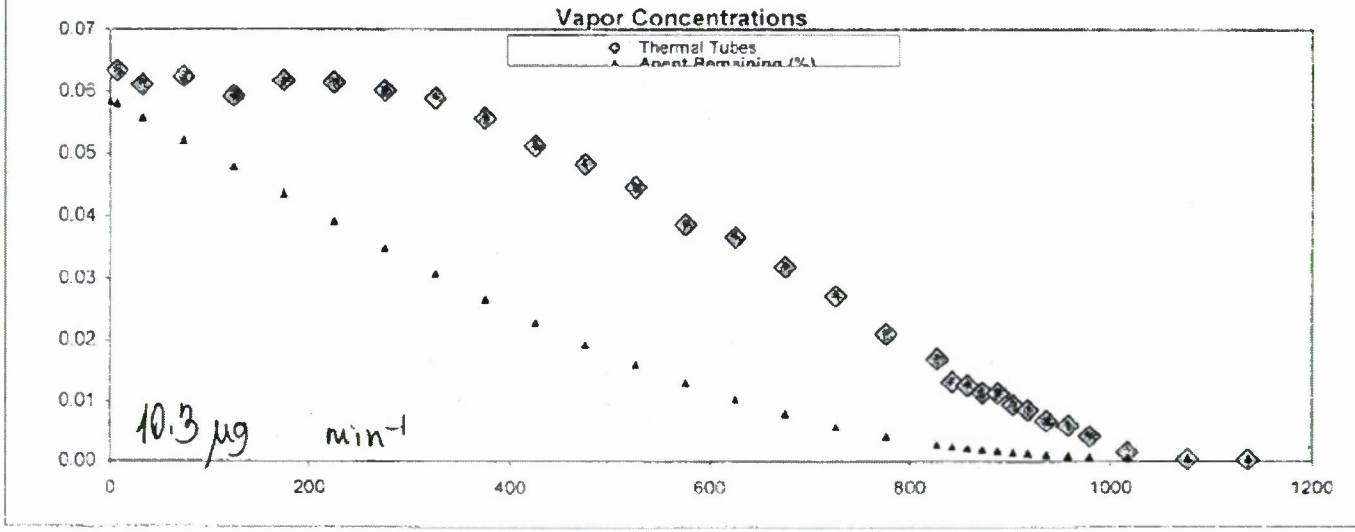
20060118_3d_27

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3d	
Instruments:	VTS#2/GCMSD	
Date/Experiment #:	01/18/06	27
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6	µL
Mass of agent disseminated:	7.72	mg
Corrected mass on 100% agent purity:	7.52	mg
Average substrate temperature:	15.47	°C
Average air flow rate:	182.20	SLPM
Average air temperature above drop:	14.97	°C
Mass % recovery in vapor:	99.3	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	99.3	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.5	2.97%	Go
0.7	0.41%	Go
0.1	0.55%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
7.23	6.34E-02	99.44%
32.36	6.11E-02	95.65%
74.18	6.24E-02	89.39%
124.36	5.93E-02	81.99%
174.56	6.18E-02	74.63%
224.75	6.15E-02	67.14%
274.93	6.02E-02	59.74%
325.11	5.89E-02	52.50%
375.30	5.57E-02	45.53%
425.48	5.12E-02	39.03%
475.66	4.63E-02	32.97%
525.85	4.46E-02	27.32%
576.03	3.87E-02	22.26%
626.21	3.66E-02	17.68%
676.40	3.19E-02	13.51%
726.60	2.71E-02	9.92%
776.78	2.10E-02	7.00%
826.85	1.69E-02	4.70%
841.91	1.31E-02	4.15%
856.99	1.26E-02	3.68%
872.04	1.14E-02	3.24%
887.10	1.13E-02	2.83%
902.15	9.40E-03	2.45%
917.22	8.51E-03	2.12%
935.60	6.76E-03	1.78%
957.33	5.98E-03	1.45%
979.07	4.21E-03	1.18%
1016.62	1.53E-03	0.92%
1076.68	3.31E-04	0.78%
1136.73	2.57E-04	0.74%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(-00-)\20060118_3d_27

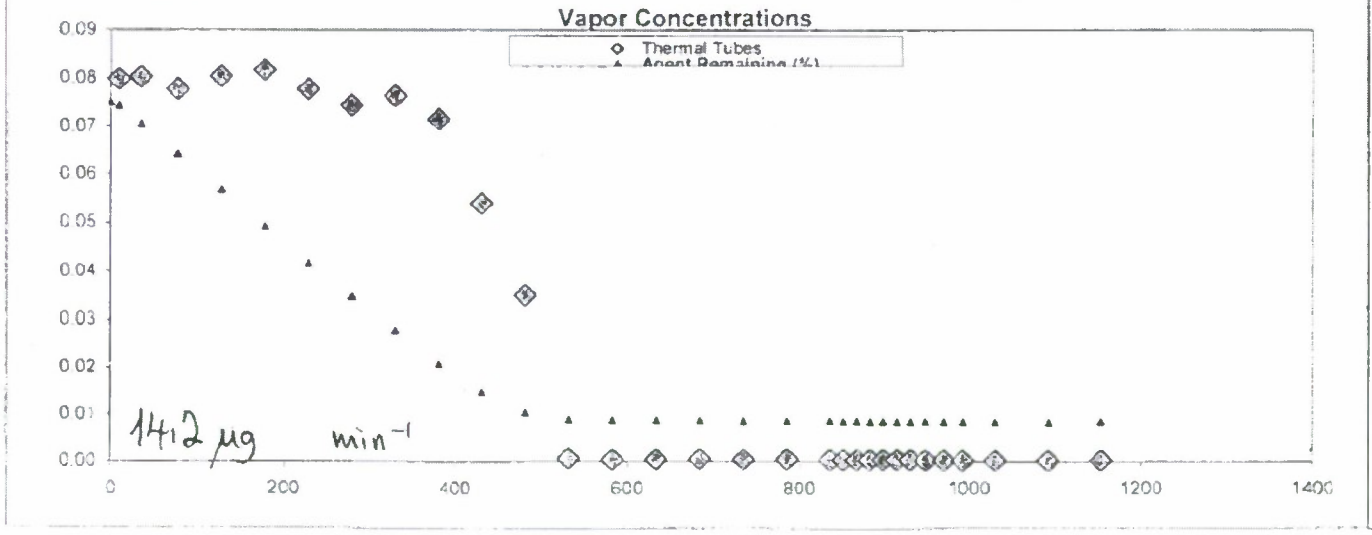
20060127_3d_31

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3d	
Instruments:	VTS#2/GCMSD	
Date/Experiment #:	01/27/06	31
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6	µL
Mass of agent disseminated:	7.58	mg
Corrected mass on 100% agent purity:	7.38	mg
Average substrate temperature:	15.52	°C
Average air flow rate:	182.01	SLPM
Average air temperature above drop:	14.93	°C
Mass % recovery in vapor:	88.6	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	88.6	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.4	2.85%	Go
0.8	0.43%	Go
0.1	0.86%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
9.42	7.98E-02	99.07%
35.13	8.03E-02	93.99%
77.44	7.77E-02	85.75%
128.04	8.04E-02	75.88%
178.64	8.17E-02	65.76%
229.24	7.78E-02	55.80%
279.84	7.44E-02	46.30%
330.44	7.65E-02	36.88%
381.04	7.15E-02	27.64%
431.64	5.41E-02	19.80%
482.24	3.51E-02	14.24%
532.84	5.96E-04	12.00%
583.44	4.60E-04	11.93%
634.04	5.31E-04	11.87%
684.64	5.88E-04	11.80%
735.24	5.26E-04	11.73%
785.84	5.55E-04	11.66%
836.44	4.52E-04	11.60%
852.12	4.14E-04	11.58%
867.83	4.33E-04	11.57%
883.55	4.23E-04	11.55%
899.28	4.18E-04	11.54%
915.00	4.24E-04	11.52%
930.73	3.94E-04	11.50%
949.45	2.59E-04	11.49%
971.18	2.63E-04	11.47%
992.90	2.41E-04	11.46%
1030.47	2.13E-04	11.44%
1092.20	1.97E-04	11.41%
1153.92	2.07E-04	11.38%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(-00-)\20060127_3d_31

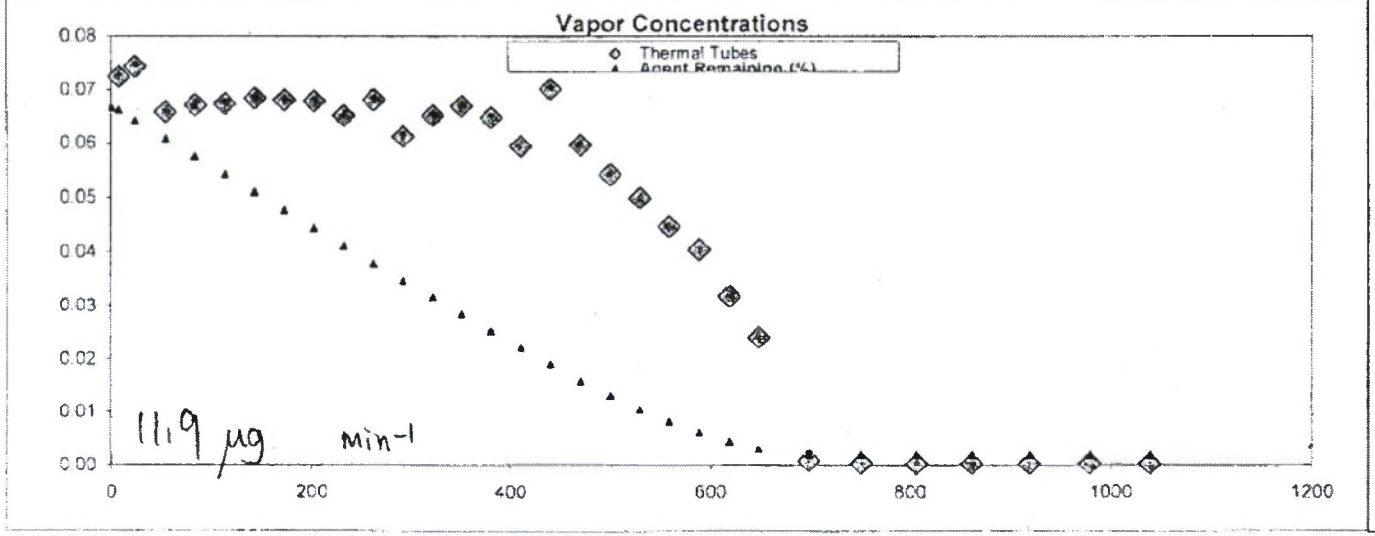
20060201_3d_34

Data Evaluation Grade: Modeling Grade

Tunnel:	3d	
Instruments:	VTS#2/GCMSD	
Date/Experiment #	02/01/06	34
Type of substrate :	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6	µL
Mass of agent disseminated:	7.60	mg
Corrected mass on 100% agent purity:	7.40	mg
Average substrate temperature:	14.95	°C
Average air flow rate:	182.04	SLPM
Average air temperature above drop:	14.91	°C
Mass % recovery in vapor:	97.2	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	97.2	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.2	1.09%	Go
0.7	0.40%	Go
0.2	1.14%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
7.63	7.24E-02	99.32%
24.15	7.43E-02	96.34%
53.87	6.59E-02	91.22%
83.60	6.72E-02	86.35%
113.33	6.74E-02	81.43%
143.05	6.84E-02	76.47%
172.78	6.81E-02	71.48%
202.52	6.79E-02	66.50%
232.23	6.52E-02	61.64%
261.97	6.81E-02	56.76%
291.68	6.13E-02	52.03%
321.42	6.52E-02	47.41%
351.15	6.70E-02	42.57%
380.87	6.48E-02	37.75%
410.60	5.95E-02	33.21%
440.33	7.01E-02	28.47%
470.07	5.97E-02	23.73%
499.78	5.42E-02	19.57%
529.52	4.99E-02	15.76%
558.58	4.46E-02	12.38%
588.63	4.04E-02	9.24%
618.70	3.17E-02	6.57%
648.77	2.40E-02	4.51%
698.82	8.38E-04	2.98%
751.38	2.95E-04	2.91%
806.45	2.61E-04	2.87%
861.50	2.29E-04	2.84%
919.07	1.86E-04	2.81%
979.13	1.77E-04	2.78%
1039.18	1.78E-04	2.76%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(-00-)\20060201_3d_34

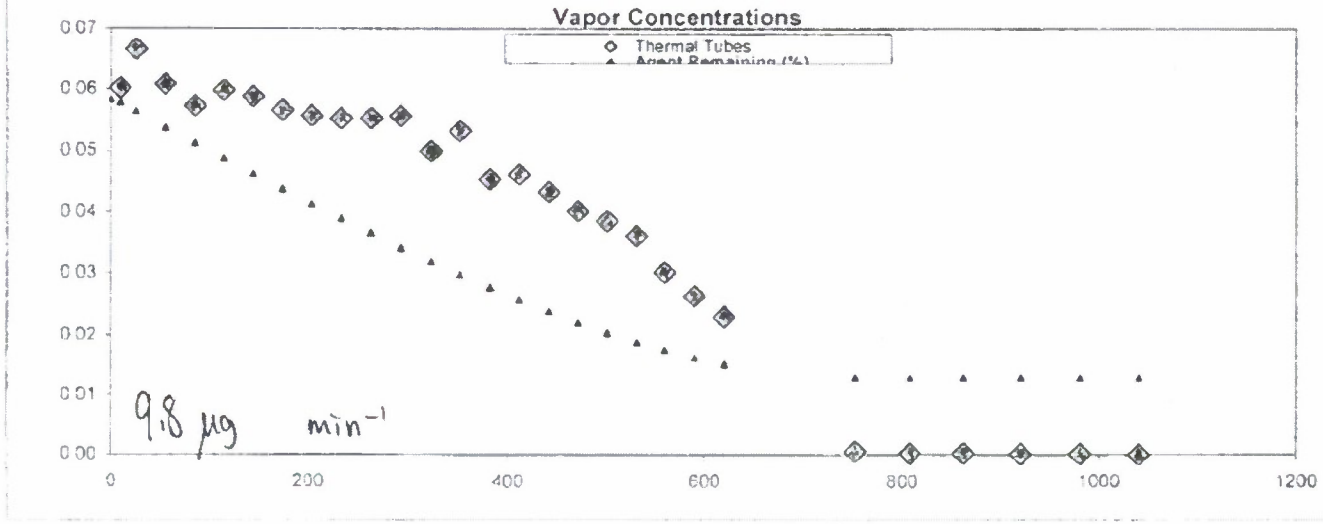
20060206_3d_36

Data Evaluation Grade: Modeling Grade

Tunnel:	3d	
Instruments:	VTS#2/GCMSD	
Date/Experiment #:	02/06/06	36
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.62 mg	
Corrected mass on 100% agent purity:	7.42 mg	
Average substrate temperature:	15.15 °C	
Average air flow rate:	181.46 SLPM	
Average air temperature above drop:	14.90 °C	
Mass % recovery in vapor:	77.7 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	77.7 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.2	1.26%	Go
0.8	0.44%	Go
0.1	0.68%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
9.38	6.03E-02	99.31%
25.78	6.66E-02	96.76%
55.52	6.09E-02	92.13%
85.23	5.73E-02	87.83%
114.97	5.58E-02	83.58%
144.68	5.89E-02	79.27%
174.42	5.66E-02	75.07%
204.13	5.58E-02	70.98%
233.87	5.53E-02	66.95%
263.60	5.53E-02	62.93%
293.32	5.57E-02	58.90%
323.05	4.99E-02	55.06%
352.77	5.32E-02	51.31%
382.50	4.54E-02	47.73%
412.22	4.62E-02	44.40%
441.95	4.33E-02	41.15%
471.68	4.02E-02	38.11%
501.42	3.87E-02	35.24%
531.13	3.63E-02	32.51%
560.20	3.03E-02	30.14%
590.25	2.65E-02	28.06%
620.32	2.31E-02	26.23%
753.00	5.06E-04	22.40%
808.05	2.20E-04	22.35%
863.12	1.93E-04	22.33%
920.67	1.46E-04	22.30%
980.73	1.40E-04	22.28%
1040.78	0.00E+00	22.27%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(-00-)\20060206_3d_36

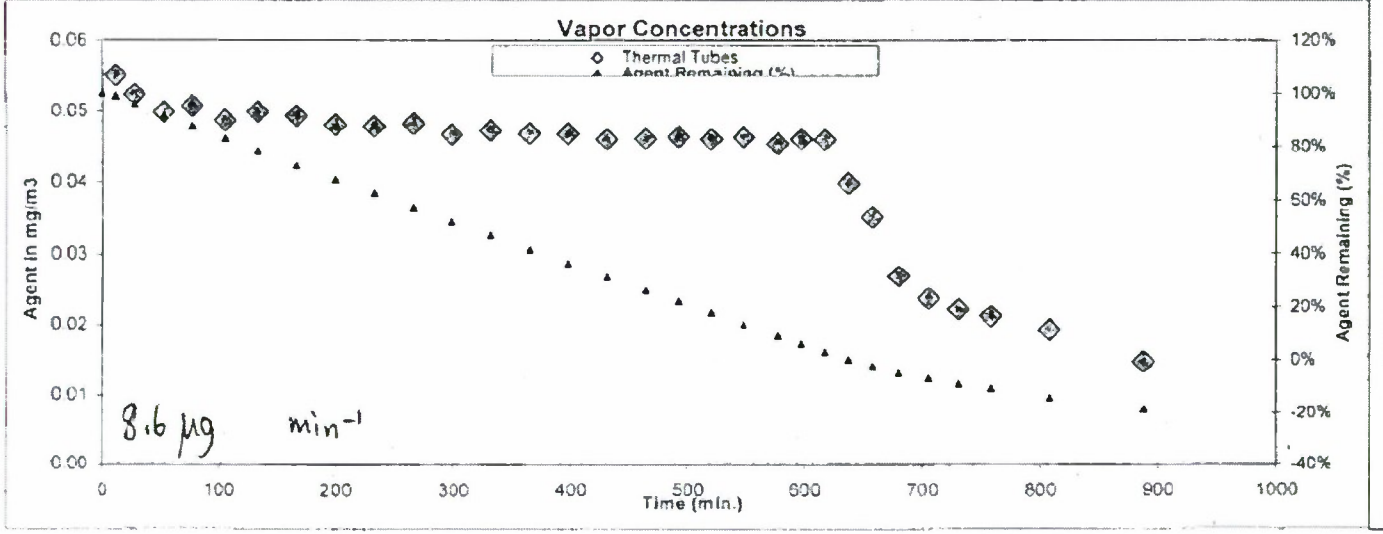
20070108_3d_074

Data Evaluation Grade: Modeling Grade

Tunnel:	3d	
Instruments:	VTS#07/GCMSD	
Date/Experiment #:	01/08/07	74
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6	µL
Mass of agent disseminated:	5.61	mg
Corrected mass on 100% agent purity:	5.45	mg
Average substrate temperature:	15.62	°C
Average air flow rate:	181.13	SLPM
Average air temperature above drop:	15.16	°C
Mass % recovery in vapor:	118.6	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	118.6	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.2	1.48%	Go
1.7	0.95%	Go
0.1	0.96%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
12.05	5.51E-02	98.90%
28.43	5.24E-02	95.98%
53.15	4.99E-02	91.79%
77.87	5.07E-02	87.67%
105.90	4.87E-02	83.05%
133.95	4.99E-02	78.46%
167.00	4.94E-02	73.03%
200.05	4.81E-02	67.69%
233.10	4.79E-02	62.42%
266.15	4.82E-02	57.16%
299.20	4.67E-02	51.95%
332.23	4.73E-02	46.80%
365.28	4.69E-02	41.64%
398.33	4.68E-02	36.50%
431.38	4.61E-02	31.41%
464.43	4.62E-02	26.36%
492.48	4.64E-02	22.06%
520.53	4.61E-02	17.76%
548.58	4.63E-02	13.46%
577.63	4.55E-02	9.04%
597.68	4.61E-02	6.00%
617.72	4.60E-02	2.94%
637.77	3.98E-02	0.08%
657.82	3.52E-02	-2.41%
680.37	2.59E-02	-4.73%
705.42	2.37E-02	-6.83%
730.47	2.22E-02	-8.74%
758.00	2.13E-02	-10.73%
808.05	1.94E-02	-14.10%
888.10	1.47E-02	-18.62%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(-00-)\20070108_3d_074

20051108_3d_06

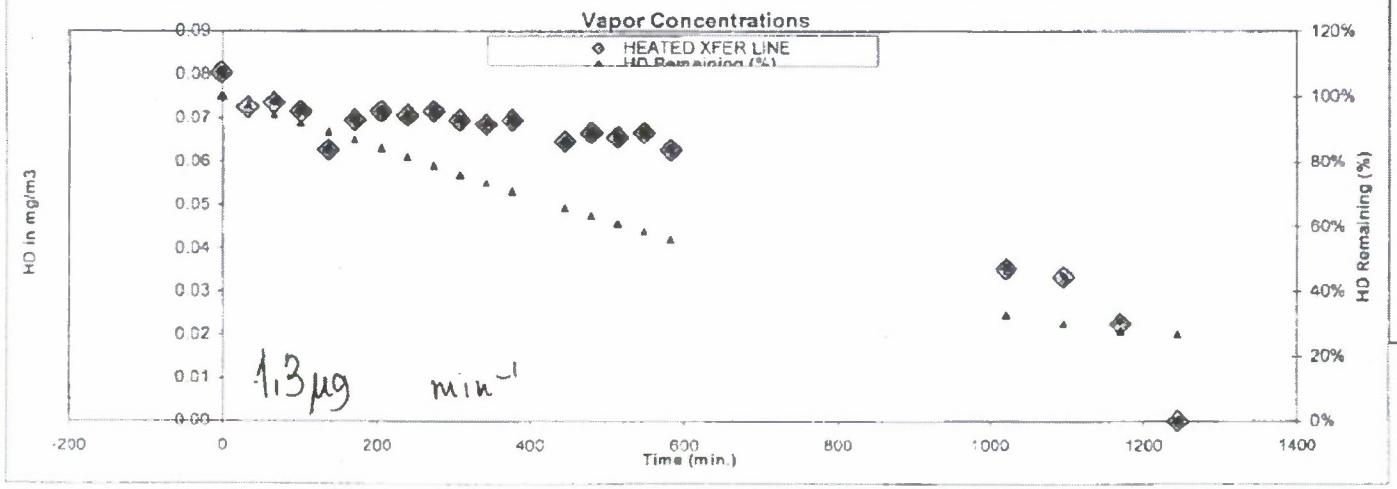
Data Evaluation Grade: Modeling Grade

Tunnel:	3d	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	11/08/05	6
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	1 µL	
Mass of agent disseminated:	1.71 mg	
Corrected mass on 100% agent purity:	1.67 mg	
Average substrate temperature:	15.55 °C	
Average air flow rate:	18.11 SLPM	
Average air temperature above drop:	13.25 °C	
Mass % recovery in vapor:	73.1 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	73.1 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.2	1.19%	Go
0.0	0.23%	Go
0.2	1.48%	Go
-	-	Go

Time (min)	Conc. mg/m³	HD rem. (%)
-2.57	8.04E-02	100.11%
31.73	7.25E-02	97.26%
66.07	7.35E-02	94.53%
100.38	7.16E-02	91.83%
136.57	6.27E-02	89.19%
170.88	6.96E-02	86.72%
205.22	7.16E-02	84.08%
239.53	7.06E-02	81.43%
273.85	7.16E-02	78.78%
308.15	6.96E-02	76.15%
342.48	6.86E-02	73.57%
376.78	6.96E-02	70.99%
445.43	6.47E-02	65.98%
479.75	6.67E-02	63.53%
514.05	6.57E-02	61.06%
547.55	6.67E-02	58.65%
582.68	6.27E-02	56.18%
1021.47	3.53E-02	32.79%
1095.78	3.33E-02	30.02%
1170.12	2.25E-02	27.76%
1244.43	0.00E+00	25.85%



G:\Agent\FateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(---)\20051108_3d_06

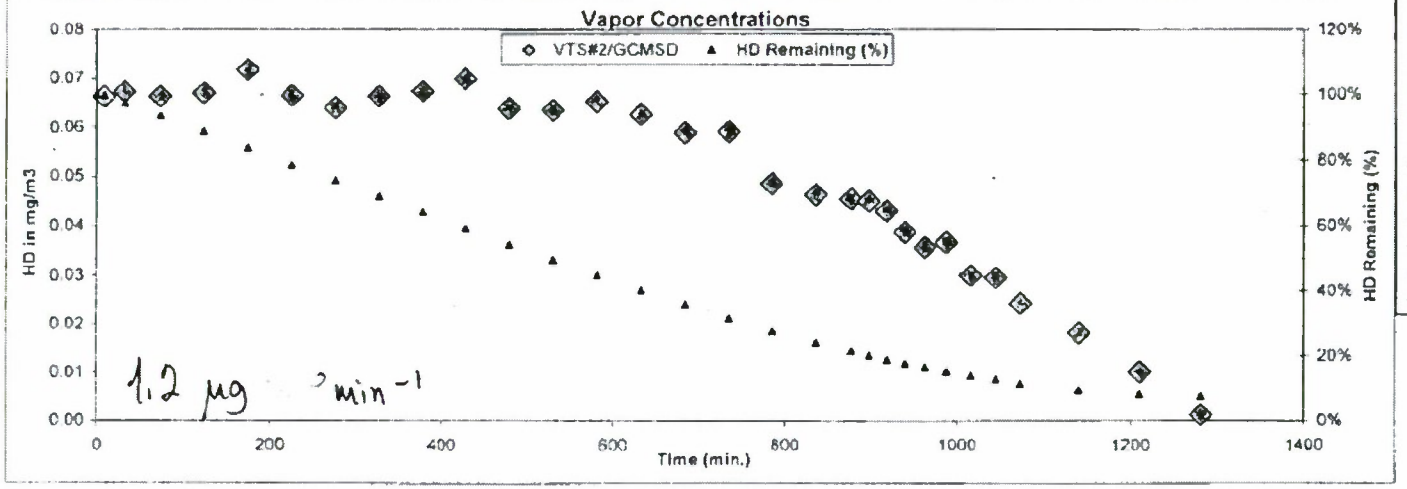
20060110_3d_24

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3d	
Instruments:	VTS#2/GCMSD	
Date/Experiment #:	01/10/06	24
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	1 µL	
Mass of agent disseminated:	1.30 mg	
Corrected mass on 100% agent purity:	1.27 mg	
Average substrate temperature:	15.38 °C	
Average air flow rate:	18.08 SLPM	
Average air temperature above drop:	15.24 °C	
Mass % recovery in vapor:	92.4 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	92.4 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.3	1.65%	Go
0.0	0.15%	Go
0.2	1.09%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
8.81	6.62E-02	99.56%
73.77	6.62E-02	93.39%
124.54	6.69E-02	88.56%
175.31	7.17E-02	83.54%
226.09	6.64E-02	78.53%
276.86	6.40E-02	73.80%
327.63	6.63E-02	69.08%
378.52	6.73E-02	64.23%
429.42	6.99E-02	59.24%
480.32	6.38E-02	54.38%
531.20	6.35E-02	49.76%
582.10	6.52E-02	45.08%
633.00	6.27E-02	40.43%
683.90	5.89E-02	36.01%
734.80	5.91E-02	31.73%
785.68	4.85E-02	27.81%
836.58	4.64E-02	24.36%
877.48	4.55E-02	21.68%
898.38	4.51E-02	20.33%
919.27	4.30E-02	19.01%
940.17	3.88E-02	17.79%
963.14	3.57E-02	16.57%
987.84	3.66E-02	15.30%
1016.30	3.00E-02	13.94%
1044.77	2.94E-02	12.74%
1073.24	2.42E-02	11.65%
1140.97	1.82E-02	9.60%
1211.21	1.01E-02	8.18%
1281.44	1.21E-03	7.62%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(---)\20060110_3d_24

G:\AgentFateTech\Wind Tunnel\Processed Data\Ready for Review\HD GL(----)\20060105_3d_22.xls

Data Sheet Droplet Evaporation in ECBC Wind Tunnel

Tunnel:	3d
Date:	January 5, 2006
Experiment Number:	22
File Name:	20060105_3d_22.xls

Substrate			
type of substrate :	Glass		
substrate sample size (mm):	36.6	0.00105	m^2
Agent			
test agent:	HD		
agent neat / thickened:	neat		
agent purity:	97.4%		
nonminal density:	1.27	mg/uL	
Contamination			
number of drops:	1		
nominal drop volume:	1	µL	
actual calculated drop volume:	0.969	µL	
weight of clean substrate:	1846.316	mg	
weight of contaminated substrate:	1847.547	mg	
mass of agent disseminated:	1.231	mg	
corrected mass on 100% agent purity:	1.199	mg	
actual contamination density:	1.17	g/m^2	
actual contamination density based on 100% agent purity:	1.14	g/m^2	
Control Parameters			
Miller Nelson temperature:	50.5	°C	0.1
air flow temperature:	15.0	°C	0.1
Aalborg Flowmeter air flow rate:	18.08	SLPM	0.0
transition section wall temperature:	13.0	°C	0.0
fetch section wall temperature:	12.1	°C	0.3
substrate temperature:	15.1	°C	0.1
piston zone temperature:	9999.0	°C	0.0
post-test section wall temperature:	18.8	°C	0.4
mixing box wall temperature:	35.0	°C	0.0
sampling duct wall temperature:	35.1	°C	0.2
test section air flow speed:	0.15	m/s	0.0
air flow relative humidity:	0.00	%	0.0
Sampling Parameters			
sampling technique:	VTS#2		
introduction technique:	UNITY/ULTRA		
analysis technique:	GCMSD		
Experiment Timing			
start time contamination (time drop hits substrate):	01/05/06 16:02:30		
end time contamination:			Delta
start time data acquisition (desired wind velocity achieved):	01/05/06 16:06:06		3.60 min.
end time data acquisition- end of vapor experiment:	01/06/06 09:21:55		1035.82 min.
Additional Information			
weight of substrate after evaporation:	1846.3180	mg	15:30 on 1-06-06
residual mass of agent after evaporation:	0.0020	mg	1.1 µg/min
Extraction liquid			
extraction liquid:	n/a		
volume extraction liquid:	n/a	mL	
extraction time (ultrasonicate):	n/a	min	
concentration of agent in extraction liquid:	n/a	µg/mL	
recovered mass:	n/a	mg	
Remarks			
drop delivered by:	Ken Sumpter		
description:	low flow, low temp, 1 mic on glass, Terry delivers drop, new coolant flow config (dual loop), VTS 2 connected		
video monitoring:	20060105_3d_22.xls	YES	

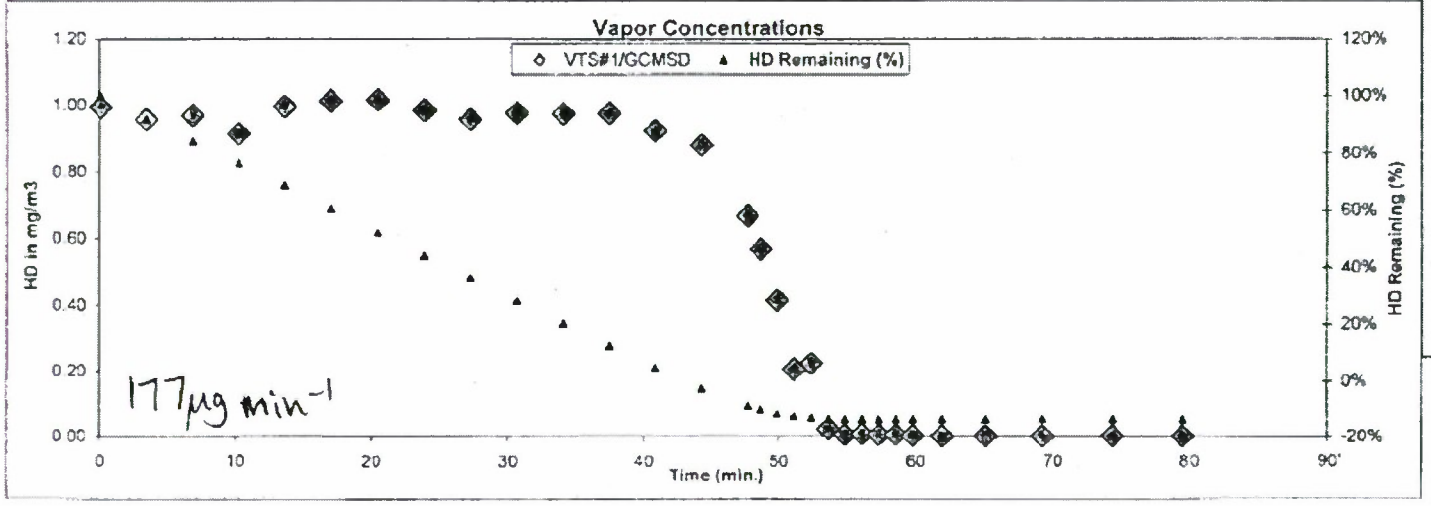
20050923_3c_28

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3c	
Instruments:	VTS#1/GCMSD	
Date/Experiment #:	09/23/05	28
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.81 mg	
Corrected mass on 100% agent purity:	7.60 mg	
Average substrate temperature:	49.81 °C	
Average air flow rate:	181.57 SLPM	
Average air temperature above drop:	50.65 °C	
Mass % recovery in vapor:	113.9 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	113.9 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.6	1.11%	Go
1.1	0.58%	Go
0.5	0.96%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
0.08	9.94E-01	99.90%
3.48	9.58E-01	91.98%
6.88	9.70E-01	84.15%
10.28	9.16E-01	76.49%
13.68	9.98E-01	68.72%
17.08	1.01E+00	60.56%
20.48	1.02E+00	52.32%
23.88	9.87E-01	44.19%
27.28	9.59E-01	36.29%
30.68	9.78E-01	28.43%
34.08	9.76E-01	20.50%
37.48	9.77E-01	12.57%
40.88	9.26E-01	4.84%
44.28	8.82E-01	-2.50%
47.68	6.71E-01	-8.80%
48.67	5.69E-01	-10.26%
49.90	4.16E-01	-11.71%
51.13	2.08E-01	-12.63%
52.38	2.26E-01	-13.27%
53.62	2.44E-02	-13.64%
54.85	6.20E-03	-13.69%
56.08	8.21E-03	-13.71%
57.32	6.58E-03	-13.73%
58.55	6.38E-03	-13.75%
59.78	4.06E-03	-13.76%
61.93	2.75E-03	-13.78%
65.08	1.99E-03	-13.80%
69.23	1.92E-03	-13.82%
74.38	2.40E-03	-13.85%
79.53	1.92E-03	-13.87%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+00-)\20050923_3c_28.

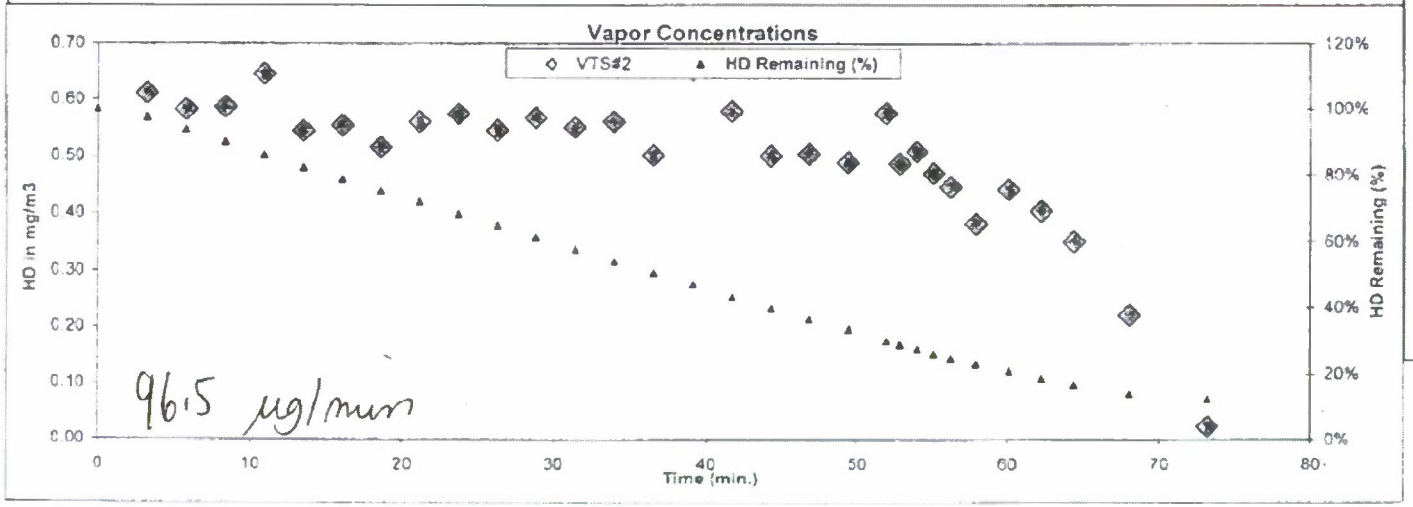
20051006_3a_73

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3a	
Instruments:	VTS#2/GCMSD	
Date/Experiment #:	10/06/05	73
Type of substrate :	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.52 mg	
Corrected mass on 100% agent purity:	7.32 mg	
Average substrate temperature:	49.58 °C	
Average air flow rate:	181.67 SLPM	
Average air temperature above drop:	50.20 °C	
Mass % recovery in vapor:	87.5 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	87.5 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	No	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.3	0.71%	Go
1.3	0.72%	Go
0.6	1.13%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
3.27	6.12E-01	97.52%
5.83	5.82E-01	93.72%
8.40	5.87E-01	90.00%
10.97	6.46E-01	86.07%
13.53	5.45E-01	82.28%
16.10	5.54E-01	78.78%
18.65	5.16E-01	75.40%
21.22	5.61E-01	71.97%
23.78	5.74E-01	68.35%
26.35	5.45E-01	64.79%
28.92	5.67E-01	61.25%
31.47	5.51E-01	57.72%
34.03	5.61E-01	54.16%
36.60	5.02E-01	50.79%
39.17	6.53E-01	47.12%
41.73	5.78E-01	43.20%
44.30	5.00E-01	39.76%
46.87	5.04E-01	36.57%
49.43	4.89E-01	33.41%
51.98	5.75E-01	30.04%
52.88	4.67E-01	28.86%
54.03	5.08E-01	27.44%
55.18	4.70E-01	26.04%
56.32	4.46E-01	24.75%
57.97	3.81E-01	23.06%
60.12	4.41E-01	20.87%
62.27	4.04E-01	18.61%
64.42	3.51E-01	16.60%
68.05	2.20E-01	14.03%
73.20	2.33E-02	12.47%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+00-)\20051006_3a_73

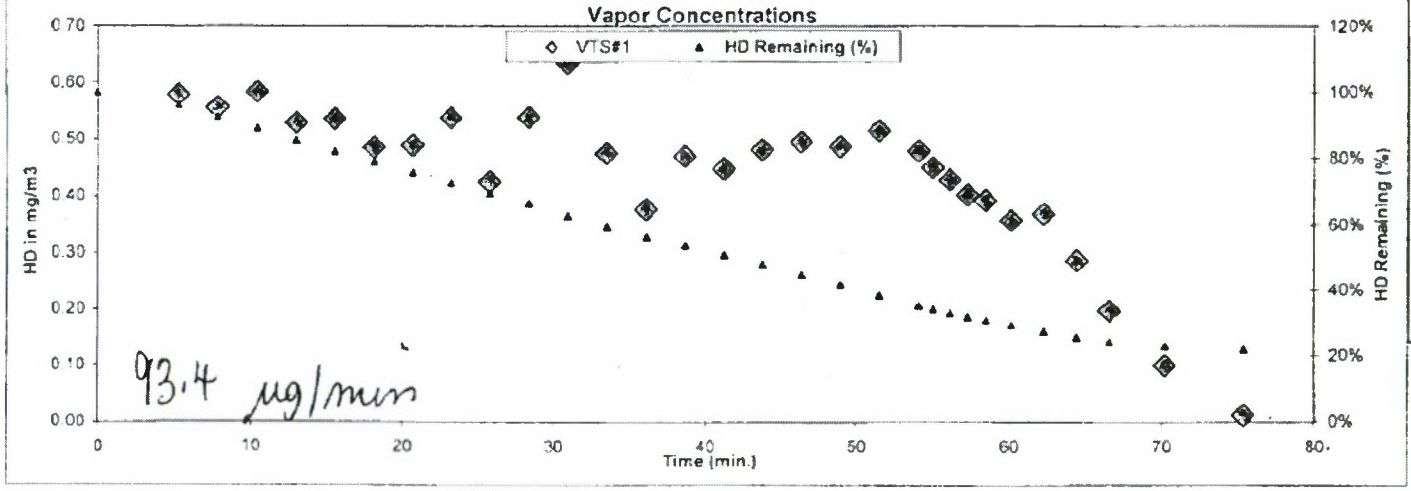
20051006_3c_32

Data Evaluation Grade: Modeling Grade

Tunnel:	3c	
Instruments:	VTS#1/GCMSD	
Date/Experiment #	10/06/05	32
Type of substrate :	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.56 mg	
Corrected mass on 100% agent purity:	7.36 mg	
Average substrate temperature:	46.92 °C	
Average air flow rate:	181.58 SLPM	
Average air temperature above drop:	50.37 °C	
Mass % recovery in vapor:	77.7 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	77.7 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	No	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.5	1.03%	Go
1.1	0.62%	Go
0.6	1.11%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
5.30	5.79E-01	96.22%
7.87	5.57E-01	92.62%
10.45	5.84E-01	88.99%
13.02	5.29E-01	85.46%
15.58	5.37E-01	82.09%
18.15	4.86E-01	78.85%
20.72	4.90E-01	75.76%
23.28	5.38E-01	72.51%
25.85	4.25E-01	69.46%
28.42	5.39E-01	66.41%
30.98	6.35E-01	62.70%
33.55	4.75E-01	59.18%
36.12	3.77E-01	56.49%
38.68	4.70E-01	53.80%
41.25	4.48E-01	50.90%
43.83	4.82E-01	47.94%
46.40	4.95E-01	44.85%
48.97	4.87E-01	41.74%
51.53	5.15E-01	38.56%
54.10	4.80E-01	35.41%
55.02	4.51E-01	34.36%
56.17	4.29E-01	33.12%
57.32	4.03E-01	31.94%
58.47	3.93E-01	30.81%
60.12	3.58E-01	29.28%
62.27	3.69E-01	27.35%
64.42	2.87E-01	25.62%
66.57	1.97E-01	24.33%
70.22	9.98E-02	23.00%
75.37	1.24E-02	22.29%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+00-)\20051006_3c_32

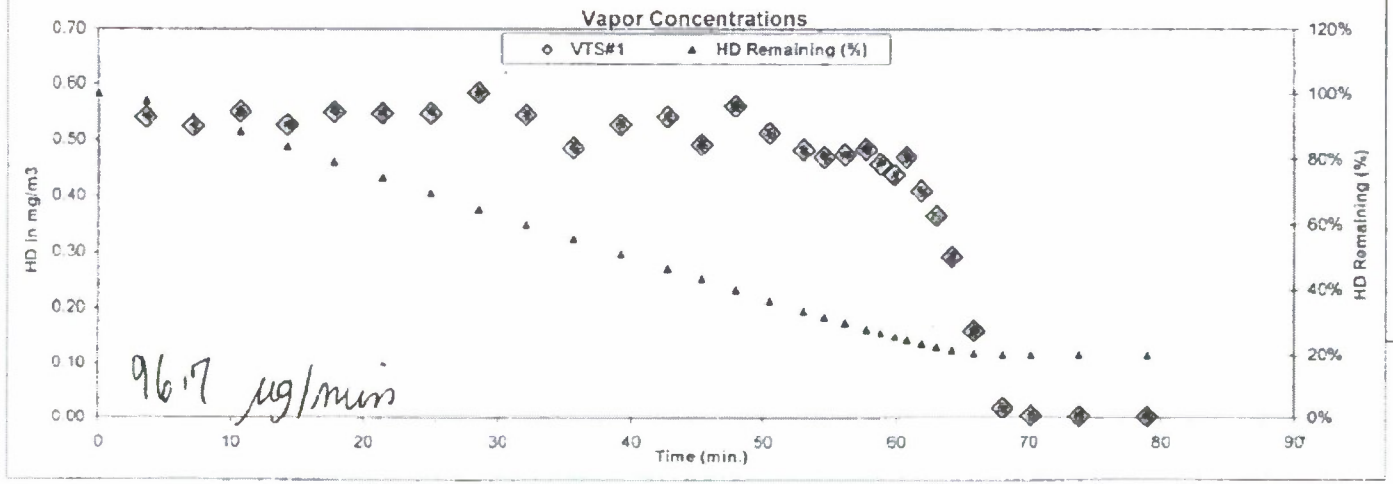
20051021_3a_77

Data Evaluation Grade: Modeling Grade

Tunnel:	3a	
Instruments:	VTS#1/GCMSD	
Date/Experiment #:	10/21/05	77
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.70 mg	
Corrected mass on 100% agent purity:	7.50 mg	
Average substrate temperature:	50.08 °C	
Average air flow rate:	181.71 SLPM	
Average air temperature above drop:	50.19 °C	
Mass % recovery in vapor:	80.0 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	80.0 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.7	1.43%	Go
1.9	1.02%	Go
0.2	0.47%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
3.60	5.41E-01	97.64%
7.17	5.25E-01	93.04%
10.73	5.51E-01	88.39%
14.28	5.28E-01	83.76%
17.85	5.51E-01	79.10%
21.42	5.48E-01	74.36%
24.98	5.48E-01	69.63%
28.55	5.85E-01	64.73%
32.12	5.45E-01	59.85%
35.68	4.87E-01	55.40%
39.23	5.28E-01	51.03%
42.80	5.42E-01	46.41%
45.37	4.92E-01	43.20%
47.93	5.61E-01	39.92%
50.50	5.13E-01	36.59%
53.07	4.83E-01	33.49%
54.63	4.71E-01	31.68%
56.20	4.75E-01	29.88%
57.77	4.84E-01	28.06%
58.83	4.59E-01	26.85%
59.88	4.39E-01	25.70%
60.78	4.71E-01	24.71%
61.93	4.11E-01	23.49%
63.08	3.66E-01	22.40%
64.23	2.93E-01	21.49%
65.88	1.61E-01	20.58%
68.03	1.91E-02	20.11%
70.18	5.23E-03	20.05%
73.82	3.26E-03	20.01%
78.97	2.80E-03	19.97%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+00-)\20051021_3a_77

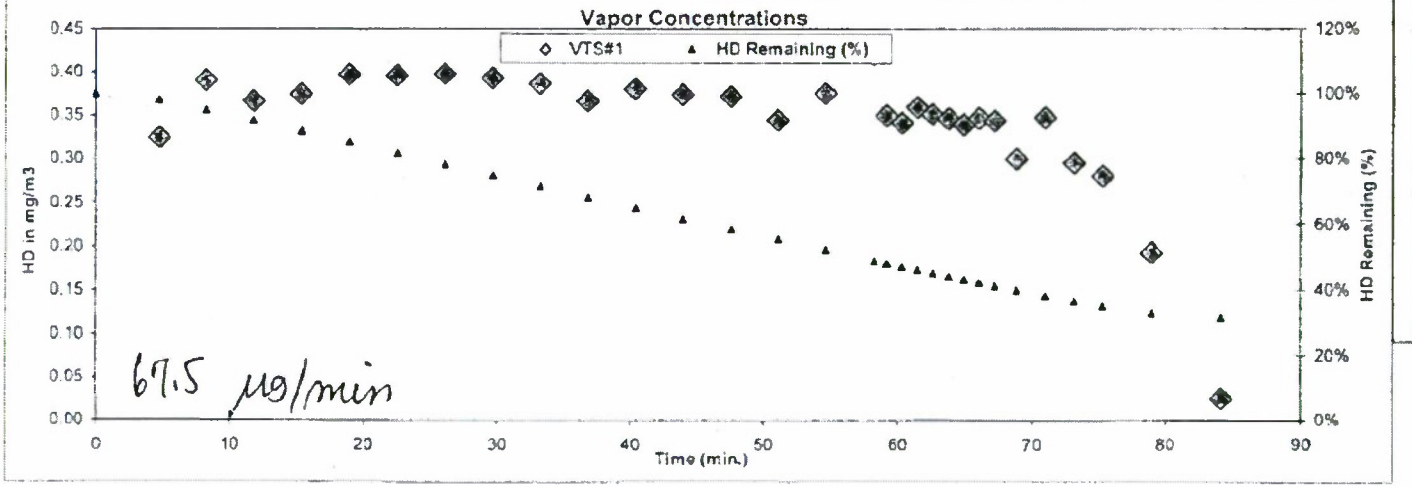
20051024_3c_40

Data Evaluation Grade: Modeling Grade

Tunnel:	3c	
Instruments:	VTS#1/GCMSD	
Date/Experiment #:	10/24/05	40
Type of substrate :	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.69 mg	
Corrected mass on 100% agent purity:	7.49 mg	
Average substrate temperature:	48.97 °C	
Average air flow rate:	181.52 SLPM	
Average air temperature above drop:	50.01 °C	
Mass % recovery in vapor:	68.3 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	68.3 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.6	1.22%	Go
1.2	0.68%	Go
0.5	1.02%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
4.74	3.25E-01	98.14%
8.30	3.91E-01	95.05%
11.88	3.66E-01	91.76%
15.45	3.74E-01	88.55%
19.02	3.97E-01	85.22%
22.58	3.96E-01	81.79%
26.15	3.98E-01	78.35%
29.72	3.93E-01	74.93%
33.28	3.86E-01	71.56%
36.85	3.66E-01	68.31%
40.42	3.80E-01	65.08%
43.98	3.73E-01	61.82%
47.57	3.71E-01	58.59%
51.13	3.44E-01	55.50%
54.70	3.75E-01	52.39%
58.27	4.21E-01	48.94%
59.18	3.49E-01	48.09%
60.33	3.41E-01	47.13%
61.48	3.59E-01	46.15%
62.63	3.51E-01	45.16%
63.78	3.46E-01	44.19%
64.93	3.39E-01	43.24%
66.08	3.46E-01	42.28%
67.23	3.43E-01	41.32%
68.88	2.99E-01	40.03%
71.03	3.47E-01	38.35%
73.18	2.95E-01	36.68%
75.33	2.80E-01	35.18%
76.98	1.93E-01	33.09%
84.13	2.54E-02	31.72%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+00-)\20051024_3c_40

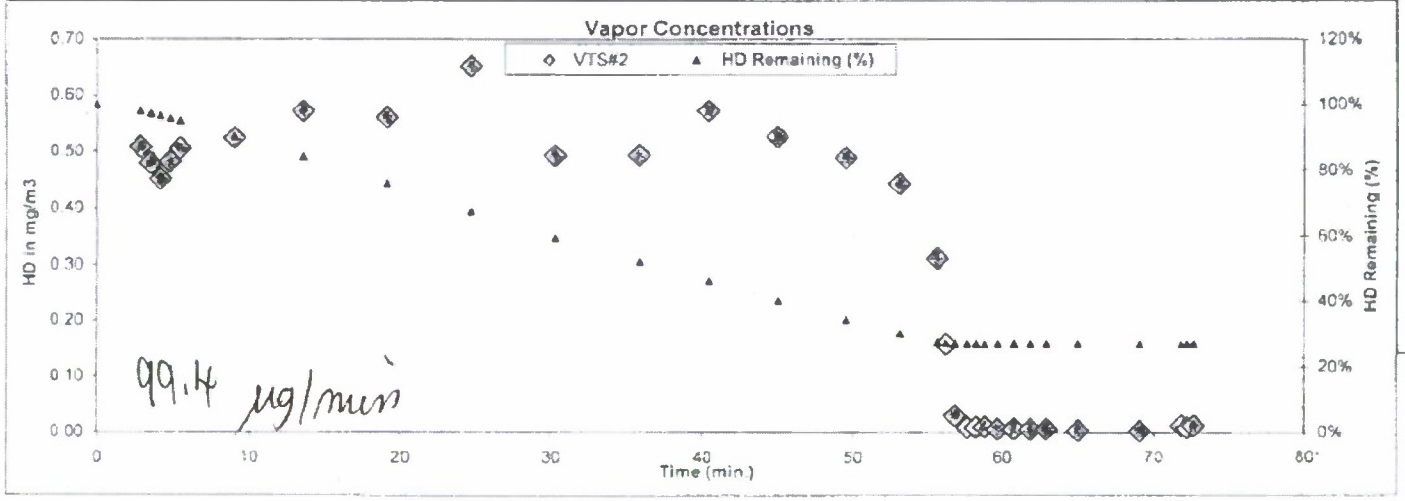
20051031_3a_80

Data Evaluation Grade: Modeling Grade

Tunnel:	3a	
Instruments:	VTS#2/GCMSD	
Date/Experiment #:	10/31/05	80
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.42 mg	
Corrected mass on 100% agent purity:	7.23 mg	
Average substrate temperature:	50.27 °C	
Average air flow rate:	181.94 SLPM	
Average air temperature above drop:	50.66 °C	
Mass % recovery in vapor:	72.9 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	72.9 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	No	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.5	0.99%	Go
2.1	1.16%	Go
0.6	1.16%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
2.90	5.08E-01	98.14%
3.55	4.80E-01	97.34%
4.20	4.52E-01	96.57%
4.85	4.82E-01	95.81%
5.50	5.06E-01	95.00%
9.07	5.24E-01	90.38%
13.62	5.72E-01	84.10%
19.18	5.61E-01	76.16%
24.75	6.52E-01	67.65%
30.32	4.93E-01	59.62%
35.88	4.94E-01	52.70%
40.45	5.73E-01	46.57%
45.02	5.26E-01	40.25%
49.58	4.89E-01	34.42%
53.13	4.43E-01	30.25%
55.70	3.12E-01	27.81%
56.28	1.58E-01	27.47%
56.87	3.01E-02	27.33%
57.68	8.97E-03	27.29%
58.27	9.29E-03	27.27%
58.85	9.91E-03	27.26%
59.68	6.11E-03	27.24%
60.75	5.96E-03	27.23%
61.83	5.45E-03	27.21%
62.92	5.57E-03	27.20%
65.00	3.12E-03	27.17%
69.06	2.41E-03	27.15%
71.82	1.22E-02	27.09%
72.24	8.17E-03	27.08%
72.65	1.16E-02	27.07%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+00-)\20051031_3a_80

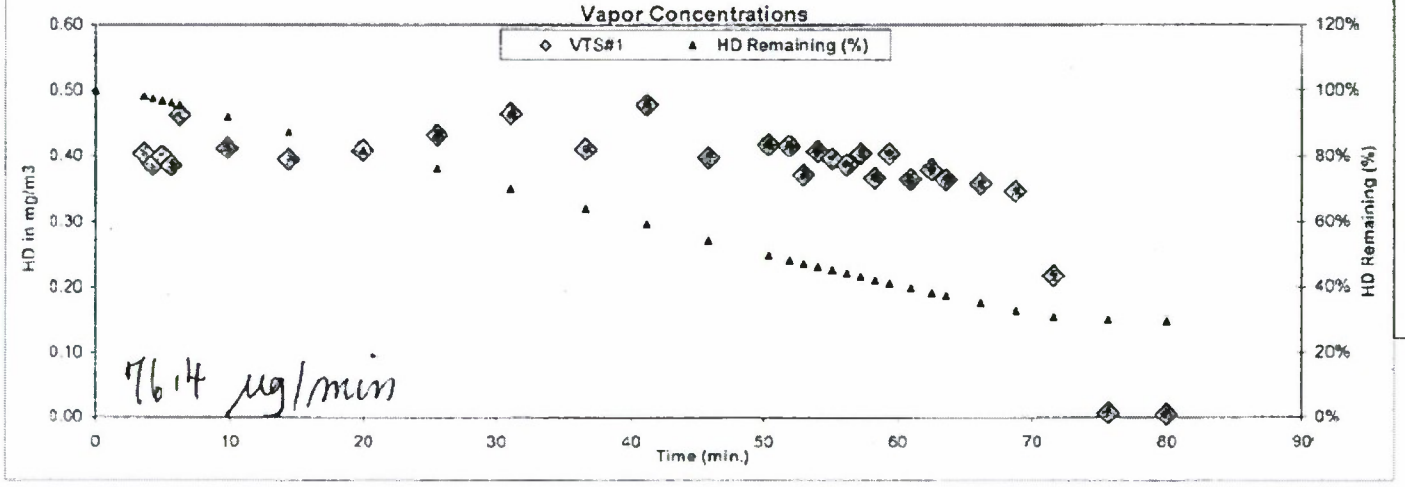
20051031_3c_46

Data Evaluation Grade: Modeling Grade

Tunnel:	3c	
Instruments:	VTS#1/GC/MSD	
Date/Experiment #:	10/31/05	46
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.67 mg	
Corrected mass on 100% agent purity:	7.47 mg	
Average substrate temperature:	49.71 °C	
Average air flow rate:	181.77 SLPM	
Average air temperature above drop:	50.50 °C	
Mass % recovery in vapor:	70.3 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	70.3 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	No	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.7	1.49%	Go
1.5	0.82%	Go
0.6	1.22%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
3.63	4.04E-01	98.21%
4.28	3.87E-01	97.59%
4.95	4.00E-01	96.95%
5.60	3.86E-01	96.33%
6.25	4.63E-01	95.65%
9.82	4.12E-01	91.66%
14.38	3.96E-01	87.37%
19.95	4.09E-01	81.92%
25.52	4.32E-01	76.22%
31.08	4.65E-01	70.14%
36.65	4.11E-01	64.20%
41.22	4.78E-01	59.26%
45.80	3.98E-01	54.37%
50.37	4.17E-01	49.85%
51.93	4.16E-01	48.26%
53.00	3.72E-01	47.24%
54.07	4.08E-01	46.22%
55.13	3.96E-01	45.18%
56.22	3.87E-01	44.14%
57.28	4.05E-01	43.12%
58.35	3.67E-01	42.12%
59.42	4.04E-01	41.12%
60.98	3.65E-01	39.66%
62.55	3.80E-01	38.24%
63.63	3.64E-01	37.26%
66.20	3.58E-01	35.00%
68.77	3.47E-01	32.80%
71.58	2.17E-01	30.87%
75.65	6.57E-03	29.76%
79.97	3.92E-03	29.71%

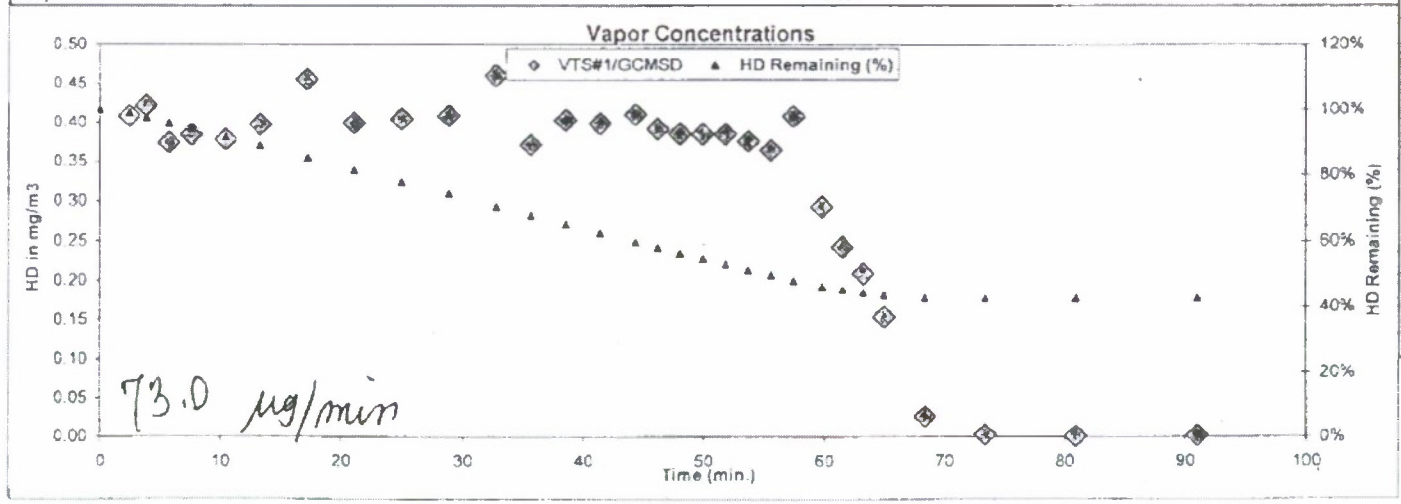
G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+00-)\20051031_3c_46.

20060619_3c_136

Tunnel:	3c		Date:	06/19/06
Parameters:	VTS#1	GCMSD	Exp. #:	136
type of substrate:	Glass	Dutch Gaiss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem:	KS	2/28/2006
number of drops:	1			
nominal drop volume:	6 µL			
mass of agent disseminated:	8.10 mg			
corrected mass on 100% agent purity:	7.89 mg		SD	P/F
Miller Nelson temperature:	0.00 °C		0.0	Pass
transition section wall temperature:	50.01 °C		0.2	Pass
fetch section wall temperature:	50.07 °C		0.3	Pass
post-test section wall temperature:	50.00 °C		0.0	Pass
mixing box wall temperature:	50.51 °C		0.5	Pass
sampling duct wall temperature:	50.01 °C		0.08	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			

Substrate: 49.9°C

181 SLPM



73.0 µg/min

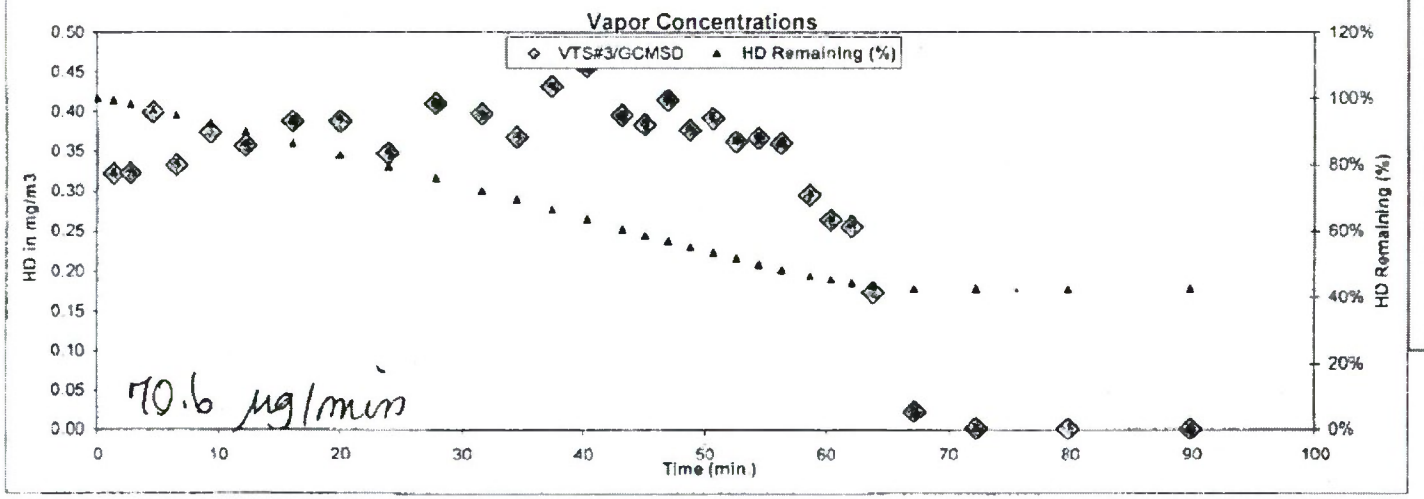
Time (min)	Conc. mg/m³	HD rem. (%)
2.48	4.08E-01	98.84%
3.86	4.22E-01	97.52%
5.75	3.74E-01	95.79%
7.63	3.85E-01	94.15%
10.52	3.79E-01	91.62%
13.38	3.98E-01	89.06%
17.26	4.56E-01	85.25%
21.15	3.99E-01	81.44%
25.03	4.05E-01	77.85%
28.91	4.09E-01	74.22%
32.80	4.60E-01	70.35%
35.68	3.71E-01	67.59%
38.57	4.03E-01	65.03%
41.45	3.99E-01	62.37%
44.33	4.10E-01	59.69%
46.23	3.92E-01	57.94%
48.10	3.85E-01	56.28%
49.98	3.85E-01	54.61%
51.86	3.85E-01	52.94%
53.75	3.76E-01	51.30%
55.63	3.64E-01	49.70%
57.51	4.08E-01	48.02%
59.82	2.93E-01	46.17%
61.54	2.42E-01	45.12%
63.25	2.09E-01	44.23%
64.97	1.54E-01	43.51%
68.35	2.63E-02	42.61%
73.40	2.91E-03	42.64%
80.95	1.17E-03	42.61%
91.00	1.54E-03	42.58%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+00-)\20060619_3c_136

20060619_3k_009

Tunnel:	3K		Date:	06/19/06
Parameters:	VTS#3	GCMSD	Exp. #:	9
type of substrate :	Glass	Dutch Gaiss		
test agent:	HD			
agent grade :	neat			
agent purity:	97.4%	Date/Chem:	KS	2/28/2006
number of drops:	1			
nominal drop volume:	6 µL			
mass of agent disseminated:	7.75 mg			
corrected mass on 100% agent purity:	7.54 mg		SD	P/F
Miller Nelson temperature:	0.00 °C		0.0	Pass
transition section wall temperature:	50.66 °C		0.5	Pass
fetch section wall temperature:	50.67 °C		0.5	Pass
post test section wall temperature:	50.70 °C		0.5	Pass
mixing box wall temperature: Substr 50.9°C	51.90 °C		0.5	Pass
sampling duct wall temperature:	51.62 °C		0.51	Pass
description:				
Tube #s consistant: 182 SLPM	YES			
Daily CCV < +/- 15%	Pass			

Time (min)	Conc. mg/m^3	HD rem. (%)
1.33	3.22E-01	99.48%
2.71	3.23E-01	98.41%
4.60	4.00E-01	96.77%
6.48	3.33E-01	95.11%
9.36	3.74E-01	92.65%
12.25	3.58E-01	90.11%
16.13	3.69E-01	86.62%
20.01	3.89E-01	82.98%
23.90	3.48E-01	79.54%
27.78	4.11E-01	75.99%
31.67	3.98E-01	72.21%
34.55	3.68E-01	69.55%
37.43	4.32E-01	66.77%
40.32	4.57E-01	63.69%
43.20	3.96E-01	60.73%
45.08	3.84E-01	58.96%
46.96	4.15E-01	57.15%
48.85	3.78E-01	55.35%
50.73	3.92E-01	53.60%
52.61	3.63E-01	51.89%
54.50	3.67E-01	50.24%
56.38	3.61E-01	48.59%
58.68	2.96E-01	46.77%
60.40	2.64E-01	45.61%
62.12	2.56E-01	44.54%
63.83	1.73E-01	43.65%
67.22	2.31E-02	42.85%
72.27	1.61E-03	42.70%
79.82	9.62E-04	42.68%
89.87	7.60E-04	42.65%



G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+00-)\20060619_3k_009

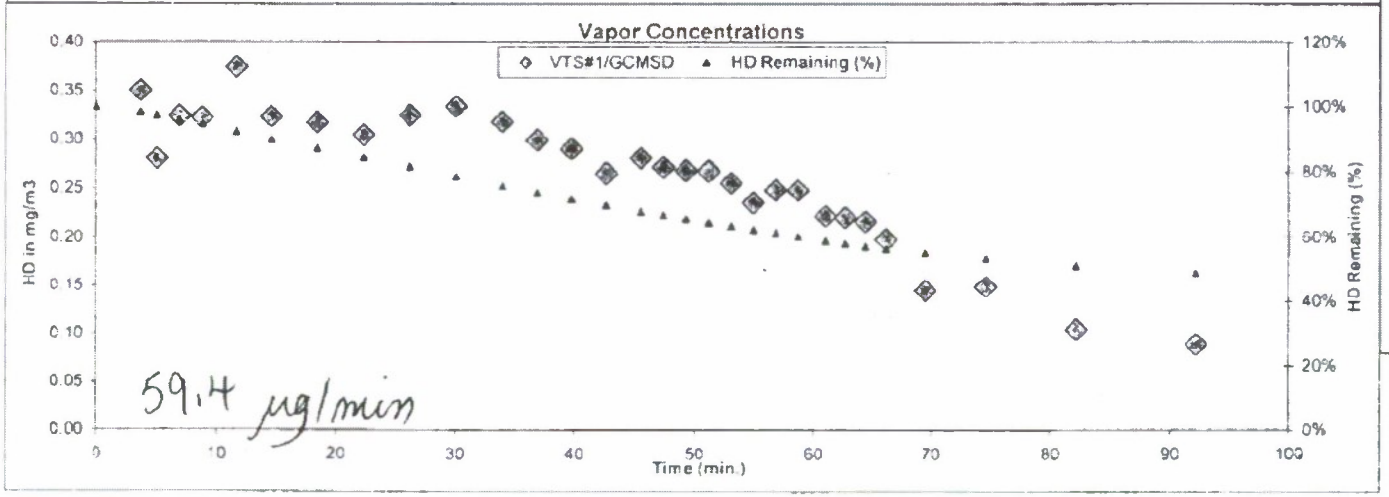
20060621_3c_138

Tunnel:	3c		Date:	06/21/06
Parameters:	VTS#1	GCMSD	Exp. #:	138
type of substrate:	Glass	Dutch Galss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem:	KS	2/28/2006
number of drops:	1			
nominal drop volume:	6 µL			
mass of agent disseminated:	8.09 mg			
corrected mass on 100% agent purity:	7.88 mg		SD	P/F
Miller Nelson temperature:	0.00 °C		0.0	Pass
transition section wall temperature:	50.01 °C		0.2	Pass
fetch section wall temperature:	50.00 °C		0.1	Pass
post-test section wall temperature:	50.00 °C		0.0	Pass
mixing box wall temperature:	50.06 °C		0.2	Pass
sampling duct wall temperature:	50.00 °C		0.01	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%:	Pass			

Substrate: 50.1°C

181.5 SLPM

Time (min)	Conc. mg/m³	HD rem. (%)
3.68	3.50E-01	98.51%
5.07	2.81E-01	97.51%
6.95	3.24E-01	96.20%
8.83	3.23E-01	94.79%
11.72	3.75E-01	92.48%
14.60	3.24E-01	90.16%
18.48	3.17E-01	87.29%
22.37	3.05E-01	84.50%
26.25	3.25E-01	81.69%
30.13	3.34E-01	78.74%
34.02	3.18E-01	75.82%
36.90	3.00E-01	73.77%
39.78	2.90E-01	71.81%
42.67	2.66E-01	69.96%
45.55	2.81E-01	68.15%
47.43	2.72E-01	66.95%
49.32	2.68E-01	65.78%
51.20	2.68E-01	64.61%
53.08	2.55E-01	63.48%
54.97	2.36E-01	62.41%
56.85	2.49E-01	61.36%
58.73	2.48E-01	60.28%
61.04	2.22E-01	59.04%
62.75	2.21E-01	58.16%
64.47	2.16E-01	57.29%
66.19	1.98E-01	56.48%
69.57	1.45E-01	55.14%
74.62	1.49E-01	53.43%
82.17	1.04E-01	51.23%
92.20	8.92E-02	49.00%



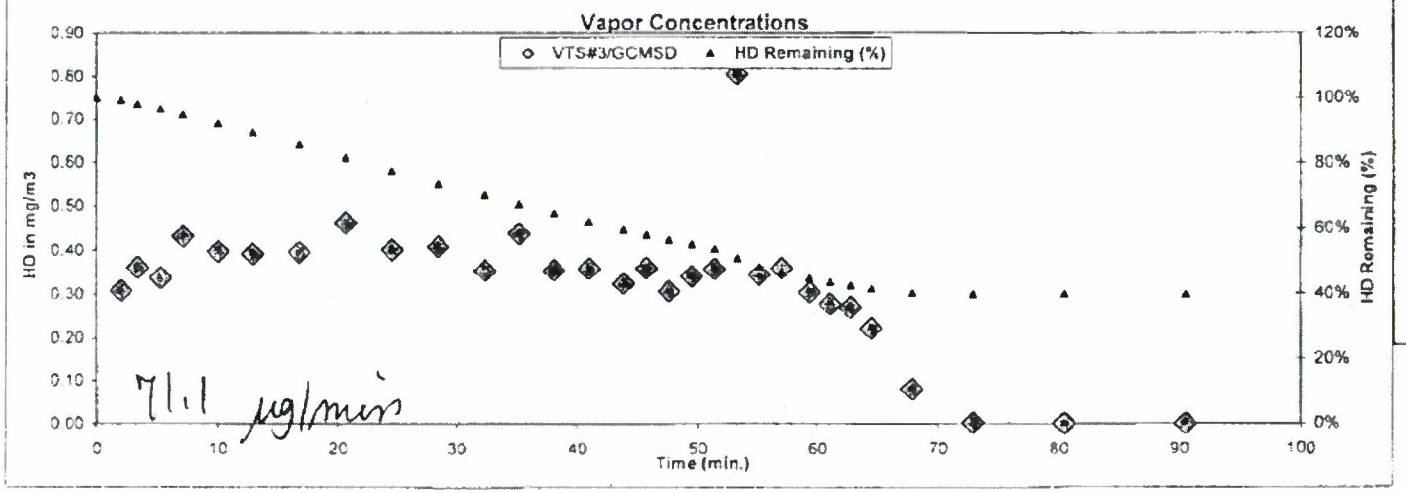
59.4 µg/min

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+00-)\20060621_3c_138

20060621_3k_011

Tunnel:	3K		Date:	06/21/06
Parameters:	VTS#3	GCMSD	Exp. #:	11
type of substrate :	Glass	Dutch Galss		
test agent:	HD			
agent grade.:	neat			
agent purity:	97.4%	Date/Chem.	KS	2/28/2006
number of drops:	1			
nominal drop volume:	6 µL			
mass of agent disseminated:	7.75 mg			
corrected mass on 100% agent purity:	7.54 mg		SD	P/F
Miller Nelson temperature:	0.00 °C		0.0	Pass
transition section wall temperature:	50.01 °C		0.1	Pass
fetch section wall temperature:	50.00 °C		0.1	Pass
post-test section wall temperature:	50.00 °C		0.0	Pass
mixing box wall temperature:	50.74 °C		0.4	Pass
sampling duct wall temperature:	50.63 °C		0.48	Pass
description:	49.7°C Substrate			
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			
	181 SLPM			

Time (min)	Conc. mg/m³	HD rem. (%)
1.99	3.09E-01	99.26%
3.36	3.62E-01	98.15%
5.25	3.39E-01	96.56%
7.13	4.33E-01	94.62%
10.02	3.97E-01	91.94%
12.90	3.92E-01	89.20%
16.78	3.96E-01	85.52%
20.66	4.63E-01	81.50%
24.55	4.02E-01	77.47%
28.43	4.09E-01	73.68%
32.31	3.55E-01	70.11%
35.20	4.39E-01	67.36%
38.08	3.55E-01	64.61%
40.96	3.59E-01	62.13%
43.85	3.25E-01	59.76%
45.73	3.60E-01	58.20%
47.62	3.07E-01	56.69%
49.50	3.41E-01	55.22%
51.38	3.58E-01	53.64%
53.27	8.05E-01	51.00%
55.15	3.45E-01	48.40%
57.04	3.60E-01	45.80%
59.34	3.04E-01	44.96%
61.05	2.77E-01	43.76%
62.77	2.69E-01	42.64%
64.49	2.21E-01	41.62%
67.87	8.02E-02	40.40%
72.92	1.91E-03	39.90%
80.47	9.67E-04	39.87%
90.52	7.34E-04	39.85%



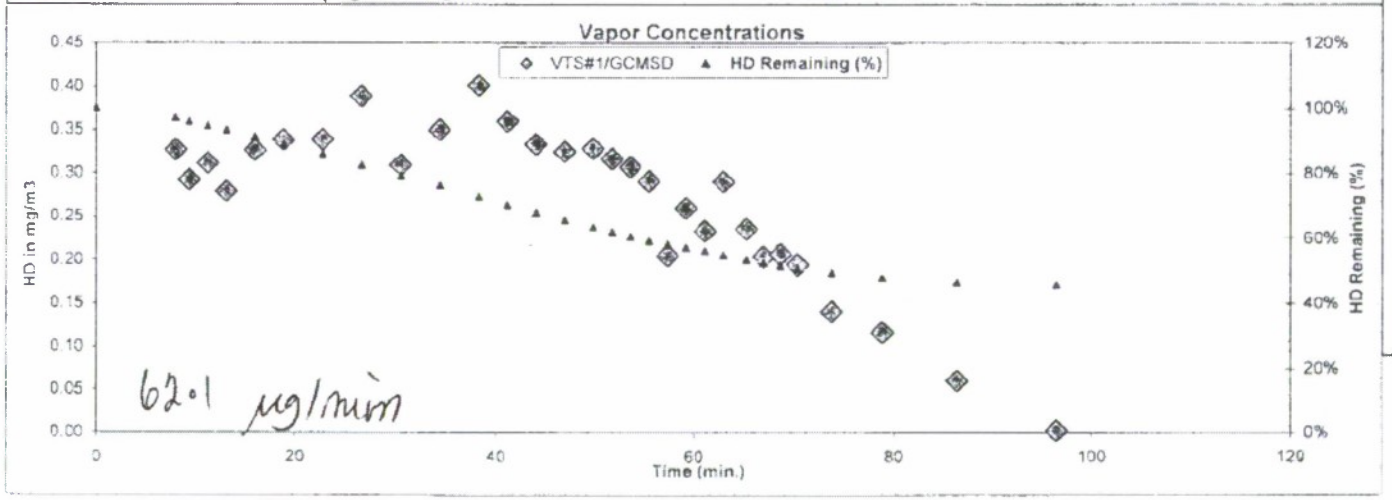
G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+00-)\20060621_3k_011

20060627_3c_140

Tunnel:	3c		Date:	06/27/06
Parameters:	VTS#1	GCMSD	Exp. #:	140
type of substrate :	Glass	Dutch Galss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem:	KS	2/28/2006
number of drops:	1			
nominal drop volume:	6 µL			
mass of agent disseminated:	7.91 mg			
corrected mass on 100% agent purity:	7.70 mg		SD	P/F
Miller Nelson temperature:	0.00 °C		0.0	Pass
transition section wall temperature:	50.04 °C		0.4	Pass
fetch section wall temperature:	50.05 °C		0.2	Pass
post-test section wall temperature:	50.01 °C		0.1	Pass
mixing box wall temperature:	50.35 °C		0.5	Pass
sampling duct wall temperature:	50.01 °C		0.09	Pass
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			

Substrate : 49.7°C

182 SLPM



62.1 µg/min

Time (min)	Conc. mg/m³	HD rem. (%)
8.00	3.27E-01	96.91%
9.38	2.93E-01	95.90%
11.27	3.11E-01	94.56%
13.15	2.79E-01	93.25%
16.03	3.27E-01	91.19%
18.90	3.39E-01	88.94%
22.78	3.39E-01	85.83%
26.66	3.89E-01	82.50%
30.55	3.10E-01	79.30%
34.43	3.50E-01	76.27%
38.31	4.01E-01	72.83%
41.20	3.60E-01	70.24%
44.08	3.33E-01	67.88%
46.96	3.25E-01	65.64%
49.85	3.29E-01	63.42%
51.73	3.17E-01	61.99%
53.61	3.07E-01	60.60%
55.50	2.91E-01	59.27%
57.38	2.85E-01	58.17%
59.27	2.60E-01	57.14%
61.15	2.33E-01	56.04%
63.03	2.90E-01	54.88%
65.34	2.36E-01	53.45%
67.05	2.04E-01	52.56%
68.77	2.07E-01	51.72%
70.48	1.95E-01	50.91%
73.87	1.41E-01	49.57%
78.92	1.17E-01	48.04%
86.47	6.08E-02	46.45%
96.50	2.25E-03	45.71%

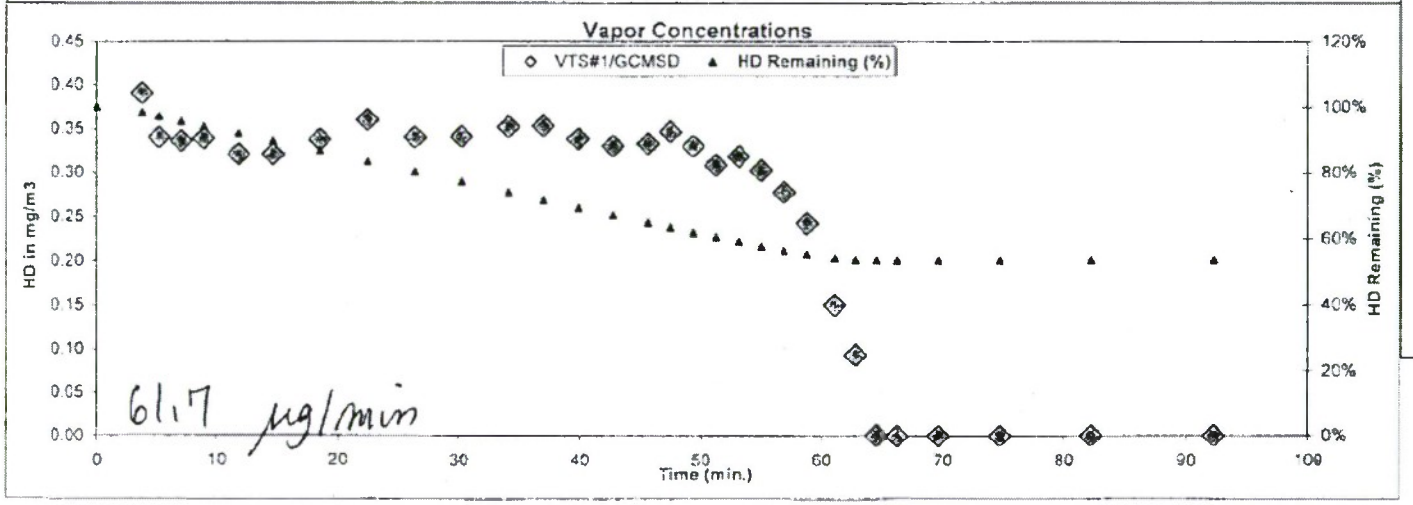
G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+00-)\20060627_3c_140

20060629_3c_142

Tunnel:	3c		Date:	06/29/06
Parameters:	VTS#1	GCMSD	Exp. #:	142
type of substrate:	Glass	Dutch Galss		
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem:	KS	2/28/2006
number of drops:	1			
nominal drop volume:	6	µL		
mass of agent disseminated:	7.95	mg		
corrected mass on 100% agent purity:	7.74	mg	SD	P/F
Miller Nelson temperature:	0.00	°C	0.0	Pass
transition section wall temperature:	50.02	°C	0.2	Pass
fetch section wall temperature:	50.76	°C	0.7	Pass
post-test section wall temperature:	50.40	°C	0.6	Pass
mixing box wall temperature:	52.42	°C	1.6	Fail
sampling duct wall temperature:	51.34	°C	1.25	Fail
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Pass			

Substrate: 49.2°C

181 SLPM



61.7 µg/min

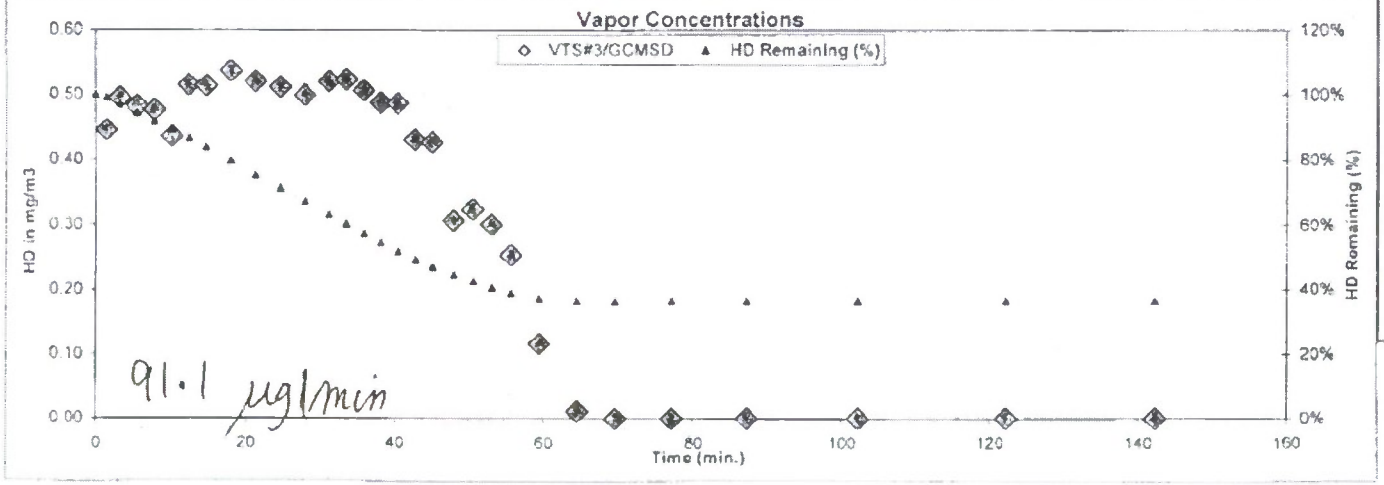
Time (min)	Conc. mg/m³	HD rem. (%)
3.78	3.91E-01	98.27%
5.16	3.40E-01	97.09%
7.05	3.36E-01	95.59%
8.93	3.39E-01	94.11%
11.82	3.21E-01	91.88%
14.70	3.21E-01	89.71%
18.58	3.38E-01	85.71%
22.46	3.60E-01	83.54%
26.35	3.41E-01	80.35%
30.23	3.41E-01	77.25%
34.11	3.52E-01	74.09%
37.00	3.54E-01	71.71%
39.88	3.39E-01	69.37%
42.76	3.30E-01	67.12%
45.65	3.33E-01	64.88%
47.53	3.47E-01	63.38%
49.42	3.30E-01	61.88%
51.30	3.08E-01	60.47%
53.18	3.19E-01	59.09%
55.07	3.02E-01	57.72%
56.95	2.78E-01	56.45%
58.83	2.42E-01	55.30%
61.14	1.50E-01	54.24%
62.85	9.40E-02	53.75%
64.57	0.00E+00	53.56%
66.27	0.00E+00	53.56%
69.65	0.00E+00	53.56%
74.70	0.00E+00	53.56%
82.25	0.00E+00	53.56%
92.30	0.00E+00	53.56%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+00-)\20060629_3c_142

20060803_3L_013

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3L				
Instruments:	VTS#3 GCMSD				
Date:	08/03/06				
Exp. #:	13				
Type of substrate:	Glass				
Test agent:	HD				
Agent purity:	97.4%	Date/Chem:	KS	2/28/2006	
Number of drops:	1				
Nominal drop volume:	6 µL				
Mass of agent disseminated:	7.75 mg				
Corrected mass on 100% agent purity:	7.54 mg		SD	%SD	
Avg. Substrate Temperature	50.45 °C		0.3	0.55%	Go
Avg. Air Flow Rate	181.58 SLPM		1.1	0.60%	Go
Avg Air Temperature	49.82 °C		0.2	0.35%	Go
Mass % Recovery in Vapor	63.5 %		-	-	Go
Tube #s consistant:	Yes				
Daily CCV < +/- 15%	Yes				



Time (min)	Conc. mg/m³	HD rem. (%)
1.47	4.45E-01	99.21%
3.28	4.96E-01	97.17%
5.56	4.83E-01	94.48%
7.86	4.77E-01	91.83%
10.16	4.36E-01	89.30%
12.46	5.15E-01	86.66%
14.75	5.14E-01	83.81%
18.06	5.37E-01	79.64%
21.36	5.20E-01	75.44%
24.65	5.12E-01	71.34%
27.96	5.00E-01	67.33%
31.26	5.21E-01	63.27%
33.56	5.23E-01	60.38%
35.86	5.07E-01	57.53%
38.16	4.88E-01	54.78%
40.48	4.87E-01	52.06%
42.77	4.31E-01	49.52%
45.07	4.27E-01	47.14%
48.00	3.07E-01	44.56%
50.55	3.24E-01	42.62%
53.10	3.01E-01	40.70%
55.65	2.55E-01	38.99%
59.45	1.16E-01	37.29%
64.50	1.13E-02	36.52%
69.55	0.00E+00	36.45%
77.10	0.00E+00	36.45%
87.15	0.00E+00	36.45%
102.20	0.00E+00	36.45%
122.23	0.00E+00	36.45%
142.28	0.00E+00	36.45%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+00-)\20060803_3L_013

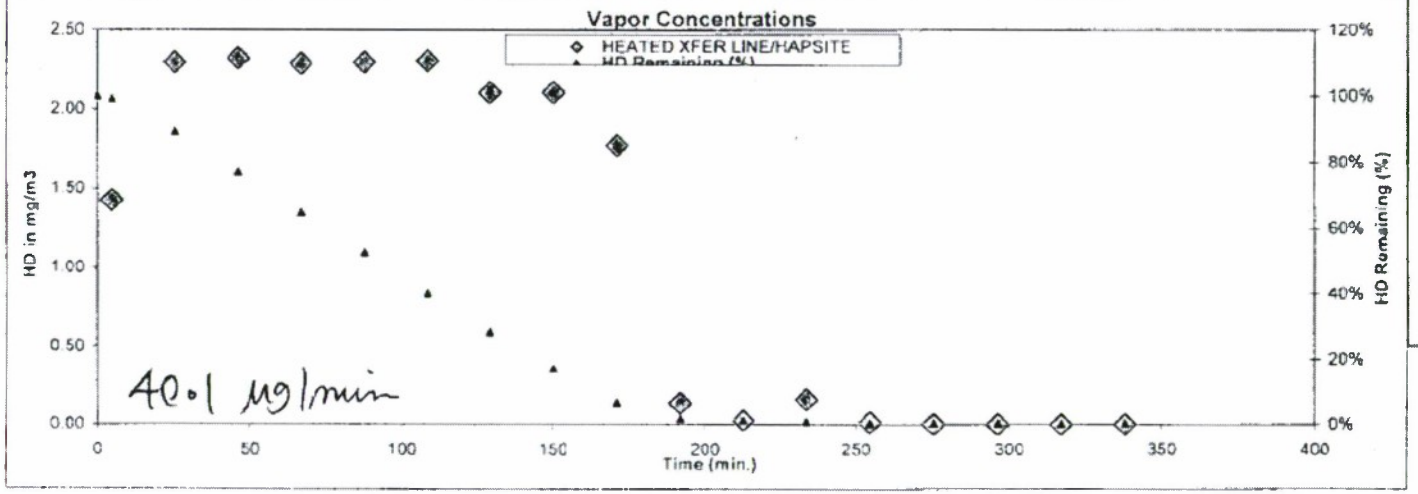
20050614_3a_31

Data Evaluation Grade: Modeling Grade

Tunnel:	3a	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	06/14/05	31
Type of substrate :	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.22 mg	
Corrected mass on 100% agent purity:	7.04 mg	
Average substrate temperature:	46.83 °C	
Average air flow rate:	18.02 SLPM	
Average air temperature above drop:	47.85 °C	
Mass % recovery in vapor:	99.7 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	99.7 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	No	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.6	1.31%	Go
0.2	1.15%	Go
0.3	0.70%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
4.58	1.43E+00	99.16%
25.30	2.30E+00	89.29%
46.08	2.32E+00	77.00%
66.88	2.29E+00	64.72%
87.72	2.30E+00	52.46%
108.55	2.30E+00	40.22%
129.40	2.10E+00	28.45%
150.25	2.10E+00	17.21%
171.12	1.77E+00	6.85%
192.00	1.39E-01	1.73%
212.88	2.70E-02	1.29%
233.77	1.60E-01	0.78%
254.68	1.10E-02	0.33%
275.55	0.00E+00	0.30%
296.38	0.00E+00	0.30%
317.23	0.00E+00	0.30%
338.10	0.00E+00	0.30%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%

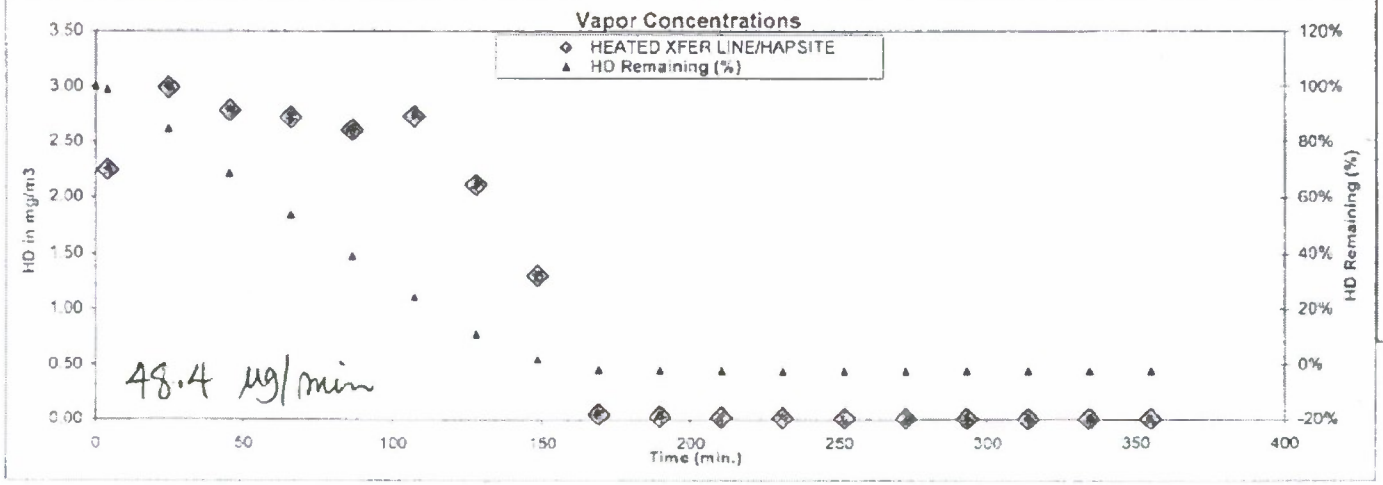
20050615_3a_32

Data Evaluation Grade: Modeling Grade

Tunnel:	3a	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	06/15/05	32
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	6.98 mg	
Corrected mass on 100% agent purity:	6.80 mg	
Average substrate temperature:	48.52 °C	
Average air flow rate:	18.05 SLPM	
Average air temperature above drop:	47.32 °C	
Mass % recovery in vapor:	102.4 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	102.4 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	No	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.3	0.58%	Go
0.1	0.66%	Go
0.1	0.28%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
4.17	2.24E+00	98.76%
24.73	2.99E+00	84.47%
45.33	2.78E+00	68.69%
65.95	2.72E+00	53.63%
86.58	2.61E+00	39.04%
107.22	2.73E+00	24.42%
127.85	2.11E+00	11.16%
148.50	1.30E+00	1.82%
169.15	4.74E-02	-1.86%
189.82	2.49E-02	-2.06%
210.50	1.63E-02	-2.17%
231.15	1.08E-02	-2.25%
251.82	8.27E-03	-2.30%
272.48	7.04E-03	-2.34%
293.15	5.72E-03	-2.38%
313.82	3.37E-03	-2.40%
334.48	0.00E+00	-2.41%
355.15	0.00E+00	-2.41%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%

G:\Agent\FateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+0--)\20050615_3a_32

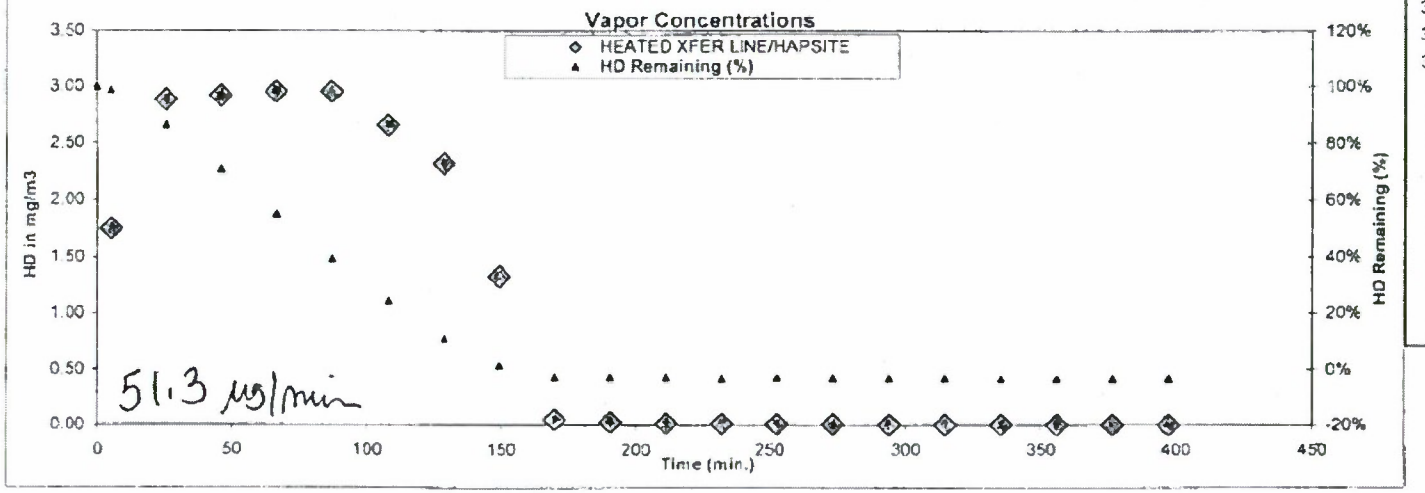
20050616_3a_33

Data Evaluation Grade: Modeling Grade

Tunnel:	3a	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	06/16/05	33
Type of substrate :	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.13 mg	
Corrected mass on 100% agent purity:	6.95 mg	
Average substrate temperature:	50.03 °C	
Average air flow rate:	18.05 SLPM	
Average air temperature above drop:	47.43 °C	
Mass % recovery in vapor:	103.2 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	103.2 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	No	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.5	1.07%	Go
0.2	0.86%	Go
0.2	0.36%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
5.08	1.75E+00	98.85%
25.65	2.89E+00	86.46%
46.25	2.92E+00	70.91%
66.85	2.96E+00	55.18%
87.47	2.96E+00	39.34%
108.10	2.66E+00	24.28%
128.75	2.32E+00	10.92%
149.40	1.32E+00	1.14%
170.05	4.85E-02	-2.54%
190.70	2.72E-02	-2.74%
211.37	1.67E-02	-2.86%
232.03	1.26E-02	-2.94%
252.70	8.87E-03	-2.99%
273.37	8.25E-03	-3.04%
294.03	5.14E-03	-3.08%
314.70	3.42E-03	-3.10%
335.37	2.75E-03	-3.11%
356.03	2.72E-03	-3.13%
376.70	2.69E-03	-3.14%
397.37	0.00E+00	-3.15%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%

G:\Agent\FateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+0--)\20050616_3a_33

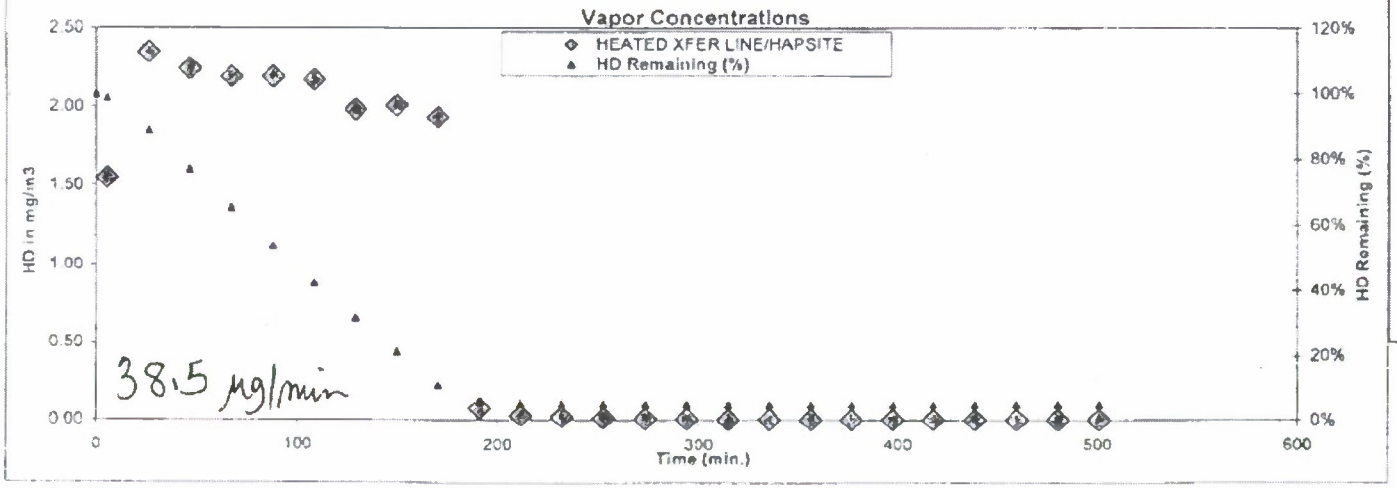
20050620_3a_34

Data Evaluation Grade: Modeling Grade

Tunnel:	3a	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	06/20/05	34
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.32 mg	
Corrected mass on 100% agent purity:	7.13 mg	
Average substrate temperature:	48.31 °C	
Average air flow rate:	18.05 SLPM	
Average air temperature above drop:	47.18 °C	
Mass % recovery in vapor:	95.2 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	95.2 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.3	0.64%	Go
0.2	0.86%	Go
0.1	0.31%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
5.67	1.55E+00	98.89%
25.22	2.35E+00	88.75%
45.80	2.24E+00	76.79%
67.40	2.19E+00	65.22%
88.02	2.19E+00	53.78%
108.63	2.17E+00	42.38%
129.25	1.98E+00	31.53%
149.88	2.01E+00	21.11%
170.52	1.93E+00	10.82%
191.15	7.73E-02	5.57%
211.78	3.10E-02	5.29%
232.43	1.99E-02	5.16%
253.08	1.39E-02	5.07%
273.73	8.53E-03	5.01%
294.38	7.60E-03	4.97%
315.03	3.37E-03	4.94%
335.70	4.58E-03	4.92%
356.40	3.62E-03	4.89%
377.03	3.21E-03	4.88%
397.70	2.80E-03	4.86%
418.37	2.44E-03	4.85%
439.03	0.00E+00	4.84%
459.70	0.00E+00	4.84%
480.37	0.00E+00	4.84%
501.03	0.00E+00	4.84%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%

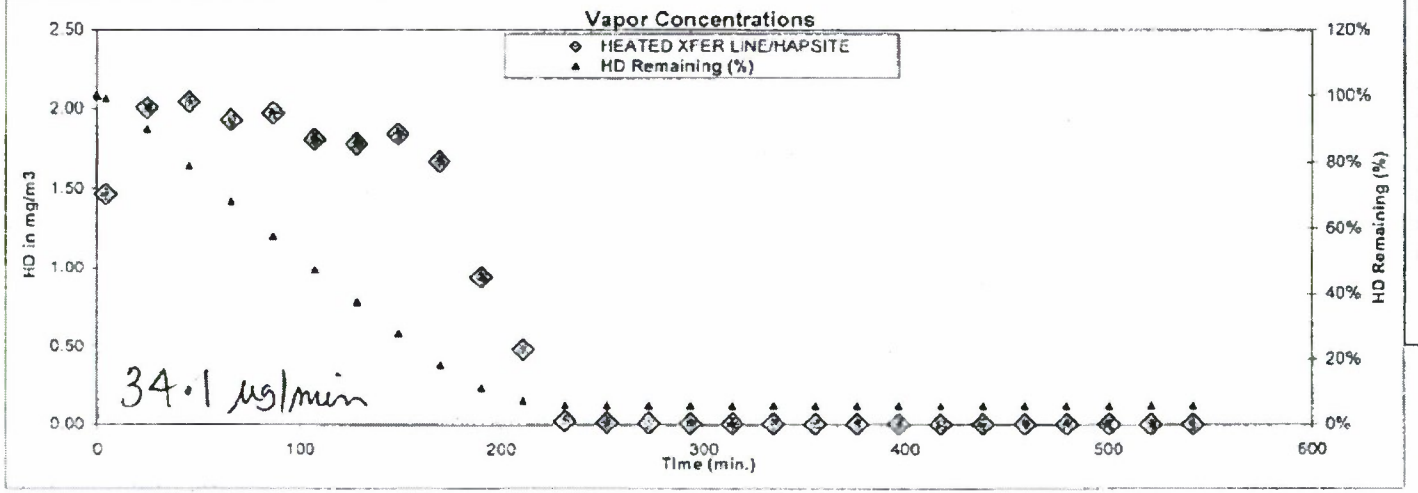
20050621_3a_35

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3a	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #	06/21/05	35
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.09 mg	
Corrected mass on 100% agent purity:	6.90 mg	
Average substrate temperature:	48.32 °C	
Average air flow rate:	18.05 SLPM	
Average air temperature above drop:	47.20 °C	
Mass % recovery in vapor:	94.3 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	94.3 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	No	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.6	1.26%	Go
0.3	1.42%	Go
0.2	0.40%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
4.30	1.47E+00	99.18%
24.93	2.01E+00	89.81%
45.58	2.04E+00	78.87%
66.25	1.93E+00	68.13%
86.92	1.97E+00	57.58%
107.58	1.81E+00	47.35%
128.25	1.78E+00	37.64%
148.92	1.84E+00	27.84%
169.58	1.67E+00	18.33%
190.25	9.40E-01	11.28%
210.90	4.81E-01	7.44%
231.55	2.28E-02	6.08%
252.22	1.32E-02	5.98%
272.90	9.83E-03	5.92%
293.58	7.18E-03	5.88%
314.28	6.07E-03	5.84%
334.98	4.94E-03	5.81%
355.68	3.82E-03	5.79%
376.38	3.12E-03	5.77%
397.07	2.42E-03	5.75%
417.75	2.09E-03	5.74%
438.43	1.75E-03	5.73%
459.10	1.43E-03	5.72%
479.78	1.10E-03	5.71%
500.47	1.07E-03	5.71%
521.15	0.00E+00	5.71%
541.83	0.00E+00	5.71%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%
0.00	0.00E+00	0.00%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+0--)\20050621_3a_35

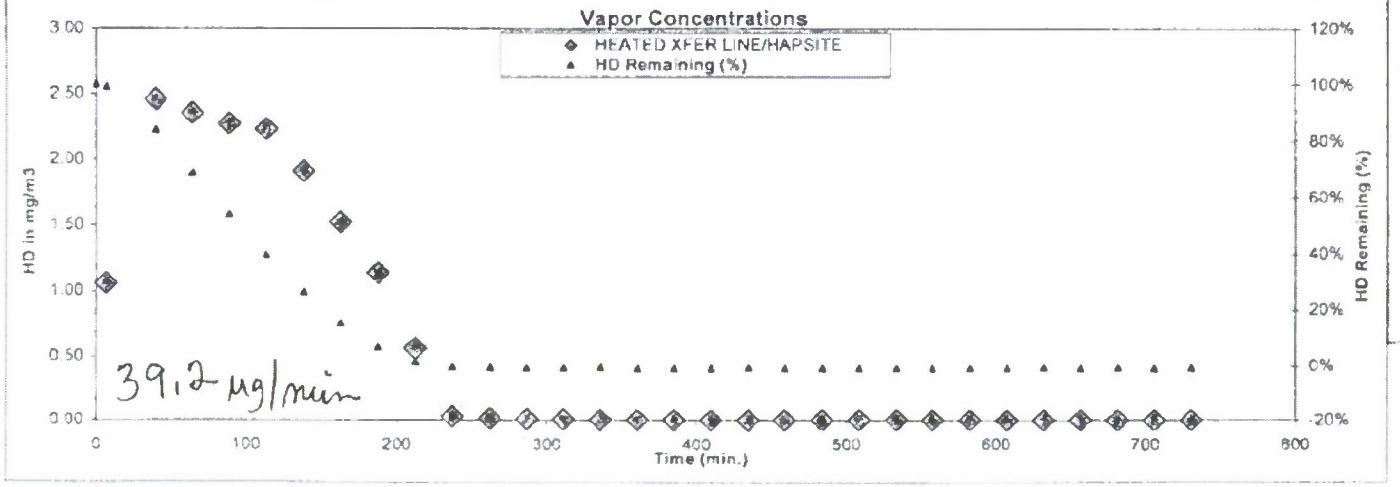
20050808_3c_07

Data Evaluation Grade: Modeling Grade

Tunnel:	3c	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	08/08/05	7
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.18 mg	
Corrected mass on 100% agent purity:	7.00 mg	
Average substrate temperature:	47.64 °C	
Average air flow rate:	18.05 SLPM	
Average air temperature above drop:	47.94 °C	
Mass % recovery in vapor:	100.8 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	100.8 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	No	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.3	0.60%	Go
0.1	0.31%	Go
0.2	0.44%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
6.72	1.06E+00	99.08%
39.83	2.46E+00	84.06%
64.50	2.35E+00	68.75%
89.18	2.28E+00	54.01%
113.87	2.23E+00	39.65%
138.55	1.91E+00	26.45%
163.23	1.53E+00	15.49%
187.92	1.14E+00	7.01%
212.58	5.68E-01	1.58%
237.25	2.91E-02	-0.32%
261.92	1.31E-02	-0.45%
286.60	9.14E-03	-0.52%
311.27	7.72E-03	-0.58%
335.95	5.78E-03	-0.62%
360.63	4.09E-03	-0.65%
385.32	3.89E-03	-0.68%
410.00	2.90E-03	-0.70%
434.68	2.38E-03	-0.71%
459.37	2.22E-03	-0.73%
484.05	1.69E-03	-0.74%
508.73	1.64E-03	-0.75%
533.42	1.22E-03	-0.76%
558.10	1.27E-03	-0.77%
582.78	6.89E-04	-0.77%
607.47	0.00E+00	-0.78%
632.17	0.00E+00	-0.78%
656.87	0.00E+00	-0.78%
681.57	0.00E+00	-0.78%
706.27	0.00E+00	-0.78%
730.93	0.00E+00	-0.78%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+0--)\20050808_3c_07

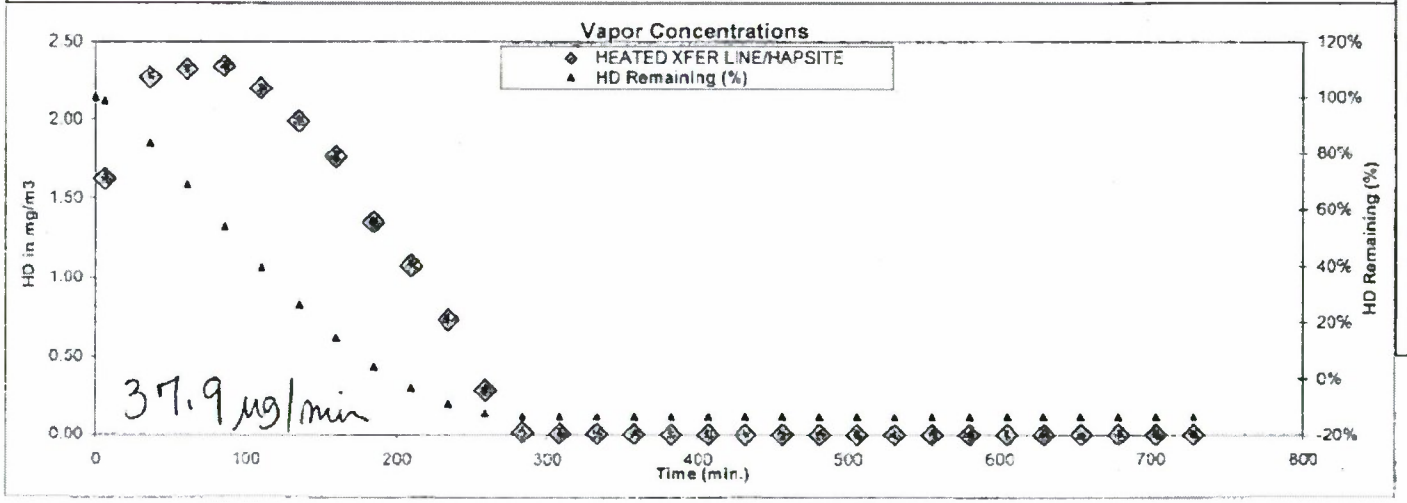
20050810_3c_09

Data Evaluation Grade: Modeling Grade

Tunnel:	3c	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #	08/10/05	9
Type of substrate :	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.21 mg	
Corrected mass on 100% agent purity:	7.02 mg	
Average substrate temperature:	48.53 °C	
Average air flow rate:	18.04 SLPM	
Average air temperature above drop:	49.20 °C	
Mass % recovery in vapor:	113.5 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	113.5 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.4	0.73%	Go
0.4	2.21%	Go
0.2	0.44%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
6.18	1.62E+00	98.71%
36.72	2.27E+00	83.43%
61.38	2.32E+00	68.86%
86.07	2.34E+00	54.06%
110.73	2.20E+00	39.66%
135.42	1.99E+00	26.36%
160.10	1.76E+00	14.45%
184.80	1.35E+00	4.57%
209.50	1.08E+00	-3.15%
234.22	7.36E-01	-8.91%
258.93	2.87E-01	-12.16%
283.65	1.90E-02	-13.13%
308.37	1.05E-02	-13.22%
333.08	7.56E-03	-13.28%
357.78	6.19E-03	-13.33%
382.48	3.77E-03	-13.36%
407.16	3.58E-03	-13.38%
431.68	3.25E-03	-13.40%
456.58	2.96E-03	-13.42%
481.30	2.04E-03	-13.44%
506.00	2.25E-03	-13.45%
530.72	1.85E-03	-13.46%
555.43	1.52E-03	-13.47%
580.13	1.24E-03	-13.48%
604.83	1.17E-03	-13.49%
629.53	1.10E-03	-13.50%
654.23	4.92E-04	-13.50%
678.98	8.48E-04	-13.51%
703.68	0.00E+00	-13.51%
728.40	4.70E-04	-13.51%

G:\Agent\FateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+0--)\20050810_3c_09

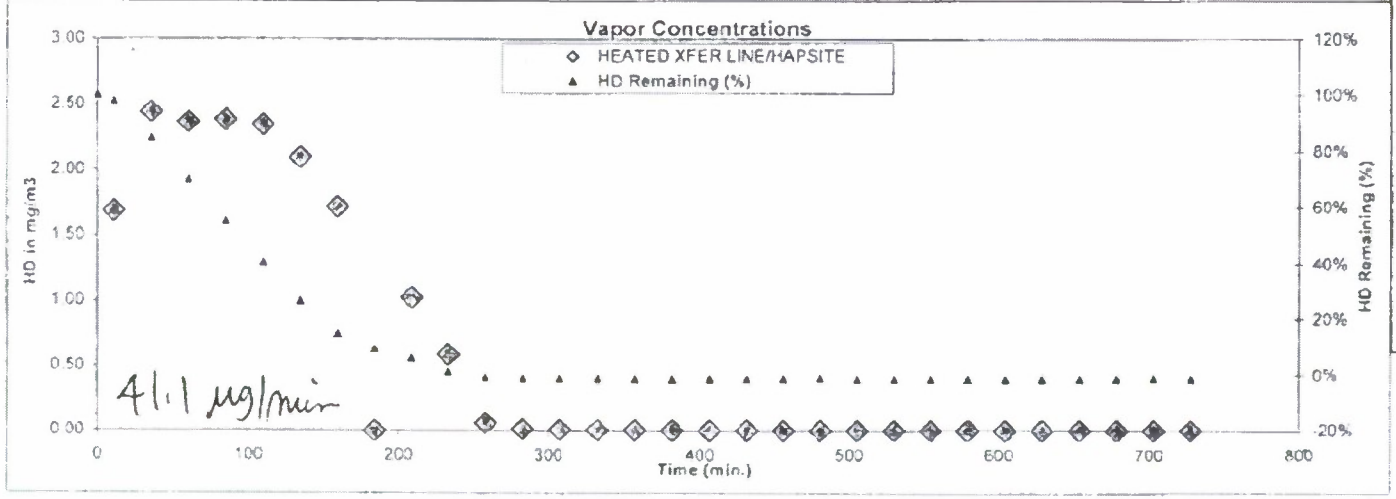
20050815_3c_11

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3c	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	08/15/05	11
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.37 mg	
Corrected mass on 100% agent purity:	7.18 mg	
Average substrate temperature:	48.44 °C	
Average air flow rate:	18.05 SLPM	
Average air temperature above drop:	49.25 °C	
Mass % recovery in vapor:	101.4 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	101.4 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.4	0.79%	Go
0.0	0.27%	Go
0.2	0.44%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
11.05	1.69E+00	97.66%
35.70	2.44E+00	84.86%
60.38	2.37E+00	69.93%
85.08	2.38E+00	55.19%
109.80	2.35E+00	40.49%
134.53	2.10E+00	26.65%
159.27	1.72E+00	14.81%
184.02	0.00E+00	9.45%
208.73	1.03E+00	6.26%
233.45	5.90E-01	1.24%
258.18	5.94E-02	-0.78%
282.92	1.48E-02	-1.01%
307.65	9.91E-03	-1.08%
332.38	8.08E-03	-1.14%
357.12	6.03E-03	-1.18%
381.85	4.87E-03	-1.22%
406.58	3.95E-03	-1.25%
431.32	3.17E-03	-1.27%
456.05	2.50E-03	-1.29%
480.78	2.54E-03	-1.30%
505.52	1.99E-03	-1.31%
530.25	1.50E-03	-1.33%
554.98	1.69E-03	-1.34%
579.72	1.30E-03	-1.34%
604.45	1.00E-03	-1.35%
629.18	1.15E-03	-1.36%
653.92	9.13E-04	-1.37%
678.65	0.00E+00	-1.37%
703.38	5.45E-04	-1.37%
728.12	0.00E+00	-1.37%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+0--)\20050815_3c_11

G:\AgentFateTech\Wind Tunnel\Processed Data\Delivered\HD Glass\HDGl(+ 0 -)\050915\20050818_3a_51

Data sheet droplet evaporation in ECBC Tunnel 3a

DATE:	18-Aug-2005
ECBC FILESERVERNAME:	rgockel on 'Filesvr'(H:)\Spartan\Gluss\Runs\20050818_3a_51.xls
LABVIEW FILENAME	B5150\C:\Tunnel\3a\2005\20050818_3a_51.xls
EXP. No.:	S51

Substrate

type of substrate	Gluss valley design, 1.45" - washed according to protocol		
substrate sample size	36.6mm diameter	0.001052	m²

Agent

test liquid	HD		
agent neat / thickened:	neat		
agent purity	97.4% nominal density is	1.27	mg/uL

Contamination

number of drops	1	
nominal drop volume	6	µL
actual calculated drop volume	6.174	µL
weight of clean substrate	1728.566	[mg]
weight of contaminated substrate:	1736.407	[mg]
mass of agent disseminated	7.841	[mg]
corrected mass on 100% agent purity	7.637	[mg] of 100% Agent
actual contamination density	7.45	[g/m²]
actual contamination density recalculated on 100% agent purity:	7.26	[g/m²]

CONTROL PARAMETERS	set up	actual mean value	Units	± stdev
Miller Nelson Temperature		49.3	°C	0.5
air flow temperature:		50.0	°C	0.2
Aalborg Flowmeter air flow rate		18.14	SLPM	0.0
Flowmeter corrected flow rate		#DIV/0!	l/min	#DIV/0!
Transition section wall temp. (cone)		55.0	°C	0.1
Fetch section wall temp.(front)		55.0	°C	0.1
Substrate Temperature		50.7	°C	1.1
Piston zone temperature(Piston)		54.9	°C	1.1
post-test section wall temp		50.0	°C	0.0
mixing box wall temp		50.1	°C	0.3
sampling duct wall temp (Vent)?		50.0	°C	0
test section air flow speed		0.24	m/s	0.0
air flow relative humidity (Rotronic):		1.59	%	0.1

Sampling set up

Versatile Tube Sampler prototype#1
{Tubes Auto desorbed by Markes Ultra (ECBC barcode C5491) attached to MarkesUnity desorber (ECBC barcode C5492) and air server (ECBC barcode (C5493);
!Desorbed analyte was analyzed by Agilent 5890N gas chromatograph (ECBC barcode C5206) with FPD!
HYFED was Meloy Labs Model PA 260 Analyzer (ECBC barcode 35158) - set at 10"

Experiment timing

start time contamination (time drop hits substrate):	08/18/05 14:54:40		
end time contamination:			
start time data acquisition(desired wind velocity achieved):	08/18/05 14:57:42	3.03	minutes
end time data acquisition- end of vapor experiment:	08/18/05 20:00:02	302.33	minutes

Additional information

weight of substrate after evaporation:	1728.5530	[g] measured at 11 AM on 8-22-2005
residual mass of 'agent' after evaporation:	-0.0130	[g]

Extraction liquid

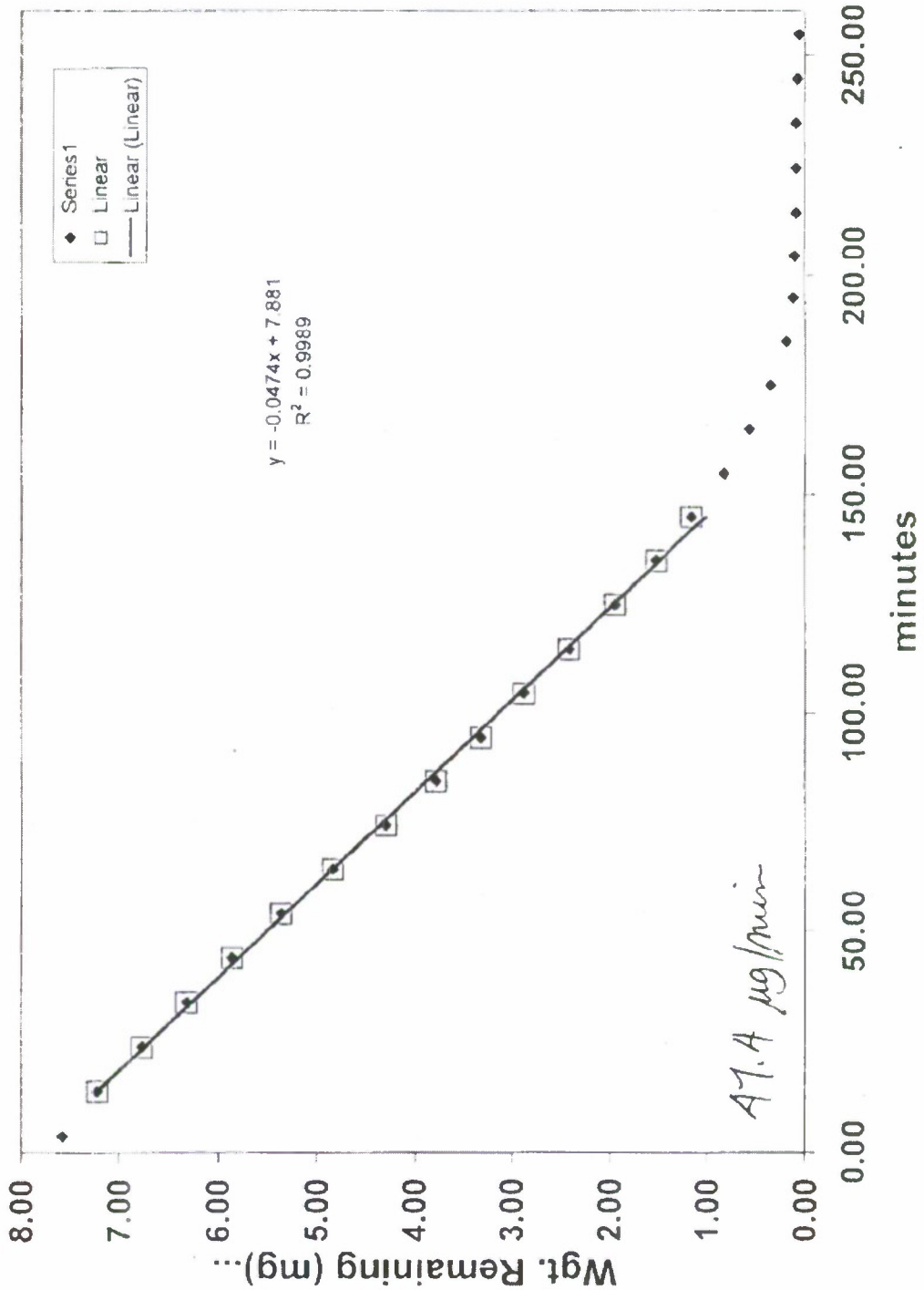
extraction liquid	NA	
volume extraction liquid	NA	[mL]
extraction time: (ultrasonicate)	NA	[min]
concentration of agent in extraction liquid	NA	[µg/mL]
recovered mass:	NA	[mg]

Used automatic detectors

List of troubleshootings

Remarks

Drop deposited by SHI using VWR microdispenser - uniform spreading
video data was recorded


Series1
Linear
Linear (Linear)
y = -0.0474x + 7.881
R² = 0.9989
Wgt. Remaining (mg)...
minutes
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
0.00
50.00
100.00
150.00
200.00
250.00
47.4 µg/min

G:\Agent\FateTech\Wind Tunnel\Processed Data\Delivered\HD Glass\HDG\[+ 0 -]050915\20050822_3a_53

Data sheet droplet evaporation in ECBC Tunnel 3a

DATE:	22-Aug-2005	
ECBC FILESERVERNAME:	rgnckol on 'Fileswr'(H:)\Spartan\Glass\Runs\20050822_3a_53.xls	
LABVIEW FILENAME	05150\C:\Tunnel\3a\2005\20050822_3a_53.xls	
EXP. No.:	S53	

Substrate

type of substrate :	Glass valley design, 1.45" - washed according to protocol	
substrate sample size	36.6mm diameter	0.001052 m^2

Agent

test liquid:	HD	
agent neat / thickened	neat	
agent purity	97.4% nominal density is	1.27 mg/uL

Contamination

number of drops:	1
nominal drop volume	6 µL
actual calculated drop volume	5.626 µL
weight of clean substrate	1858.342 [mg]
weight of contaminated substrate:	1865.487 [mg]
mass of agent disseminated	7.145 [mg]
corrected mass on 100% agent purity	6.959 [mg] of 100% Agent
actual contamination density	6.79 [g/m^2]
actual contamination density recalculated on 100% agent purity:	6.62 [g/m^2]

CONTROL PARAMETERS	set up	actual mean value	Units	± stdev
Miller Nelson Temperature		49.4	°C	0.1
air flow temperature.		50.2	°C	0.2
Aalborg Flowmeter air flow rate		18.14	SLPM	0.1
Transition section wall temp (rear)		55.0	°C	0.1
Teich section wall temp (front)		55.0	°C	0.0
Substrate Temperature		50.5	°C	0.7
Piston zone temperature (Piston)		54.9	°C	0.8
post-test section wall temp.		50.0	°C	0.1
mixing box wall temp.		50.0	°C	0.1
sampling duct wall temp (Vent)?		50.0	°C	0
test section air flow speed		0.24	m/s	0.0
air flow relative humidity (Rotronic):		2.36	%	0.1

Sampling set up

Versatile Tube Sampler prototype#1
1)Tubes Auto desorbed by Markes Ultra (ECBC barcode C5491) attached to MarkesUnity desorber (ECBC barcode C5492) and air server (ECBC barcode (C5493))
)Desorbed analyte was analyzed by Agilent 5890N gas chromatograph (ECBC barcode C5206) with FPD)
HYFED was Meloy Labs Model PA 260 Analyzer (ECBC barcode 15158) set at 10^6

Experiment timing

start time contamination (time drop hits substrate)	08/22/05 10:58:50	
end time contamination:		
start time data acquisition(desired wind velocity achieved)	08/22/05 11:02:55	4.08 minutes
end time data acquisition- end of vapor experiment.	08/22/05 15:00:00	237.08 minutes

Additional information

weight of substrate after evaporation:	1858.3400 [g]	measured at 11 am on 8/23/2005
residual mass of "agent" after evaporation:	-0.0020 [g]	

Extraction liquid

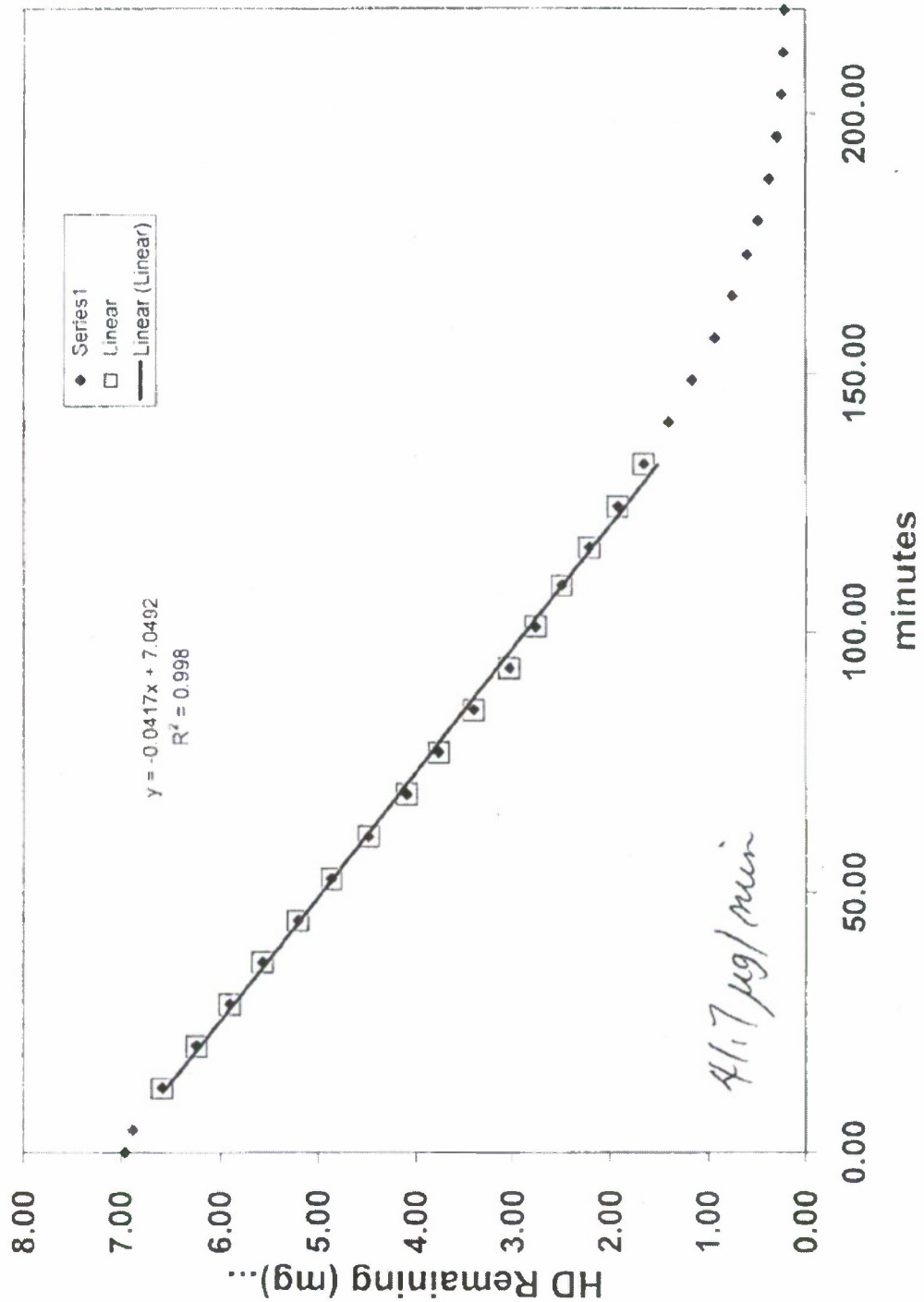
extraction liquid	NA	
volume extraction liquid:	NA	[ml]
extraction time (ultrasonicate)	NA	[min]
concentration of agent in extraction liquid:	NA	[µg/ml]
recovered mass:	NA	[mg]

Used automatic detectors

List of troubleshootings

Remarks

Drop deposited with VWR microdispenser by KBS, uniform spread
video data was recorded


HD Remaining (mg)...
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0.00
50.00
100.00
150.00
200.00
minutes
Series1
Linear
Linear (Linear)
y = -0.0417x + 7.0492
R² = 0.998
41.7 µg/min

G:\Agent\FateTech\Wind Tunnel\Processed Data\Delivered\HD Glass\HDG\[~ 0 ~]050915\20050823_3a_54

Data sheet droplet evaporation in ECBC Tunnel 3a

DATE:	23-Aug-2005
ECBC FILESERVERNAME:	rgnekal on 'Filesvr'(H:)\Spartan\Glass\Runs\20050822_3a_54.xls
LABVIEW FILENAME	B5150\C\Tunnel\3a\2005\20050822_3a_54.xls
EXP. No.:	S54

Substrate			
type of substrate :		Glass valley design, 1.45" - washed according to protocol	
substrate sample size	36.6mm diameter	0.001052	m²

Agent			
test liquid:	HD		
agent neat / thickened	neat		
agent purity	97.4%	nominal density is	1.27 mg/uL

Contamination			
number of drops:	1		
nominal drop volume	6	µL	
actual calculated drop volume	5.667	µL	
weight of clean substrate	1810.848	[mg]	
weight of contaminated substrate	1818.045	[mg]	
mass of agent disseminated	7.197	[mg]	
corrected mass on 100% agent purity	7.010	[mg] of 100% Agent	
actual contamination density	6.84	[g/m²]	
actual contamination density recalculated on 100% agent purity:	6.66	[g/m²]	

CONTROL PARAMETERS	set up	actual mean value	Units	± stdev
Miller Nelson Temperature		49.4	°C	0.1
air flow temperature:		50.0	°C	0.2
Aalborg flowmeter air flow rate		18.14	SLPM	0.1
Transition section wall temp. (cone)		55.0	°C	0.1
Frich section wall temp (front)		55.0	°C	0.0
Substrate Temperature		51.0	°C	0.4
Piston zone temperature:(Piston)		54.9	°C	0.8
pre-test section wall temp.		50.0	°C	0.0
mixing box wall temp.		50.2	°C	0.4
sampling duct wall temp (Vent)?		50.0	°C	0.0
test section air flow speed:		0.24	m/s	0.0
air flow relative humidity (Rotronic):		1.63	%	0.0

Sampling set up

Versatile Tube Sampler prototype#1:
{Tubes A are desorbed by Markes Ultra (ECBC barcode C5491) attached to MarkesUnity desorber (ECBC barcode C5492) and air server (ECBC barcode (C5493)}
{Desorbed analyte was analyzed by Agilent 5890N gas chromatograph (ECBC barcode C5206) with FPD}
{YEED was Mehoy Labs Model PA 260 Analyzer (ECBC barcode 35158) - set at: 10^{-6}

Experiment timing		
start time contamination (time drop hits substrate):	8/23/2005 10:49:00	
end time contamination:		
start time data acquisition(desired wind velocity achieved):	8/23/2005 10:52:32	3.53 minutes
end time data acquisition- end of vapor experiment:	8/23/2005 16:59:57	367.42 minutes

Additional information		
weight of substrate after evaporation:	1810.8410	[g] measured at
residual mass of "agent" after evaporation:	-0.0070	[g]

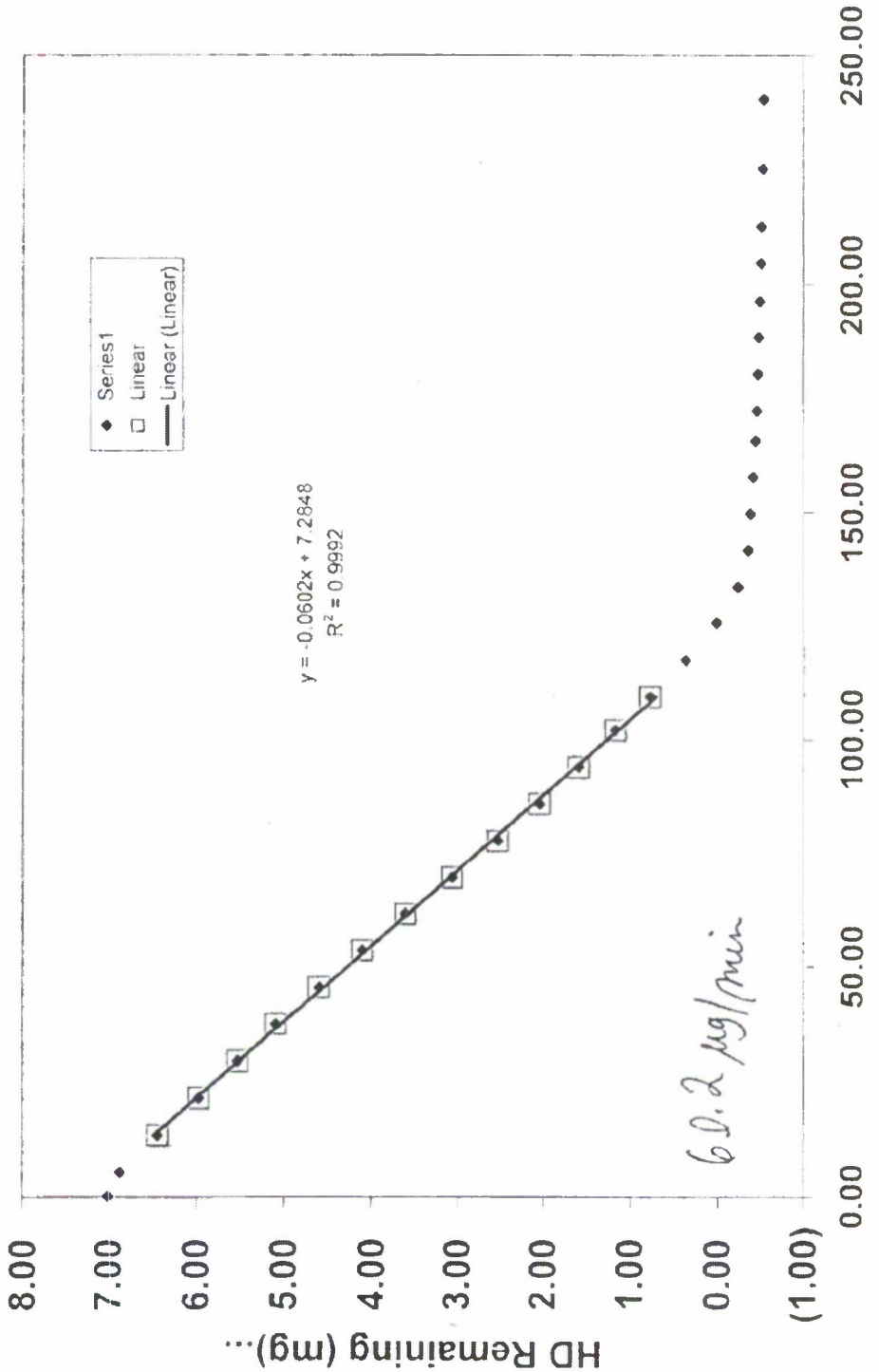
Extraction liquid		
extraction liquid:	NA	
volume extraction liquid:	NA	[ml]
extraction time: (ultrasonicate)	NA	[min]
concentration of agent in extraction liquid:	NA	[µg/ml]
recovered mass:	NA	[mg]

Used automatic detectors

List of troubleshootings

Remarks

Drop was deposited by KBS using VWR microdispenser - uniform spreading observed
Video data was recorded


HD Remaining (mg)...
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
(1.00)
0.00
50.00
100.00
150.00
200.00
250.00
minutes
Series1
Linear
Linear (Linear)
y = -0.0602x + 7.2848
R² = 0.9992
60.2 µg/min

G:\AgentFateTech\Wind Tunnel\Processed Data\Delivered\HD Glass\HDGl(+ 0 -)050915\20050825_3a_56

Data sheet droplet evaporation in ECBC Tunnel 3a

DATE:	25-Aug-2005
ECBC FILESERVERNAME:	rgackat on 'Fileswr'(H:)\Spartan\Glass\Runs\20050825_3a_56.xls
LABVIEW FILENAME	H:\150\C\Tunnel\3a\2005\20050825_3a_56.xls
EXP. No.:	S56

Substrate

type of substrate	Glass valley design, 1.45" - washed according to protocol	
substrate sample size	36.6mm diameter	0.001052 m²

Agent

test liquid:	HD	
agent neat / thickened:	neat	
agent purity	97.4% nominal density is	1.27 mg/uL

Contamination

number of drops	1	
nominal drop volume	6	µL
actual calculated drop volume	5.991	µL
weight of clean substrate	1830.639	[mg]
weight of contaminated substrate	1838.248	[mg]
mass of agent disseminated:	7.609	[mg]
corrected mass on 100% agent purity	7.411	[mg] of 100% Agent
actual contamination density	7.23	[g/m²]
actual contamination density recalculated on 100% agent purity:	7.04	[g/m²]

CONTROL PARAMETERS	set up	actual mean value	Units	± stdev
Miller Nelson Temperature		49.3	°C	0.1
air flow temperature		50.1	°C	0.2
Aalborg Flowmeter air flow rate		18.14	SLPM	0.0
Transition section wall temp (cone)		55.0	°C	0.1
Feeth section wall temp (front)		55.0	°C	0.0
Substrate Temperature		51.2	°C	0.6
Piston zone temperature (Piston)		54.9	°C	0.8
post-test section wall temp		50.0	°C	0.1
mixing box wall temp		50.3	°C	0.4
sampling duct wall temp (Vent)		50.0	°C	0
test section air flow speed		0.25	m/s	0.0
air flow relative humidity (Rotronic):		1.63	%	0.0

Sampling set up

Versatile Tube Sampler prototype#1
(Tubes Auto desorbed by Markes Ultra (ECBC barcode C5491) attached to MarkesUnity desorber (ECBC barcode C5402) and air server (ECBC barcode (C5493))
(Desorbed analyte was analyzed by Agilent 5890N gas chromatograph (ECBC barcode C5206) with FPD)
HYFED was Meloy Labs Model PA 260 Analyzer (ECBC barcode 55158)

Experiment timing

start time contamination (time drop hits substrate)	8/25/2005 11:17:30	
end time contamination		
start time data acquisition(desired wind velocity achieved)	8/25/2005 11:22:15	4.75 minutes
end time data acquisition- end of vapor experiment	8/25/2005 16:59:55	337.67 minutes

Additional information

weight of substrate after evaporation	1830.6480	[g] measured at 2pm 8/29/2005
residual mass of "agent" after evaporation:	0.0090	[g]

Extraction liquid

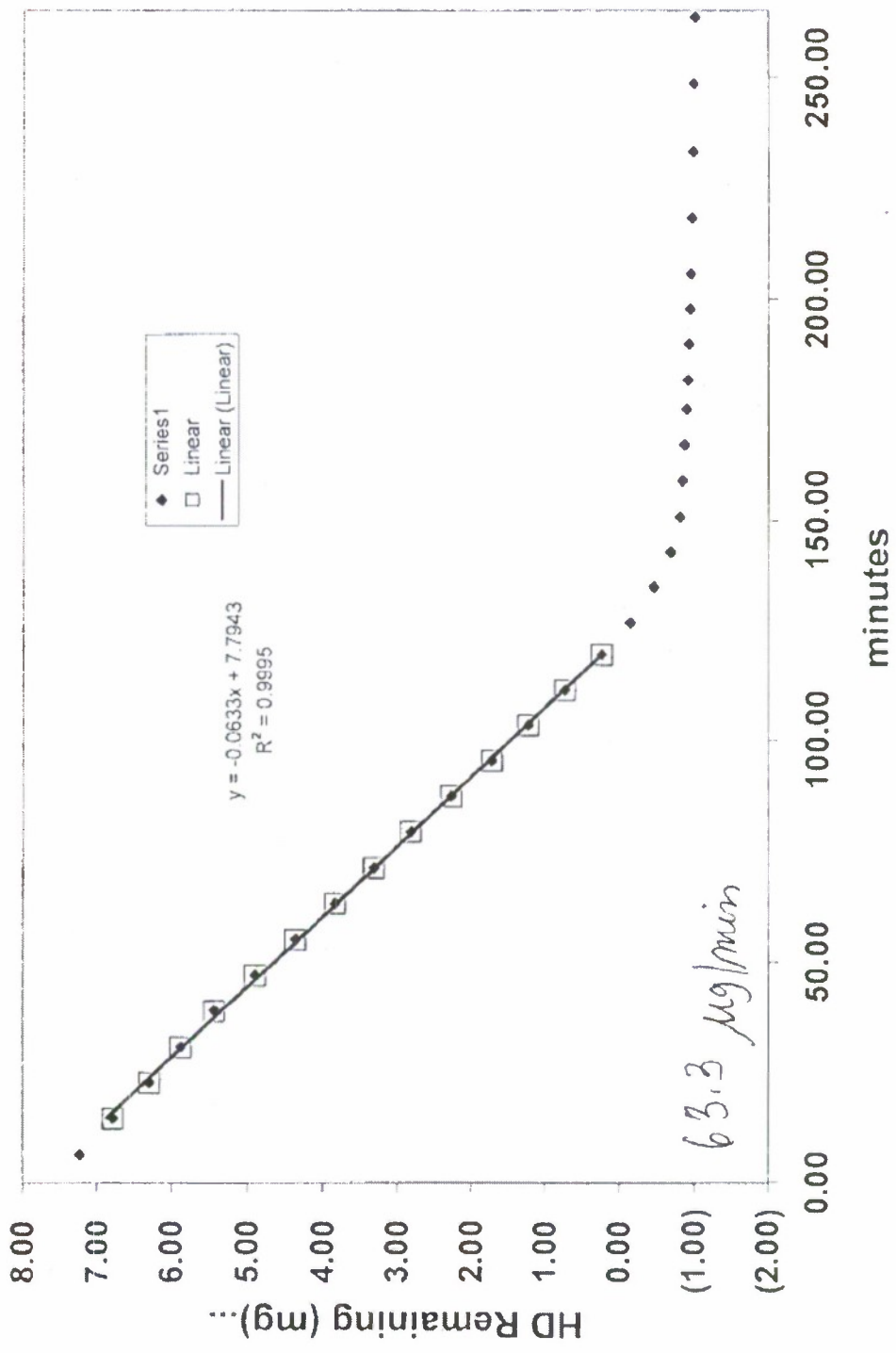
extraction liquid	NA	
volume extraction liquid	NA	[ml]
extraction time (ultrasonicate)	NA	[min]
concentration of agent in extraction liquid	NA	[µg/ml]
recovered mass	NA	[mg]

Used automatic detectors

List of troubleshootings

Remarks

First time the autosampler is run without BK being on hand. AF and RGN handle the duties.
KBS deposits drop using VWR autosampler set at 6.35. Slight movement of pipette during deposition.
disc was freshly cleaned, whereas most others are pre-cleaned


HD Remaining (mg)...
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
(1.00)
(2.00)
0.00
50.00
100.00
150.00
200.00
250.00
minutes
Series1
Linear
Linear (Linear)
y = -0.0633x + 7.7943
R² = 0.9995
63.3 µg/min

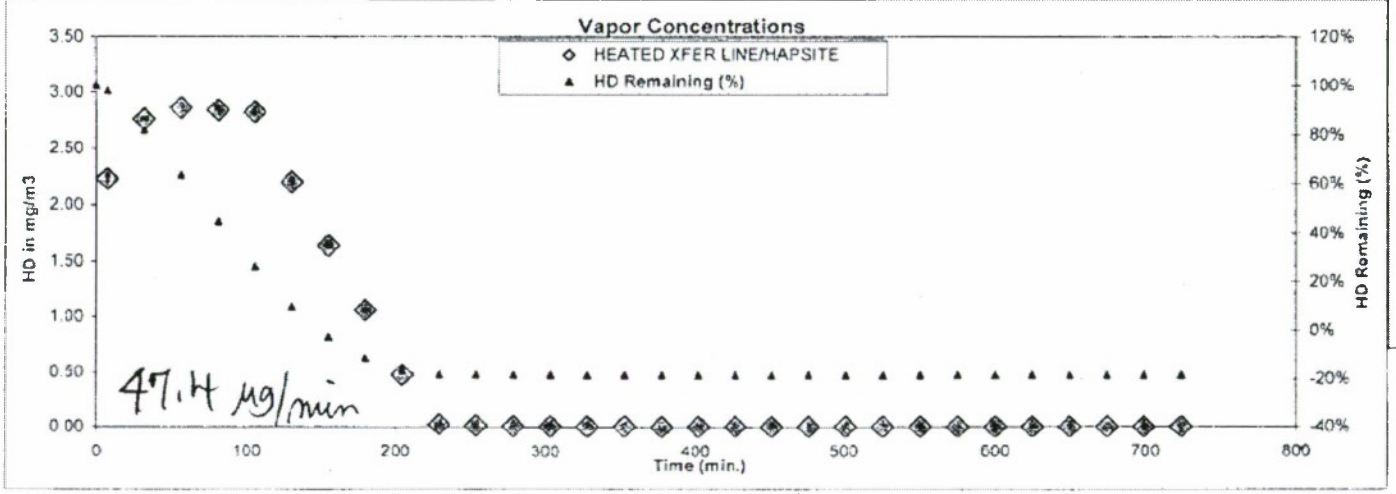
20050816_3c_12

Data Evaluation Grade: Modeling Grade

Tunnel:	3c	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	08/16/05	12
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.02 mg	
Corrected mass on 100% agent purity:	6.84 mg	
Average substrate temperature:	46.22 °C	
Average air flow rate:	18.02 SLPM	
Average air temperature above drop:	49.04 °C	
Mass % recovery in vapor:	118.4 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	118.4 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	No	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.3	0.70%	Go
0.6	3.19%	Go
0.2	0.48%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
7.32	2.23E+00	97.85%
31.97	2.76E+00	81.64%
56.63	2.86E+00	63.36%
81.32	2.84E+00	44.81%
106.00	2.82E+00	26.37%
130.70	2.20E+00	10.01%
155.38	1.64E+00	-2.49%
180.08	1.06E+00	-11.28%
204.78	4.78E-01	-15.29%
229.50	2.42E-02	-17.93%
254.22	1.18E-02	-18.05%
278.92	9.30E-03	-18.12%
303.62	6.68E-03	-18.17%
328.33	5.45E-03	-18.21%
353.05	3.85E-03	-18.24%
377.78	0.00E+00	-18.25%
402.47	3.20E-03	-18.26%
427.18	2.37E-03	-18.28%
451.90	2.40E-03	-18.29%
476.63	1.85E-03	-18.31%
501.38	1.57E-03	-18.32%
526.12	1.34E-03	-18.33%
550.87	1.45E-03	-18.34%
575.62	9.74E-04	-18.35%
600.37	5.34E-04	-18.35%
625.12	6.75E-04	-18.36%
649.87	0.00E+00	-18.36%
674.62	6.18E-04	-18.36%
699.37	5.09E-04	-18.36%
724.12	7.25E-04	-18.37%

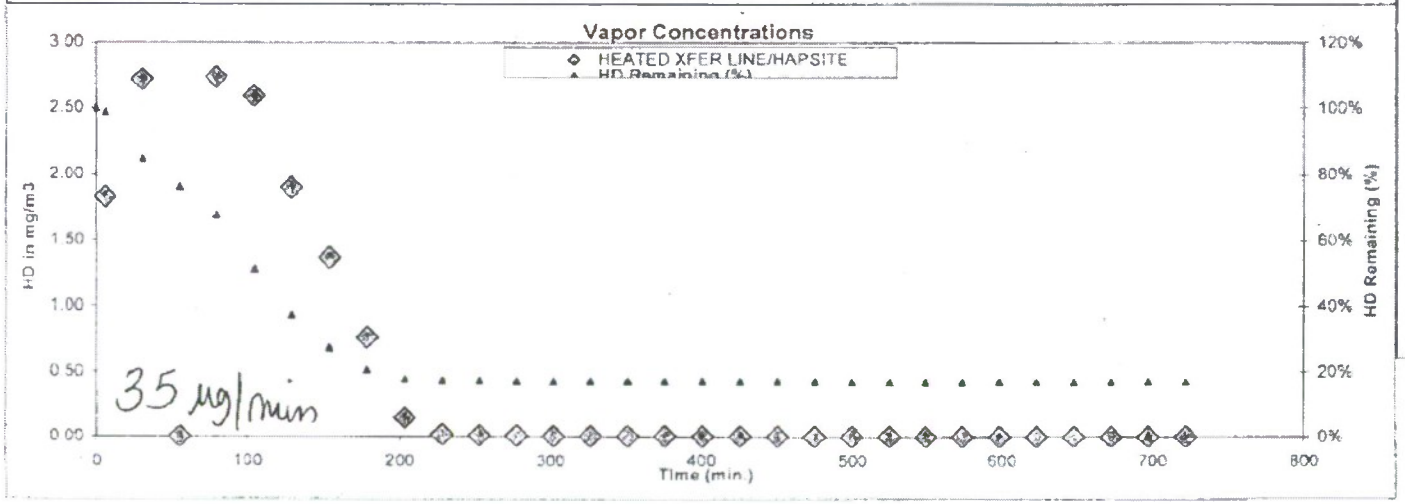
20050818_3c_13

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3c	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	08/18/05	13
Type of substrate :	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.41 mg	
Corrected mass on 100% agent purity:	7.22 mg	
Average substrate temperature:	48.44 °C	
Average air flow rate:	18.05 SLPM	
Average air temperature above drop:	49.11 °C	
Mass % recovery in vapor:	83.0 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	83.0 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	No	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.3	0.60%	Go
0.0	0.23%	Go
0.2	0.43%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
6.07	1.83E+00	98.61%
30.70	2.72E+00	84.59%
55.37	0.00E+00	76.21%
80.02	2.73E+00	67.78%
104.68	2.59E+00	51.34%
129.37	1.90E+00	37.46%
154.05	1.37E+00	27.35%
178.73	7.65E-01	20.75%
203.43	1.47E-01	17.94%
228.13	1.79E-02	17.43%
252.82	1.20E-02	17.33%
277.52	9.12E-03	17.27%
302.22	6.50E-03	17.22%
326.92	5.27E-03	17.18%
351.63	3.98E-03	17.16%
376.33	3.25E-03	17.13%
401.03	2.96E-03	17.11%
425.73	2.48E-03	17.10%
450.43	2.18E-03	17.08%
475.13	1.77E-03	17.07%
499.83	1.42E-03	17.06%
524.53	1.53E-03	17.05%
549.23	9.38E-04	17.04%
573.93	0.00E+00	17.04%
596.63	7.31E-04	17.04%
623.33	0.00E+00	17.04%
648.03	0.00E+00	17.04%
672.73	0.00E+00	17.04%
697.43	5.27E-04	17.03%
722.13	0.00E+00	17.03%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+0--)\20050818_3c_13

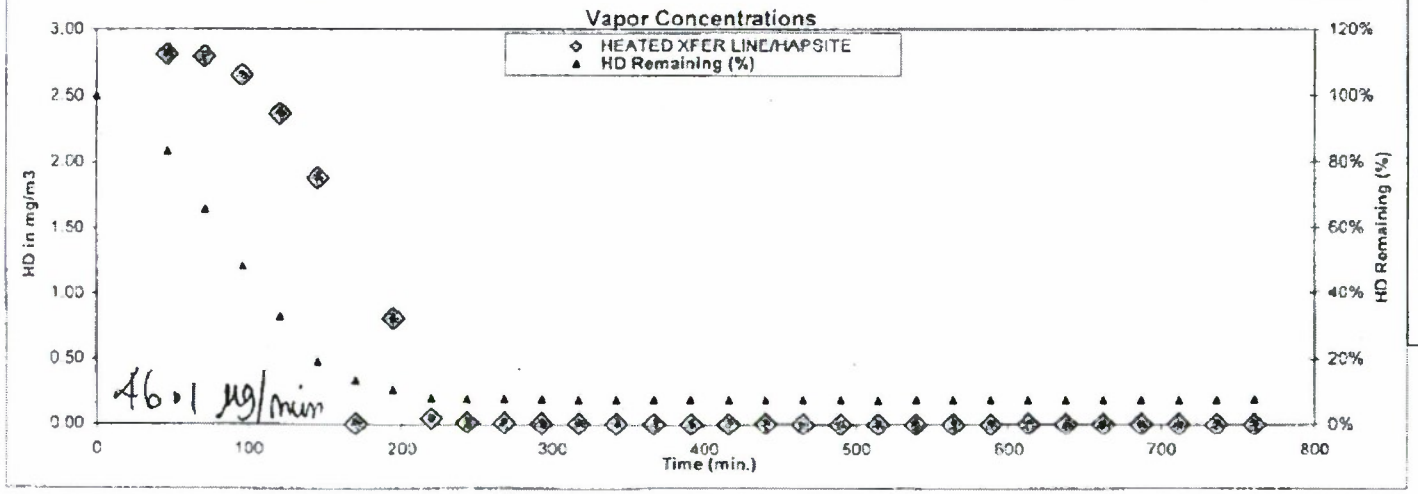
20050822_3c_14

Data Evaluation Grade: Modeling Grade

Tunnel:	3c	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	08/22/05	14
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.25 mg	
Corrected mass on 100% agent purity:	7.06 mg	
Average substrate temperature:	46.65 °C	
Average air flow rate:	18.05 SLPM	
Average air temperature above drop:	49.15 °C	
Mass % recovery in vapor:	92.4 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	92.4 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	No	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.3	0.56%	Go
0.0	0.23%	Go
0.3	0.60%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
46.73	2.81E+00	83.18%
71.35	2.60E+00	65.51%
95.98	2.65E+00	48.34%
120.62	2.36E+00	32.53%
145.25	1.88E+00	19.17%
169.90	0.00E+00	13.26%
194.52	8.07E-01	10.71%
219.15	4.52E-02	8.03%
243.78	1.42E-02	7.84%
268.42	1.00E-02	7.76%
293.05	6.84E-03	7.71%
317.68	5.06E-03	7.67%
342.32	3.65E-03	7.65%
366.93	2.86E-03	7.63%
391.57	2.54E-03	7.61%
416.18	1.89E-03	7.60%
440.80	1.23E-03	7.59%
465.42	0.00E+00	7.58%
490.03	1.29E-03	7.58%
514.65	7.73E-04	7.57%
539.27	7.49E-04	7.57%
563.87	7.35E-04	7.56%
588.48	5.59E-04	7.56%
613.10	2.90E-04	7.55%
637.72	4.12E-04	7.55%
662.33	0.00E+00	7.55%
686.95	0.00E+00	7.55%
711.58	0.00E+00	7.55%
736.22	0.00E+00	7.55%
760.85	0.00E+00	7.55%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+0--)\20050822_3c_14

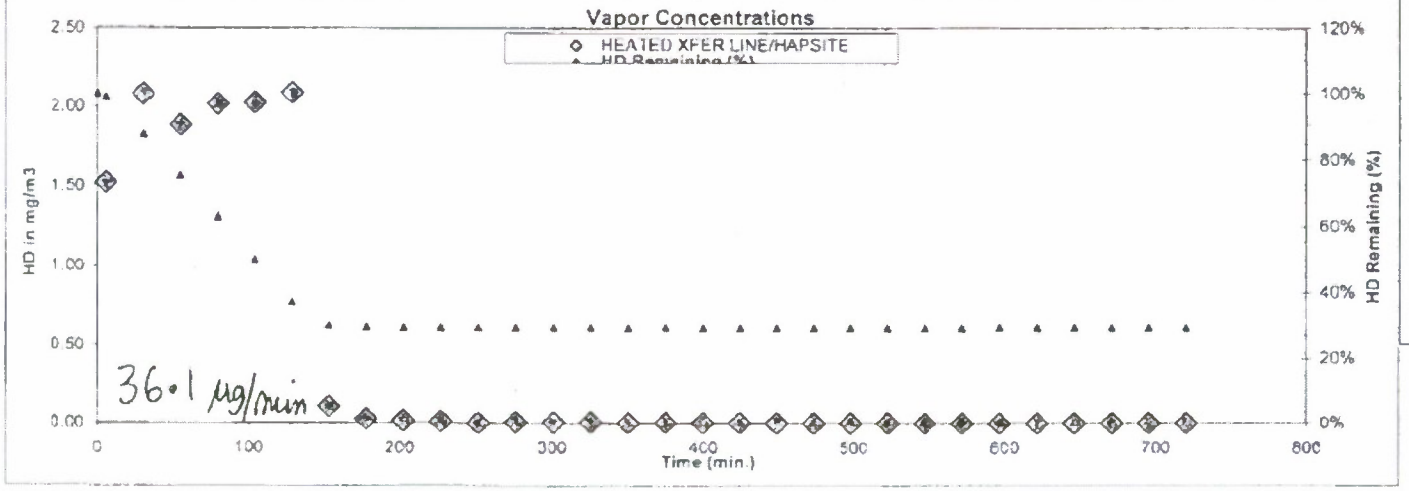
20050823_3c_15

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3c	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	08/23/05	15
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.24 mg	
Corrected mass on 100% agent purity:	7.06 mg	
Average substrate temperature:	48.77 °C	
Average air flow rate:	18.05 SLPM	
Average air temperature above drop:	49.20 °C	
Mass % recovery in vapor:	70.7 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	70.7 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	No	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.6	1.22%	Go
0.0	0.21%	Go
0.3	0.54%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
5.53	1.52E+00	98.92%
30.13	2.08E+00	87.59%
54.77	1.88E+00	75.10%
79.40	2.02E+00	62.80%
104.05	2.03E+00	50.05%
128.70	2.09E+00	37.08%
153.35	1.08E-01	30.15%
178.00	2.91E-02	29.72%
202.65	1.69E-02	29.58%
227.30	1.13E-02	29.49%
251.95	0.00E+00	29.45%
276.57	6.70E-03	29.43%
301.22	4.82E-03	29.39%
325.87	3.38E-03	29.37%
350.52	2.19E-03	29.35%
375.17	2.36E-03	29.34%
399.82	2.06E-03	29.32%
424.47	1.65E-03	29.31%
449.12	1.31E-03	29.30%
473.78	9.20E-04	29.29%
498.45	8.51E-04	29.29%
523.10	9.20E-04	29.28%
547.75	0.00E+00	29.28%
572.40	6.27E-04	29.28%
597.05	0.00E+00	29.28%
621.70	0.00E+00	29.28%
646.37	0.00E+00	29.28%
671.02	0.00E+00	29.28%
695.68	0.00E+00	29.28%
720.35	4.82E-04	29.27%

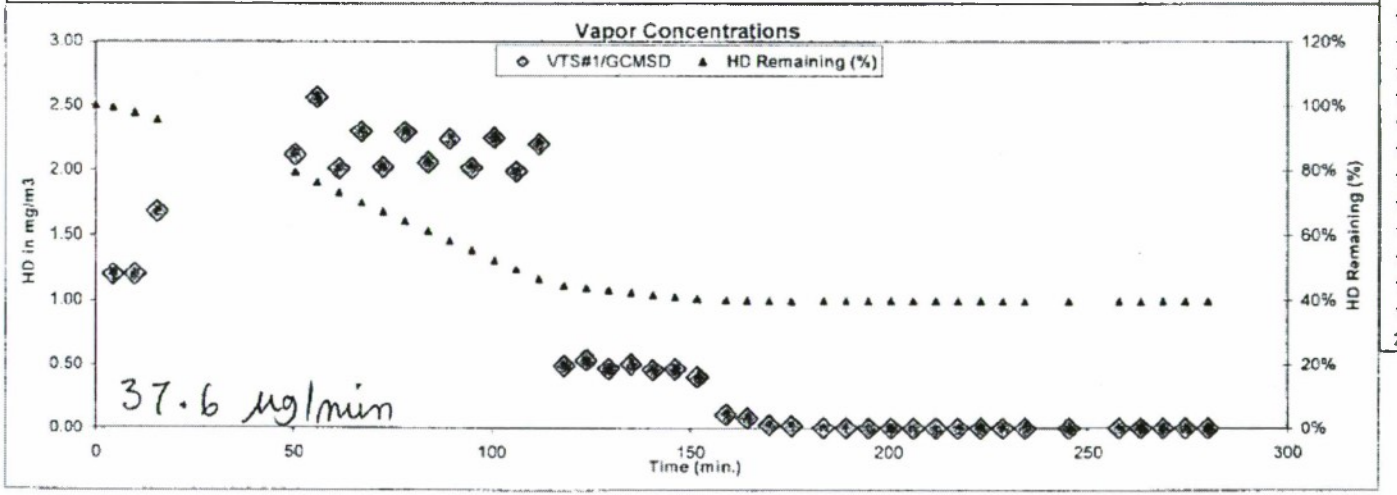
20050824_3a_55

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3a	
Instruments:	VTS#1/GCMSD	
Date/Experiment #:	08/24/05	55
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.58 mg	
Corrected mass on 100% agent purity:	7.39 mg	
Average substrate temperature:	51.11 °C	
Average air flow rate:	18.14 SLPM	
Average air temperature above drop:	50.20 °C	
Mass % recovery in vapor:	60.2 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	60.2 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
1.0	1.91%	Go
0.3	1.68%	Go
0.2	0.41%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
4.33	1.20E+00	99.36%
9.88	1.20E+00	97.72%
15.45	1.68E+00	95.75%
50.38	2.12E+00	79.43%
55.93	2.56E+00	76.24%
61.50	2.01E+00	73.11%
67.08	2.30E+00	70.15%
72.65	2.02E+00	67.19%
78.25	2.30E+00	64.22%
83.85	2.06E+00	61.23%
89.45	2.24E+00	58.27%
95.05	2.02E+00	55.34%
100.65	2.25E+00	52.41%
106.25	1.99E+00	49.49%
111.87	2.20E+00	46.60%
118.22	4.91E-01	44.50%
123.80	5.37E-01	43.80%
129.42	4.70E-01	43.10%
135.03	5.04E-01	42.43%
140.62	4.59E-01	41.77%
146.22	4.66E-01	41.14%
151.80	4.03E-01	40.54%
158.92	1.08E-01	40.09%
164.53	8.05E-02	39.96%
170.13	2.59E-02	39.89%
175.72	2.01E-02	39.86%
183.83	3.84E-03	39.83%
189.45	4.67E-03	39.83%
195.03	2.40E-03	39.82%
200.65	2.58E-03	39.82%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL (+0--)\20050824_3a_55

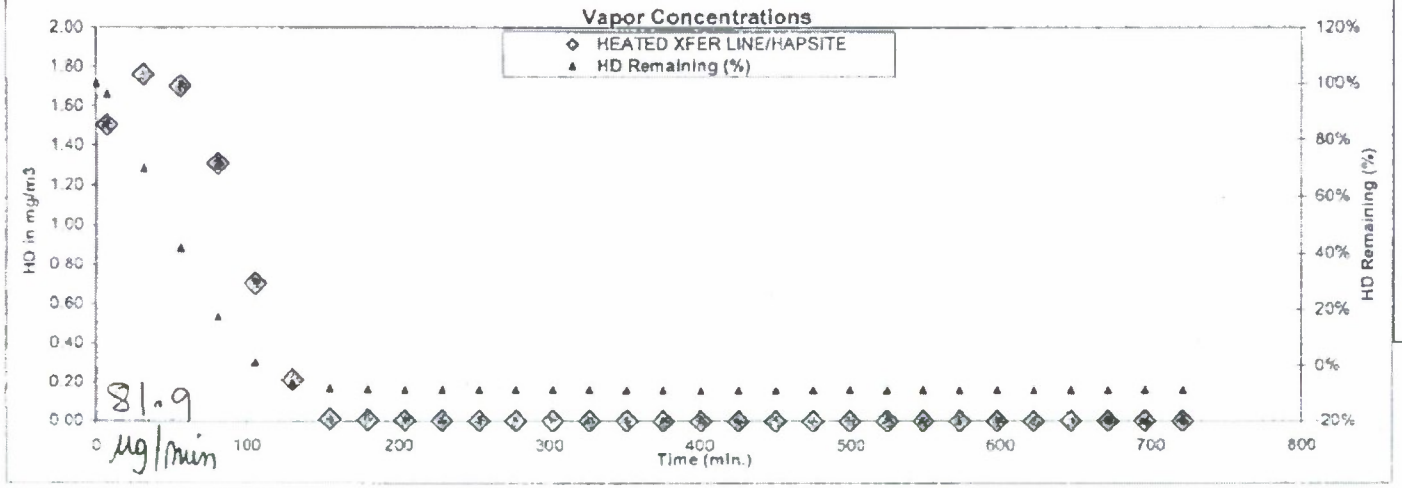
20050829_3c_16

Data Evaluation Grade: Modeling Grade

Tunnel:	3c	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	08/29/05	16
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.78 mg	
Corrected mass on 100% agent purity:	7.58 mg	
Average substrate temperature:	50.34 °C	
Average air flow rate:	→ 50.16 SLPM	
Average air temperature above drop:	50.98 °C	
Mass % recovery in vapor:	108.7 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	108.7 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.2	0.48%	Go
0.0	0.06%	Go
0.2	0.37%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
7.28	1.50E+00	96.38%
31.82	1.76E+00	69.88%
56.36	1.70E+00	41.74%
80.97	1.31E+00	17.27%
105.57	7.03E-01	0.91%
130.17	2.12E-01	-6.54%
154.78	9.91E-03	-8.35%
179.40	5.66E-03	-8.48%
204.02	3.50E-03	-8.55%
228.63	2.74E-03	-8.60%
253.25	1.86E-03	-8.64%
277.87	1.38E-03	-8.67%
302.48	8.80E-04	-8.68%
327.12	8.47E-04	-8.70%
351.75	8.72E-04	-8.71%
376.38	0.00E+00	-8.72%
401.00	4.07E-04	-8.72%
425.63	0.00E+00	-8.73%
450.27	0.00E+00	-8.73%
474.90	0.00E+00	-8.73%
499.53	0.00E+00	-8.73%
524.15	0.00E+00	-8.73%
548.78	0.00E+00	-8.73%
573.42	0.00E+00	-8.73%
598.03	0.00E+00	-8.73%
622.67	0.00E+00	-8.73%
647.27	0.00E+00	-8.73%
671.88	0.00E+00	-8.73%
696.52	0.00E+00	-8.73%
721.15	0.00E+00	-8.73%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+0--)\20050829_3c_16

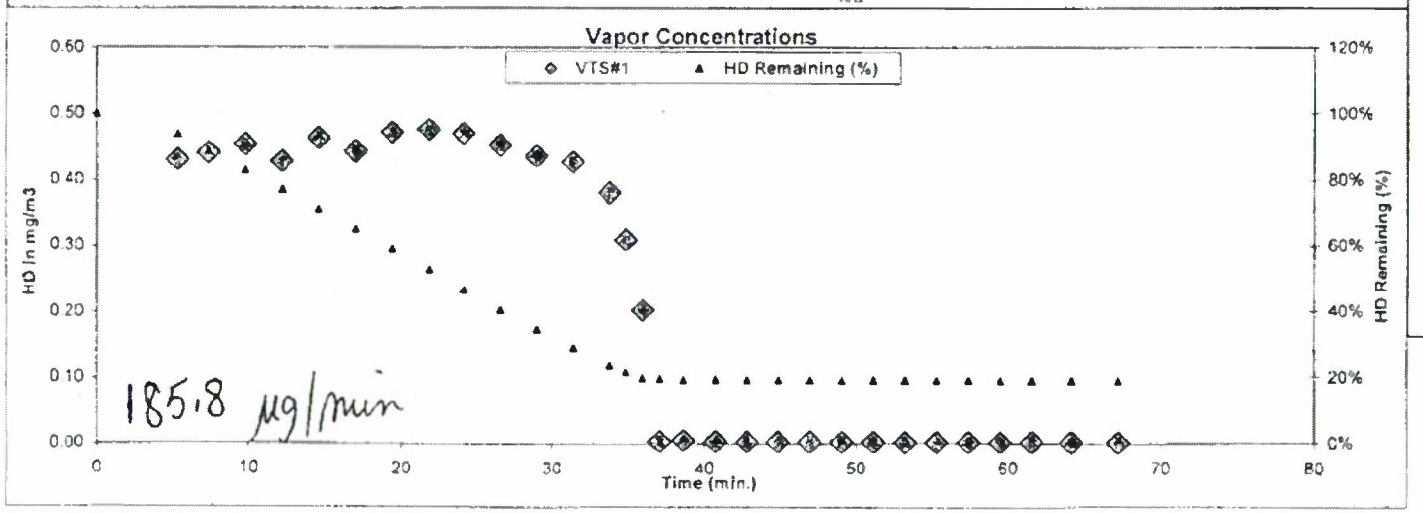
20051122_3c_52

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3c	
Instruments:	VTS#1/GCMSD	
Date/Experiment #:	11/22/05	52
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	6 µL	
Mass of agent disseminated:	7.59 mg	
Corrected mass on 100% agent purity:	7.39 mg	
Average substrate temperature:	49.75 °C	
Average air flow rate:	405.81 SLPM	
Average air temperature above drop:	50.33 °C	
Mass % recovery in vapor:	80.9 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	80.9 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.6	1.26%	Go
1.1	0.26%	Go
0.7	1.33%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
5.32	4.31E-01	93.71%
7.38	4.41E-01	88.76%
9.79	4.54E-01	82.85%
12.20	4.29E-01	77.01%
14.60	4.64E-01	71.14%
17.00	4.44E-01	65.16%
19.40	4.72E-01	59.13%
21.80	4.77E-01	52.87%
24.20	4.71E-01	46.63%
26.60	4.53E-01	40.55%
29.00	4.36E-01	34.70%
31.40	4.27E-01	29.01%
33.80	3.81E-01	23.68%
34.88	3.09E-01	21.63%
35.97	2.03E-01	20.11%
37.07	3.06E-03	19.49%
38.65	5.12E-03	19.45%
40.73	3.27E-03	19.41%
42.82	2.91E-03	19.37%
44.90	2.65E-03	19.34%
46.98	2.75E-03	19.31%
49.08	2.28E-03	19.28%
51.17	2.30E-03	19.25%
53.25	1.86E-03	19.23%
55.33	2.12E-03	19.21%
57.42	2.09E-03	19.18%
59.50	1.80E-03	19.16%
61.58	2.03E-03	19.14%
64.17	1.47E-03	19.11%

G:\Agent\FateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+0+-)\20051122_3c_52

20051201_3d_11

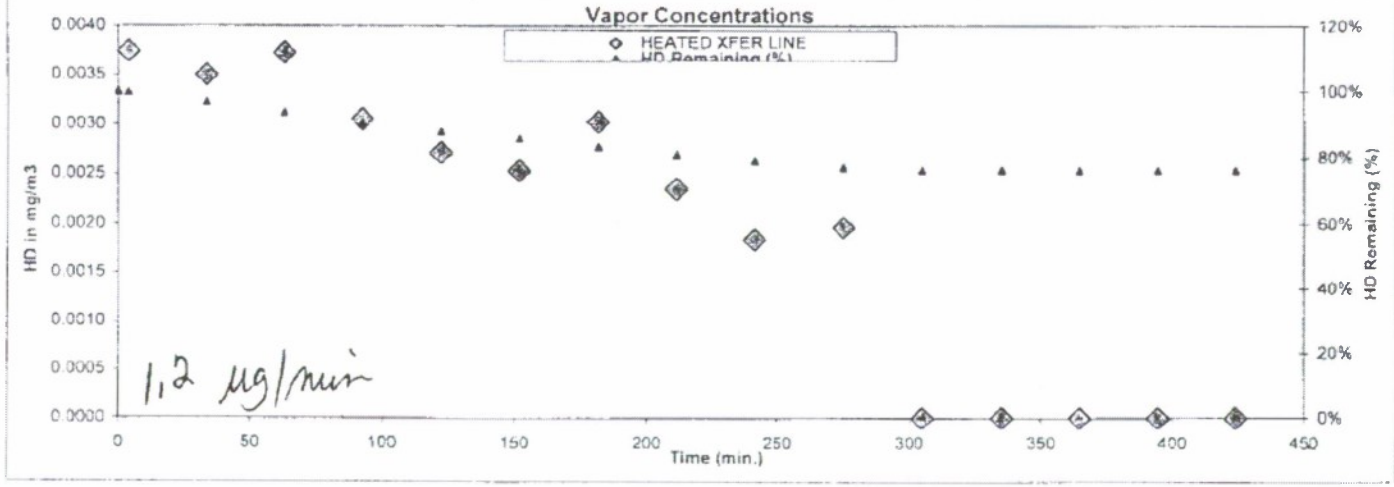
Data Evaluation Grade: Modeling Grade

Tunnel:	3d	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	12/01/05	11
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	1	µL
Mass of agent disseminated:	1.40	mg
Corrected mass on 100% agent purity:	1.36	mg
Average substrate temperature:	14.92	°C
Average air flow rate:	402.70	SLPM
Average air temperature above drop:	14.84	°C
Mass % recovery in vapor:	23.7	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	23.7	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.2	1.01%	Go
0.6	0.16%	Go
0.2	1.67%	Go
-	-	Go

Time (min)	Conc. mg/m³	HD rem. (%)
3.88	3.74E-03	99.79%
33.48	3.50E-03	96.62%
63.13	3.72E-03	93.46%
92.80	3.05E-03	90.50%
122.45	2.72E-03	87.97%
152.12	2.53E-03	85.67%
181.83	3.03E-03	83.24%
211.58	2.35E-03	80.88%
241.35	1.84E-03	79.03%
275.37	1.97E-03	77.12%
305.15	0.00E+00	76.26%
335.15	0.00E+00	76.26%
364.77	0.00E+00	76.26%
394.58	0.00E+00	76.26%
424.40	0.00E+00	76.26%



G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(--+-)\20051201_3d_11

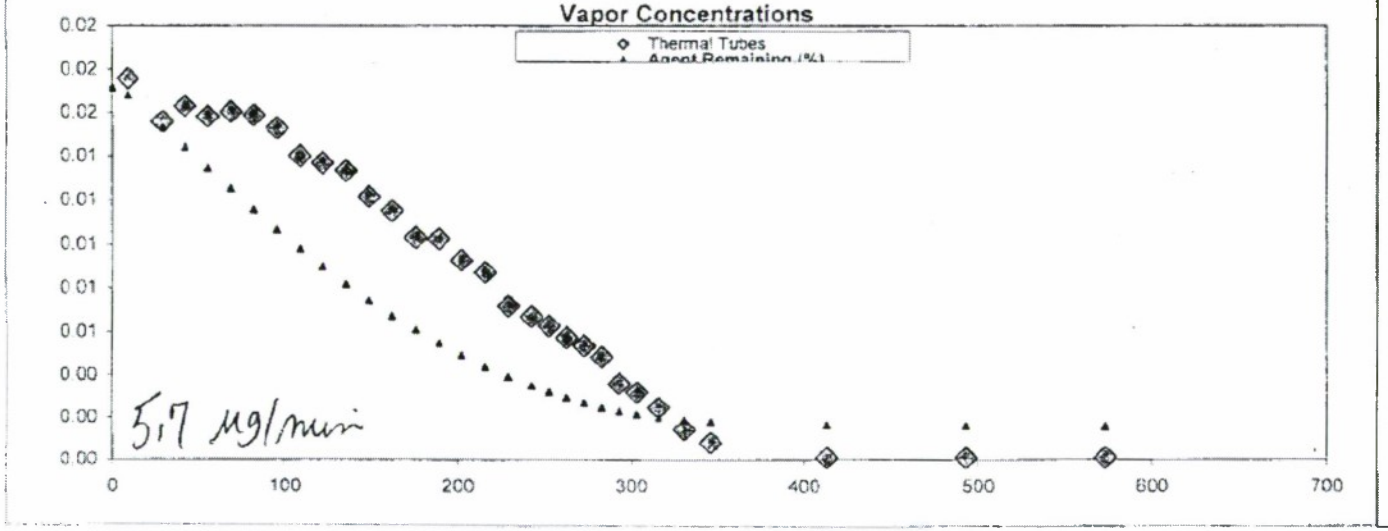
20060119_3d_28

Data Evaluation Grade: Modeling Grade

Tunnel:	3d	
Instruments:	VTS#2/GCMSD	
Date/Experiment #:	01/19/06	28
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	1	µL
Mass of agent disseminated:	1.35	mg
Corrected mass on 100% agent purity:	1.31	mg
Average substrate temperature:	15.86	°C
Average air flow rate:	406.05	SLPM
Average air temperature above drop:	15.18	°C
Mass % recovery in vapor:	109.1	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	109.1	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.3	1.89%	Go
0.8	0.21%	Go
0.1	0.62%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
8.97	1.76E-02	97.56%
28.99	1.56E-02	87.29%
42.01	1.63E-02	80.87%
55.37	1.58E-02	74.23%
68.72	1.60E-02	67.66%
82.09	1.59E-02	61.06%
95.46	1.53E-02	54.62%
108.81	1.40E-02	48.57%
122.17	1.37E-02	42.84%
135.52	1.33E-02	37.26%
148.89	1.22E-02	31.98%
162.24	1.15E-02	27.09%
175.61	1.03E-02	22.58%
188.96	1.03E-02	18.34%
202.32	9.27E-03	14.30%
215.69	8.72E-03	10.58%
229.04	7.17E-03	7.30%
242.41	6.70E-03	4.43%
252.52	6.27E-03	2.40%
262.64	5.73E-03	0.53%
272.76	5.35E-03	-1.21%
282.87	4.82E-03	-2.80%
292.99	3.58E-03	-4.12%
303.11	3.18E-03	-5.17%
315.71	2.44E-03	-6.27%
330.83	1.43E-03	-7.17%
345.93	7.89E-04	-7.69%
413.33	9.64E-05	-8.61%
493.18	9.68E-05	-8.85%
573.20	9.52E-05	-9.09%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(--+-)\20060119_3d_28

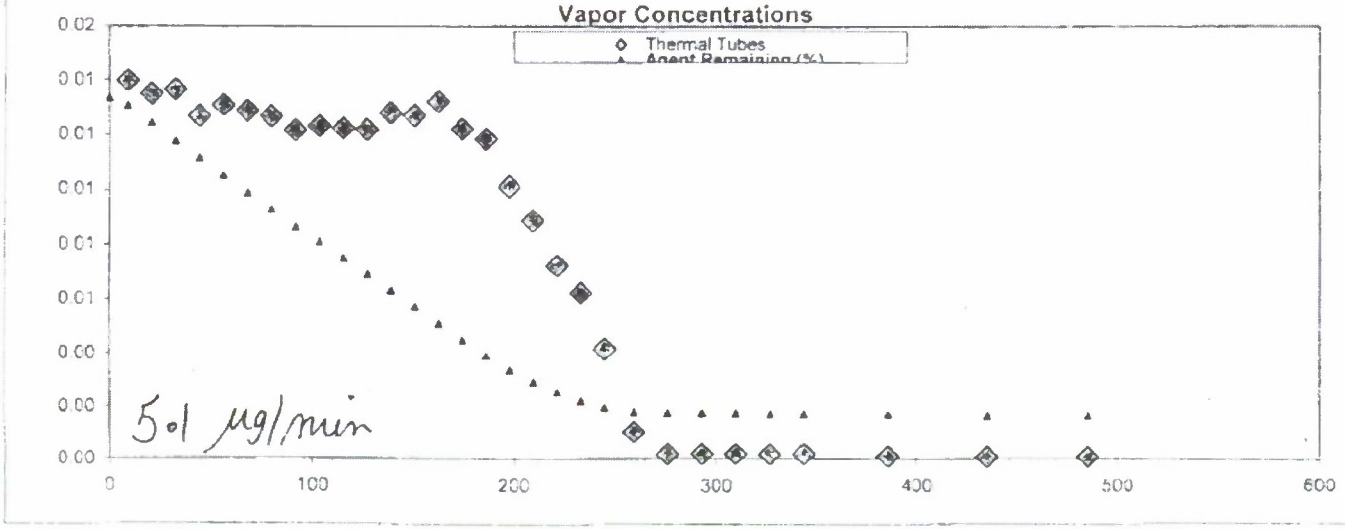
20060131_3d_33

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3d	
Instruments:	VTS#2/GCMSD	
Date/Experiment #:	01/31/06	33
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	1	µL
Mass of agent disseminated:	1.37	mg
Corrected mass on 100% agent purity:	1.34	mg
Average substrate temperature:	15.07	°C
Average air flow rate:	406.05	SLPM
Average air temperature above drop:	15.38	°C
Mass % recovery in vapor:	87.5	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	87.5	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.2	1.24%	Go
1.8	0.45%	Go
0.3	2.26%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
9.25	1.40E-02	98.03%
20.86	1.35E-02	93.17%
32.69	1.37E-02	88.30%
44.50	1.27E-02	83.56%
56.30	1.31E-02	78.94%
68.12	1.29E-02	74.27%
79.92	1.27E-02	69.69%
91.73	1.22E-02	65.22%
103.53	1.23E-02	60.82%
115.35	1.23E-02	56.41%
127.15	1.22E-02	52.02%
138.97	1.28E-02	47.52%
150.77	1.27E-02	42.94%
162.57	1.32E-02	38.29%
174.38	1.22E-02	33.72%
186.20	1.19E-02	29.40%
198.00	1.01E-02	25.46%
209.82	8.89E-03	22.04%
221.62	7.22E-03	19.15%
233.42	6.23E-03	16.74%
245.24	4.19E-03	14.86%
259.53	1.05E-03	13.73%
276.35	2.06E-04	13.41%
293.15	2.13E-04	13.30%
309.97	2.12E-04	13.19%
326.77	2.03E-04	13.08%
343.57	2.03E-04	12.98%
385.30	1.09E-04	12.78%
435.35	9.10E-05	12.63%
485.40	1.01E-04	12.49%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(--+-)\20060131_3d_33

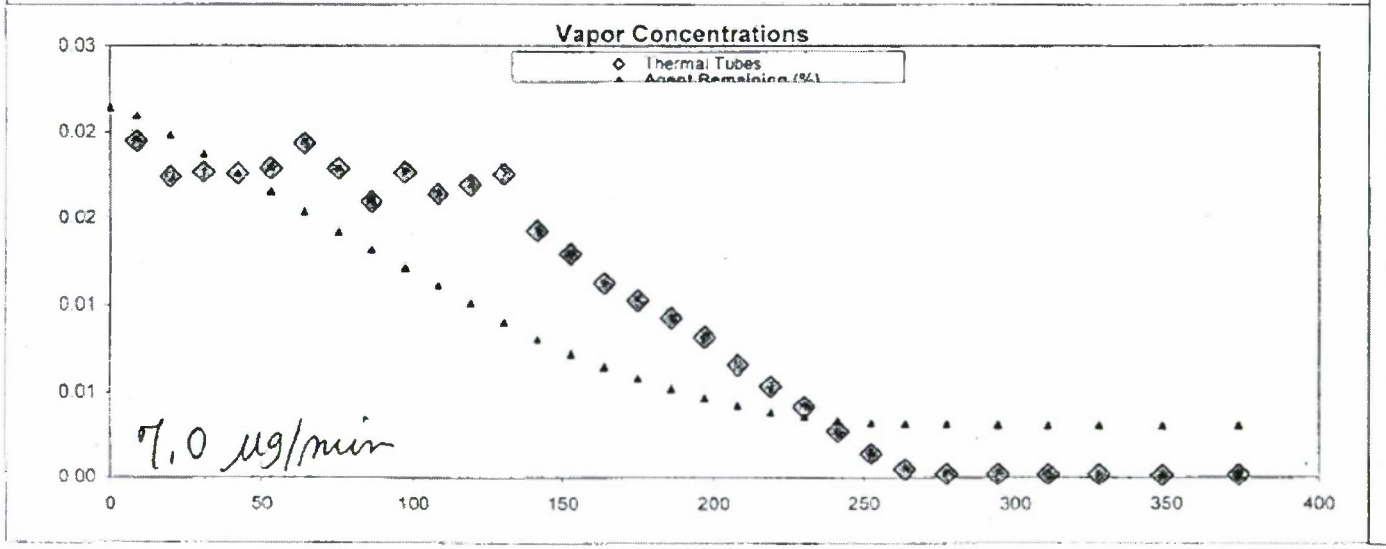
20060202_3d_35

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3d	
Instruments:	VTS#2/GCMSD	
Date/Expenment #:	02/02/06	35
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	1	µL
Mass of agent disseminated:	1.34	mg
Corrected mass on 100% agent purity:	1.30	mg
Average substrate temperature:	14.69	°C
Average air flow rate:	406.08	SLPM
Average air temperature above drop:	15.03	°C
Mass % recovery in vapor:	103.1	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	103.1	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.1	0.81%	Go
0.6	0.15%	Go
0.1	0.49%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
8.80	1.95E-02	97.32%
19.87	1.74E-02	90.96%
30.93	1.77E-02	84.90%
42.02	1.76E-02	78.79%
53.08	1.79E-02	72.66%
64.17	1.94E-02	66.22%
75.23	1.79E-02	59.78%
86.32	1.60E-02	53.92%
97.38	1.77E-02	48.11%
108.47	1.64E-02	42.21%
119.55	1.69E-02	36.45%
130.62	1.76E-02	30.49%
141.70	1.42E-02	24.98%
152.77	1.29E-02	20.29%
163.85	1.13E-02	16.11%
174.93	1.02E-02	12.39%
186.00	9.24E-03	9.03%
197.08	8.15E-03	6.03%
208.17	6.56E-03	3.48%
219.23	5.33E-03	1.43%
230.32	4.14E-03	-0.21%
241.38	2.73E-03	-1.40%
252.47	1.39E-03	-2.11%
263.55	4.68E-04	-2.43%
277.45	2.05E-04	-2.58%
294.20	2.02E-04	-2.68%
310.94	2.00E-04	-2.79%
327.69	1.82E-04	-2.89%
348.58	1.29E-04	-2.99%
373.67	1.31E-04	-3.09%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(--+-)\20060202_3d_35

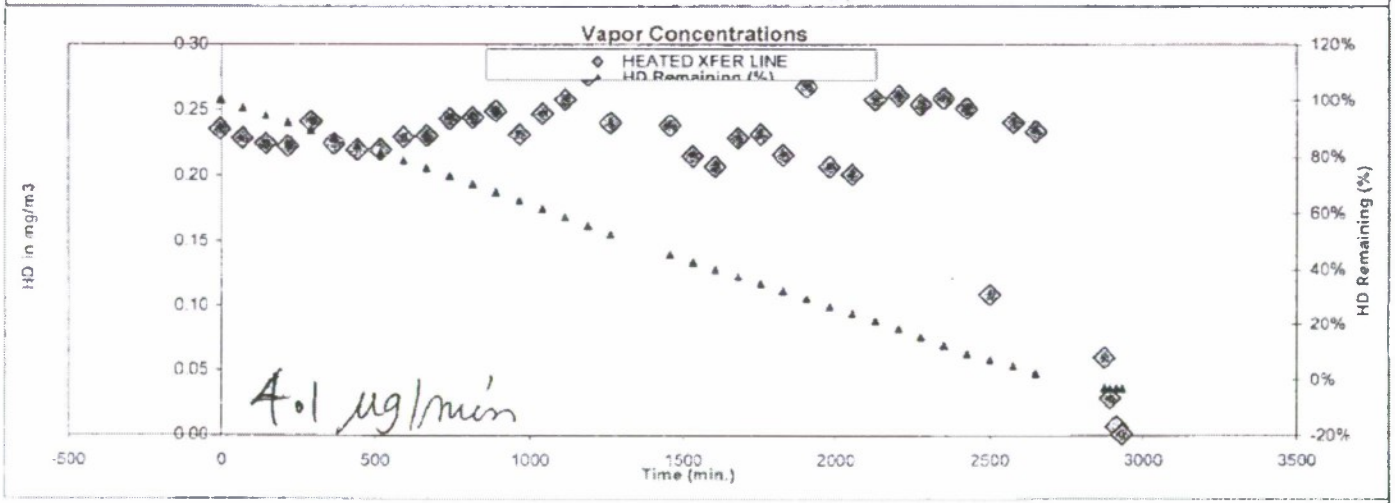
20051116_3d_07

Data Evaluation Grade: Modeling Grade

Tunnel:	3d		
Instruments:	HEATED XFER LINE/HAPSITE		
Date/Experiment #:	11/16/05	7	
Type of substrate:	Glass		
Test agent/purity:	HD		
Number of drops:	1		
Nominal drop volume:	9	µL	
Mass of agent disseminated:	11.74	mg	
Corrected mass on 100% agent purity:	11.44	mg	
Average substrate temperature:	15.82	°C	
Average air flow rate:	18.11	SLPM	
Average air temperature above drop:	13.47	°C	
Mass % recovery in vapor:	103.1	%	
Mass % recovery by extraction:	n/a	%	
Total agent % mass recovery:	103.1	%	
Tube #s consistant:	Yes		
Daily CCV < +/- 15%:	Yes		
Comments:	n/a		

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.3	1.97%	Go
0.1	0.64%	Go
0.2	1.65%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
-3.50	2.35E-01	100.07%
70.50	2.28E-01	97.35%
145.50	2.25E-01	94.66%
219.50	2.23E-01	92.04%
293.50	2.41E-01	89.32%
368.50	2.25E-01	86.56%
444.50	2.20E-01	83.89%
518.50	2.20E-01	81.31%
593.50	2.29E-01	78.65%
667.50	2.30E-01	75.95%
741.50	2.43E-01	73.18%
816.50	2.44E-01	70.29%
890.50	2.49E-01	67.40%
966.50	2.31E-01	64.51%
1041.50	2.47E-01	61.66%
1115.50	2.58E-01	58.71%
1189.50	2.76E-01	55.58%
1263.50	2.40E-01	52.55%
1457.50	2.38E-01	45.20%
1531.50	2.15E-01	42.55%
1605.50	2.07E-01	40.08%
1680.50	2.28E-01	37.49%
1754.50	2.31E-01	34.80%
1828.50	2.16E-01	32.18%
1903.50	2.68E-01	29.31%
1979.50	2.07E-01	26.46%
2053.50	2.01E-01	24.07%
2128.50	2.58E-01	21.34%
2202.50	2.61E-01	18.30%
2276.50	2.54E-01	15.29%
2351.50	2.59E-01	12.24%
2425.50	2.51E-01	9.26%
2501.50	1.09E-01	7.09%
2576.50	2.40E-01	5.02%
2650.50	2.33E-01	2.24%
2874.50	5.98E-02	-2.95%
2892.50	2.84E-02	-3.08%
2912.50	6.86E-03	-3.14%
2931.50	9.80E-04	-3.15%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(-+--)\20051116_3d_07

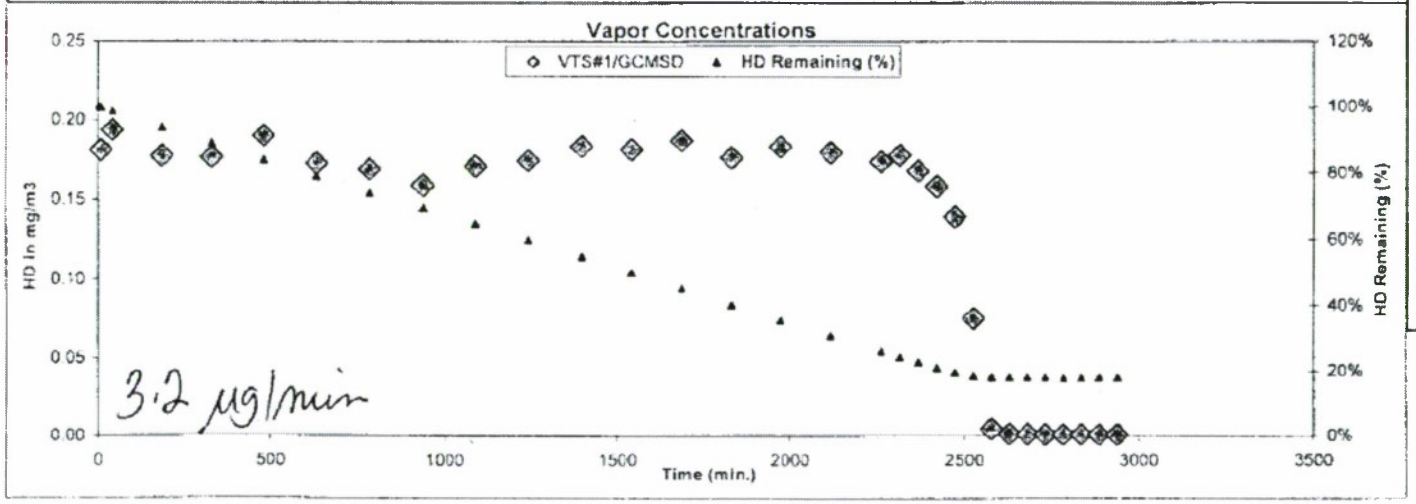
20060106_3d_23

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3d	
Instruments:	VTS#1/GCMSD	
Date/Experiment #:	01/06/06	23
Type of substrate :	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	1 µL	
Mass of agent disseminated:	10.08 mg	
Corrected mass on 100% agent purity:	9.82 mg	
Average substrate temperature:	15.63 °C	
Average air flow rate:	18.09 SLPM	
Average air temperature above drop:	15.39 °C	
Mass % recovery in vapor:	81.8 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	81.8 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.5	3.48%	Go
0.0	0.15%	Go
0.3	2.16%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
7.55	1.81E-01	99.67%
184.12	1.77E-01	93.83%
328.17	1.77E-01	89.13%
480.53	1.90E-01	83.98%
632.88	1.73E-01	78.89%
785.27	1.69E-01	74.09%
937.83	1.59E-01	69.48%
1090.38	1.71E-01	64.84%
1242.95	1.75E-01	59.99%
1396.55	1.83E-01	54.93%
1540.85	1.81E-01	50.08%
1685.15	1.87E-01	45.19%
1829.43	1.76E-01	40.36%
1973.73	1.83E-01	35.58%
2118.03	1.79E-01	30.76%
2262.30	1.74E-01	26.07%
2314.87	1.78E-01	24.37%
2367.42	1.68E-01	22.70%
2419.98	1.58E-01	21.12%
2472.55	1.39E-01	19.67%
2525.10	7.57E-02	18.63%
2577.67	4.54E-03	18.24%
2628.15	1.35E-03	18.22%
2679.88	1.13E-03	18.20%
2731.60	1.07E-03	18.19%
2783.33	9.57E-04	18.18%
2834.87	1.06E-03	18.17%
2886.40	7.89E-04	18.17%
2938.12	8.65E-04	18.16%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(-+--)\20060106_3d_23.

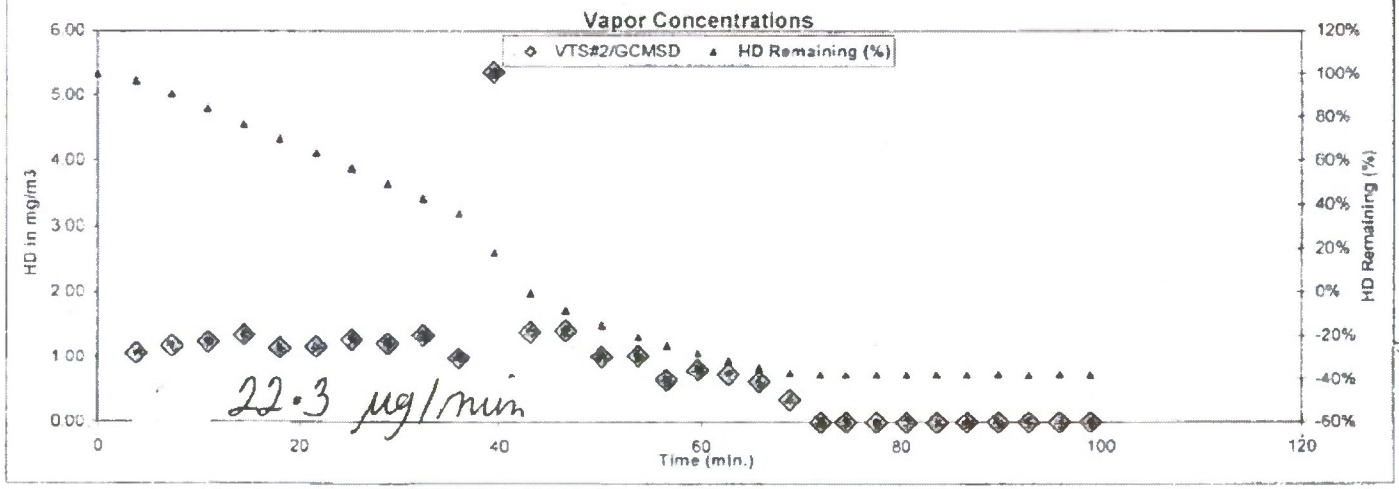
20050907_3a_61

Data Evaluation Grade: Test Grade (requires further evaluation)

Tunnel:	3a	
Instruments:	VTS#2/GCMSD	
Date/Experiment #:	09/07/05	61
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	1	µL
Mass of agent disseminated:	1.19	mg
Corrected mass on 100% agent purity:	1.16	mg
Average substrate temperature:	49.09	°C
Average air flow rate:	18.14	SLPM
Average air temperature above drop:	48.42	°C
Mass % recovery in vapor:	138.0	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	138.0	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.6	1.19%	Go
0.4	2.42%	Go
0.2	0.43%	Go
-	-	Flag



Time (min)	Conc. mg/m³	HD rem. (%)
3.87	1.06E+00	96.80%
7.42	1.17E+00	90.63%
10.98	1.24E+00	83.92%
14.55	1.34E+00	76.74%
18.12	1.15E+00	69.82%
21.68	1.17E+00	63.40%
25.25	1.27E+00	56.61%
28.82	1.22E+00	49.69%
32.37	1.34E+00	42.60%
35.93	9.95E-01	36.10%
39.50	5.37E+00	16.42%
43.07	1.40E+00	-0.37%
46.63	1.42E+00	-8.20%
50.20	1.02E+00	-14.97%
53.77	1.03E+00	-20.64%
56.58	6.60E-01	-24.34%
59.65	8.08E-01	-27.85%
62.70	7.45E-01	-31.54%
65.77	6.31E-01	-34.83%
68.83	3.51E-01	-37.17%
71.90	0.00E+00	-38.01%
74.47	0.00E+00	-38.01%
77.52	0.00E+00	-38.01%
80.58	0.00E+00	-38.01%
83.65	0.00E+00	-38.01%
86.72	0.00E+00	-38.01%
89.78	0.00E+00	-38.01%
92.85	0.00E+00	-38.01%
95.90	0.00E+00	-38.01%
98.97	0.00E+00	-38.01%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+---)\20050907_3a_61

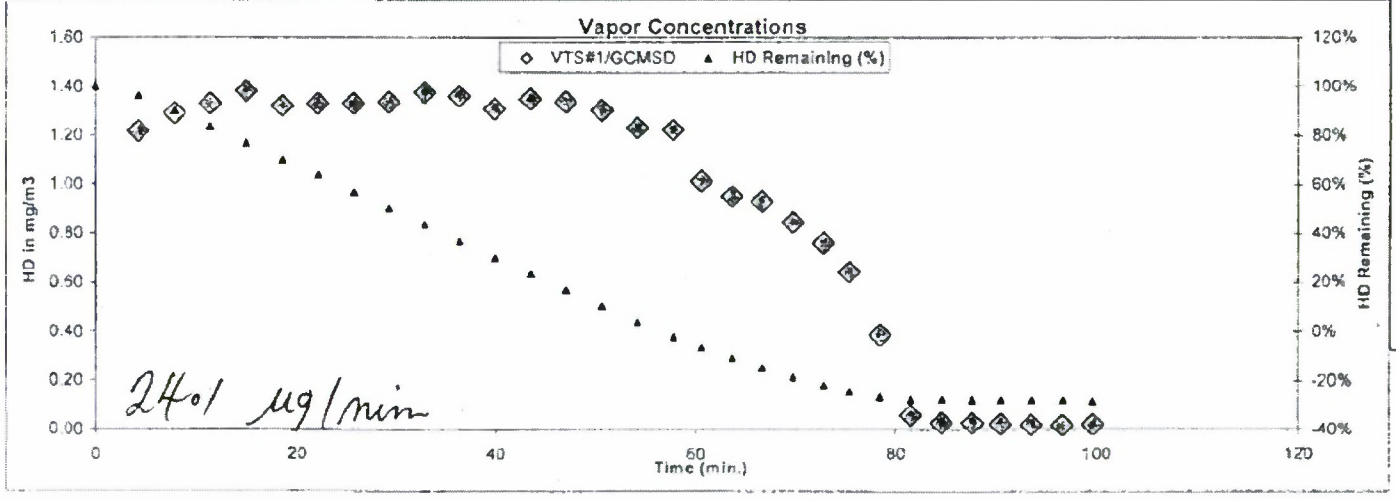
20050909_3a_64

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3a	
Instruments:	VTS#1/GCMSD	
Date/Experiment #:	09/09/05	64
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	1 µL	
Mass of agent disseminated:	1.34 mg	
Corrected mass on 100% agent purity:	1.30 mg	
Average substrate temperature:	49.18 °C	
Average air flow rate:	18.14 SLPM	
Average air temperature above drop:	50.75 °C	
Mass % recovery in vapor:	128.2 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	128.2 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.3	0.68%	Go
0.0	0.24%	Go
0.2	0.48%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
4.32	1.22E+00	96.33%
7.88	1.29E+00	90.09%
11.43	1.33E+00	83.60%
15.00	1.38E+00	76.86%
18.57	1.32E+00	70.14%
22.13	1.33E+00	63.55%
25.70	1.33E+00	56.93%
29.27	1.34E+00	50.31%
32.82	1.38E+00	43.60%
36.38	1.36E+00	36.79%
39.95	1.31E+00	30.16%
43.52	1.35E+00	23.55%
47.08	1.34E+00	16.87%
50.65	1.30E+00	10.31%
54.22	1.23E+00	4.01%
57.78	1.22E+00	-2.10%
60.60	1.01E+00	-6.49%
63.67	9.52E-01	-10.69%
66.72	9.31E-01	-14.69%
69.78	8.46E-01	-18.49%
72.85	7.61E-01	-21.93%
75.42	6.43E-01	-24.44%
78.48	3.87E-01	-26.64%
81.53	5.89E-02	-27.59%
84.60	2.79E-02	-27.76%
87.67	2.73E-02	-27.90%
90.48	2.21E-02	-27.99%
93.55	2.05E-02	-28.08%
96.62	1.82E-02	-28.17%
99.68	2.11E-02	-28.25%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+---)\20050909_3a_64.

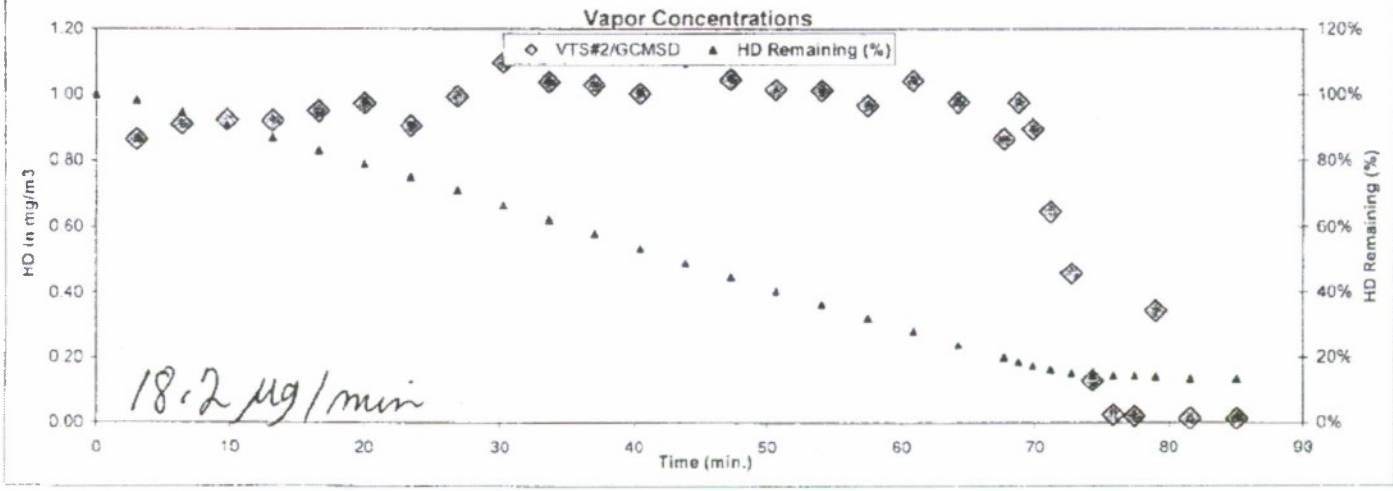
20051108_3a_84

Data Evaluation Grade: Modeling Grade

Tunnel:	3a	
Instruments:	VTS#2/GCMSD	
Date/Experiment #:	11/08/05	84
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	1	µL
Mass of agent disseminated:	1.51	mg
Corrected mass on 100% agent purity:	1.47	mg
Average substrate temperature:	49.45	°C
Average air flow rate:	18.06	SLPM
Average air temperature above drop:	49.80	°C
Mass % recovery in vapor:	86.6	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	86.6	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.8	1.61%	Go
0.0	0.11%	Go
0.2	0.47%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
3.03	8.65E-01	98.39%
6.43	9.12E-01	94.68%
9.83	9.24E-01	90.85%
13.25	9.22E-01	86.98%
16.65	9.52E-01	83.07%
20.05	9.74E-01	79.05%
23.47	9.06E-01	75.11%
26.88	9.94E-01	71.13%
30.26	1.10E+00	66.76%
33.68	1.04E+00	62.31%
37.08	1.03E+00	57.99%
40.48	1.00E+00	53.75%
43.88	1.12E+00	49.33%
47.28	1.05E+00	44.82%
50.68	1.02E+00	40.52%
54.08	1.01E+00	36.28%
57.51	9.67E-01	32.12%
60.90	1.04E+00	27.94%
64.30	9.76E-01	23.73%
67.70	8.65E-01	19.89%
68.78	9.76E-01	18.66%
69.85	8.94E-01	17.44%
71.17	6.48E-01	16.19%
72.73	4.60E-01	15.13%
74.30	1.30E-01	14.56%
75.87	2.46E-02	14.41%
77.45	2.02E-02	14.37%
79.02	3.45E-01	14.02%
81.58	1.30E-02	13.46%
85.15	1.18E-02	13.40%

G:\Agent\FateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+---)\20051108_3a_84

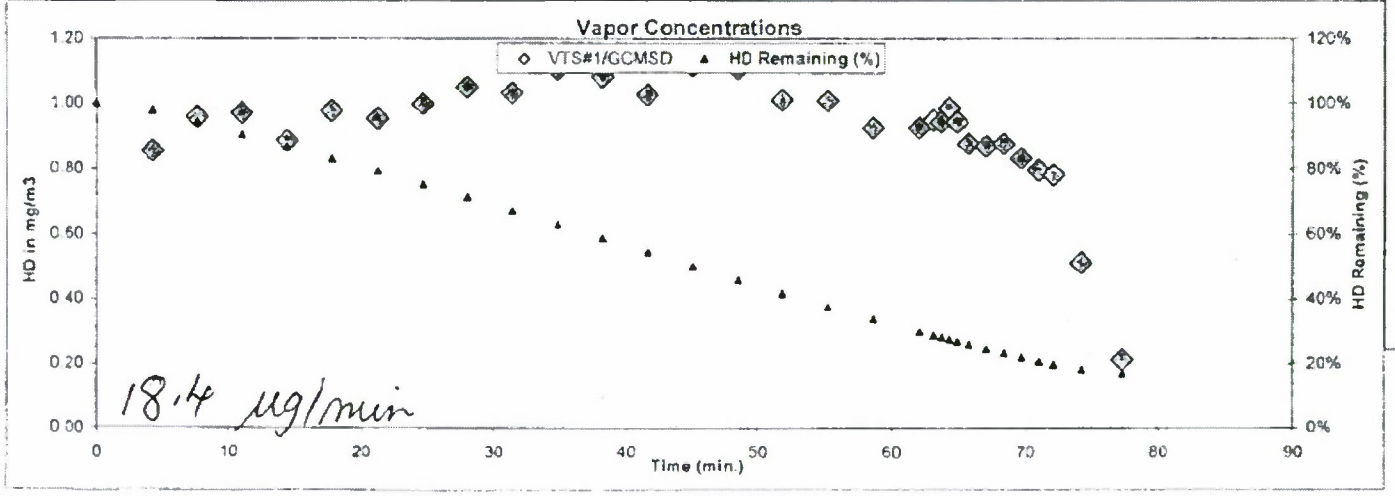
20051108_3c_50

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3c	
Instruments:	VTS#1/GCMSD	
Date/Experiment #:	11/08/05	50
Type of substrate :	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	1 µL	
Mass of agent disseminated:	1.59 mg	
Corrected mass on 100% agent purity	1.55 mg	
Average substrate temperature:	49.69 °C	
Average air flow rate:	18.05 SLPM	
Average air temperature above drop:	50.41 °C	
Mass % recovery in vapor:	83.2 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	83.2 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.6	1.26%	Go
0.0	0.22%	Go
0.4	0.88%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
4.25	8.55E-01	97.88%
7.65	9.59E-01	94.28%
11.05	9.71E-01	90.45%
14.45	8.86E-01	86.77%
17.85	9.77E-01	83.07%
21.25	9.54E-01	79.24%
24.65	9.98E-01	75.37%
28.05	1.05E+00	71.31%
31.45	1.03E+00	67.18%
34.85	1.10E+00	62.94%
38.25	1.08E+00	58.61%
41.65	1.03E+00	54.43%
45.07	1.12E+00	50.16%
48.47	1.11E+00	45.76%
51.87	1.01E+00	41.56%
55.27	1.01E+00	37.56%
58.67	9.25E-01	33.72%
62.09	9.26E-01	30.02%
63.17	9.50E-01	28.85%
63.75	9.44E-01	28.20%
64.33	9.86E-01	27.55%
64.92	9.44E-01	26.89%
65.77	8.77E-01	25.99%
67.08	8.70E-01	24.64%
68.40	8.77E-01	23.30%
69.72	8.33E-01	21.99%
71.03	7.97E-01	20.74%
72.13	7.82E-01	19.72%
74.22	5.13E-01	18.15%
77.30	2.14E-01	16.84%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+---)\20051108_3c_50.

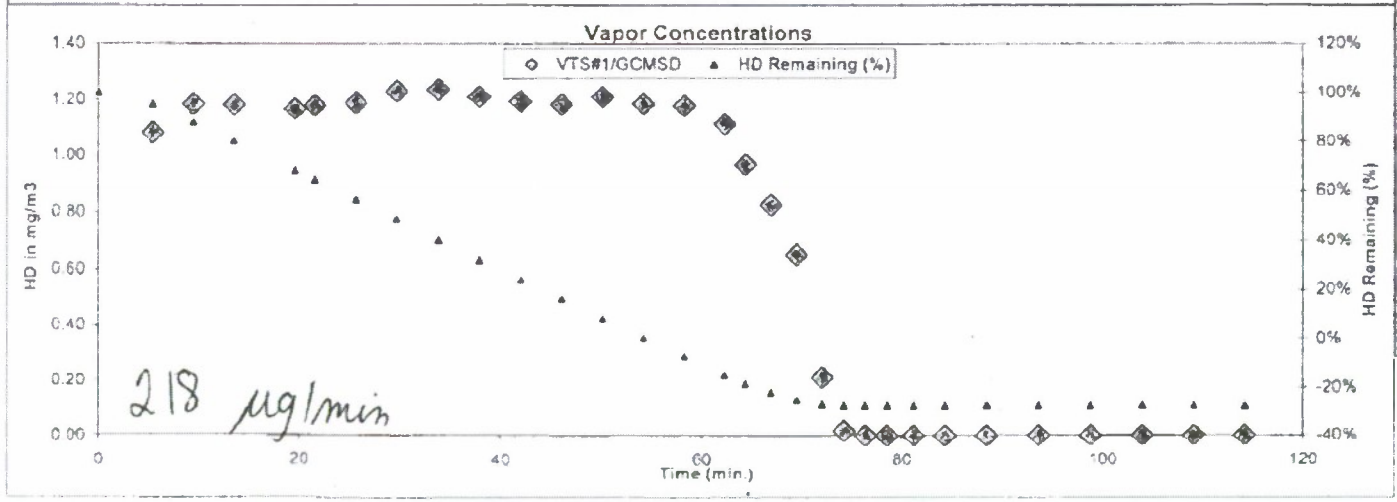
20050921_3c_26

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3c	
Instruments:	VTS#1/GCMSD	
Date/Experiment #:	09/21/05	26
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	9 µL	
Mass of agent disseminated:	11.46 mg	
Corrected mass on 100% agent purity:	11.17 mg	
Average substrate temperature:	49.83 °C	
Average air flow rate:	181.54 SLPM	
Average air temperature above drop:	50.44 °C	
Mass % recovery in vapor:	127.4 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	127.4 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.4	0.89%	Go
2.3	1.25%	Go
0.4	0.87%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
5.40	1.08E+00	95.25%
9.47	1.19E+00	87.75%
13.53	1.18E+00	79.92%
19.60	1.17E+00	68.32%
21.67	1.18E+00	64.37%
25.73	1.19E+00	56.54%
29.80	1.23E+00	48.53%
33.88	1.24E+00	40.34%
37.95	1.21E+00	32.25%
42.02	1.20E+00	24.29%
46.08	1.18E+00	16.43%
50.15	1.21E+00	8.52%
54.22	1.19E+00	0.59%
58.28	1.18E+00	-7.22%
62.35	1.11E+00	-14.80%
64.43	9.68E-01	-18.32%
67.00	8.25E-01	-22.06%
69.57	6.50E-01	-25.14%
72.13	2.12E-01	-26.94%
74.28	1.77E-02	-27.34%
76.43	0.00E+00	-27.37%
78.58	0.00E+00	-27.37%
81.23	0.00E+00	-27.37%
84.38	0.00E+00	-27.37%
88.53	0.00E+00	-27.37%
93.68	0.00E+00	-27.37%
98.83	0.00E+00	-27.37%
103.98	0.00E+00	-27.37%
109.13	0.00E+00	-27.37%
114.28	0.00E+00	-27.37%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(++0-)\20050921_3c_26

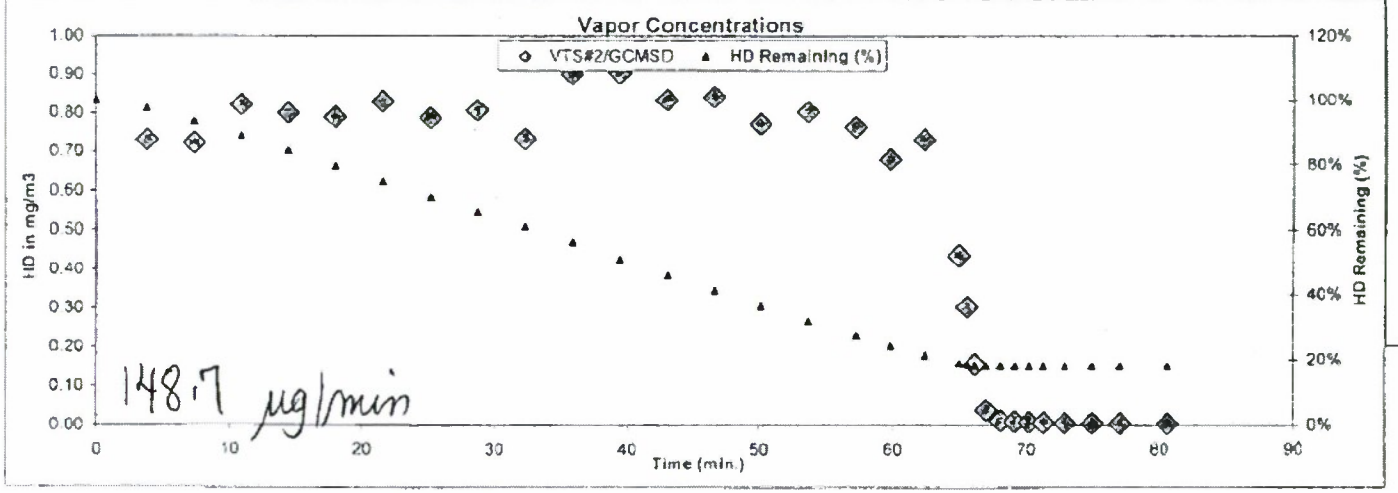
20051027_3a_79

Data Evaluation Grade: Modeling Grade

Tunnel:	3a	
Instruments:	VTS#2/GCMSD	
Date/Experiment #:	10/27/05	79
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	9	µL
Mass of agent disseminated:	11.45	mg
Corrected mass on 100% agent purity:	11.16	mg
Average substrate temperature:	50.65	°C
Average air flow rate:	181.76	SLPM
Average air temperature above drop:	50.48	°C
Mass % recovery in vapor:	81.8	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	81.8	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.6	1.13%	Go
1.4	0.77%	Go
0.7	1.45%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
3.83	7.31E-01	97.72%
7.40	7.24E-01	93.49%
10.97	6.23E-01	89.00%
14.53	8.01E-01	84.28%
18.08	7.90E-01	79.68%
21.65	8.31E-01	74.97%
25.22	7.68E-01	70.28%
28.78	8.08E-01	65.63%
32.35	7.33E-01	61.15%
35.92	9.02E-01	56.40%
39.48	9.03E-01	51.16%
43.03	8.34E-01	46.13%
46.60	8.42E-01	41.27%
50.17	7.72E-01	36.57%
53.73	8.03E-01	32.00%
57.30	7.64E-01	27.45%
59.87	6.81E-01	24.43%
62.43	7.31E-01	21.48%
65.00	4.35E-01	19.04%
65.58	3.03E-01	18.69%
66.15	1.57E-01	18.48%
66.98	3.96E-02	18.34%
68.07	1.20E-02	18.30%
69.15	9.77E-03	18.28%
70.23	8.14E-03	18.26%
71.32	7.38E-03	18.25%
72.90	5.80E-03	18.23%
74.97	5.49E-03	18.21%
77.05	4.89E-03	18.19%
80.63	3.53E-03	18.17%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(++0-)\20051027_3a_79

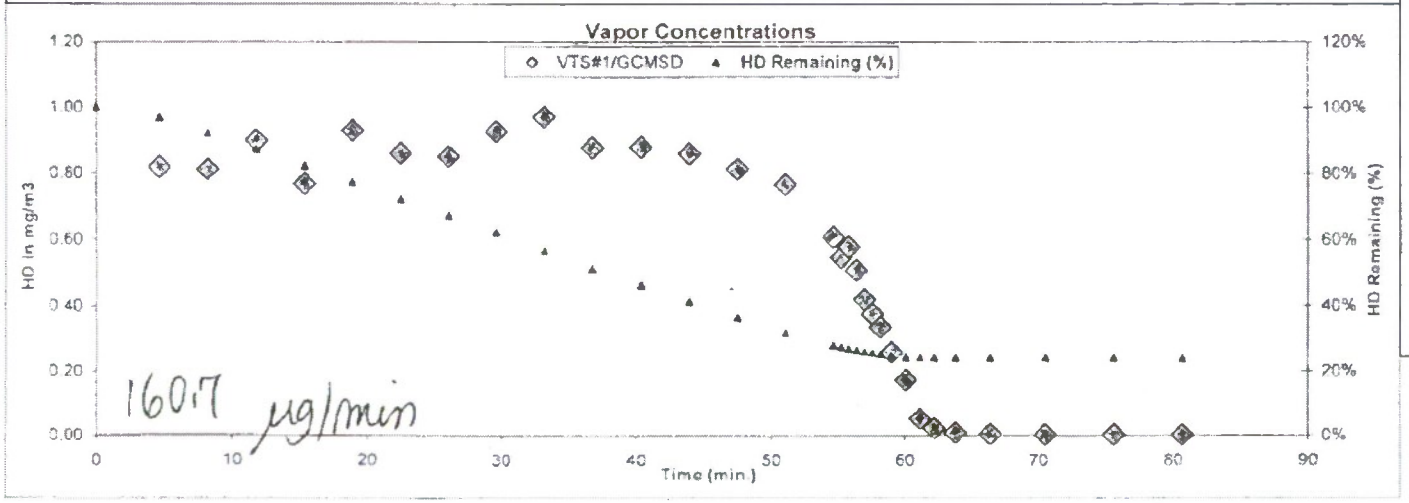
20051027_3c_45

Data Evaluation Grade: Modeling Grade

Tunnel:	3c	
Instruments:	VTS#1/GCMSD	
Date/Experiment #:	10/27/05	45
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	9 µL	
Mass of agent disseminated:	11.55 mg	
Corrected mass on 100% agent purity:	11.25 mg	
Average substrate temperature:	49.28 °C	
Average air flow rate:	181.66 SLPM	
Average air temperature above drop:	50.09 °C	
Mass % recovery in vapor:	75.9 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	75.9 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.8	1.59%	Go
0.9	0.48%	Go
0.6	1.17%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
4.68	8.20E-01	96.90%
8.25	8.13E-01	92.20%
11.82	9.00E-01	87.26%
15.40	7.70E-01	82.44%
18.97	9.30E-01	77.54%
22.53	8.62E-01	72.38%
26.10	8.52E-01	67.45%
29.67	9.27E-01	62.32%
33.23	9.71E-01	56.86%
36.82	8.79E-01	51.51%
40.38	8.80E-01	46.44%
43.95	8.61E-01	41.43%
47.52	8.14E-01	36.61%
51.08	7.69E-01	32.05%
54.65	6.09E-01	28.08%
55.25	5.49E-01	27.52%
55.83	5.80E-01	26.99%
56.42	5.09E-01	26.48%
57.00	4.21E-01	26.04%
57.58	3.76E-01	25.66%
58.17	3.37E-01	25.33%
59.00	2.59E-01	24.93%
60.08	1.73E-01	24.55%
61.18	5.30E-02	24.35%
62.27	2.29E-02	24.28%
63.85	9.87E-03	24.24%
66.43	5.32E-03	24.21%
70.52	3.77E-03	24.18%
75.60	3.02E-03	24.15%
80.68	2.71E-03	24.13%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(++0-)\20051027_3c_45

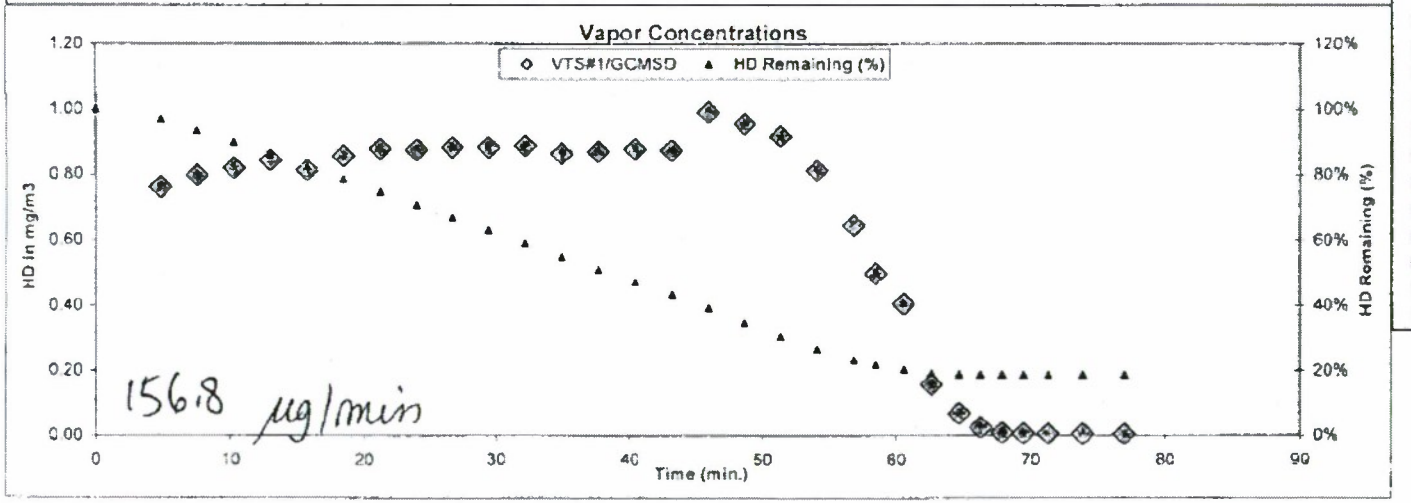
20051121_3c_51

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3c	
Instruments:	VTS#1/GCMSD	
Date/Experiment #:	11/21/05	51
Type of substrate :	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	9 µL	
Mass of agent disseminated:	11.37 mg	
Corrected mass on 100% agent purity:	11.08 mg	
Average substrate temperature:	49.68 °C	
Average air flow rate:	181.64 SLPM	
Average air temperature above drop:	50.20 °C	
Mass % recovery in vapor:	81.3 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	81.3 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.6	1.25%	Go
1.8	0.98%	Go
0.3	0.58%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
4.65	7.62E-01	96.97%
7.58	7.97E-01	93.47%
10.32	8.20E-01	89.85%
13.05	8.43E-01	86.12%
15.78	8.13E-01	82.41%
18.52	8.56E-01	78.66%
21.27	8.78E-01	74.75%
24.00	8.75E-01	70.83%
26.74	8.83E-01	66.89%
29.47	8.83E-01	62.93%
32.20	8.87E-01	58.96%
34.95	8.63E-01	55.01%
37.69	8.69E-01	51.13%
40.42	8.77E-01	47.22%
43.15	8.73E-01	43.30%
45.90	9.91E-01	39.09%
48.64	9.55E-01	34.73%
51.37	9.17E-01	30.54%
54.10	8.12E-01	26.66%
56.84	6.46E-01	23.40%
58.50	5.00E-01	21.83%
60.57	4.05E-01	20.30%
62.63	1.59E-01	19.34%
64.70	6.94E-02	18.95%
66.30	2.53E-02	18.83%
67.88	9.15E-03	18.78%
69.47	6.65E-03	18.76%
71.30	5.70E-03	18.75%
73.88	4.48E-03	18.72%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(++0-)\20051121_3c_51

20051130_3d_10

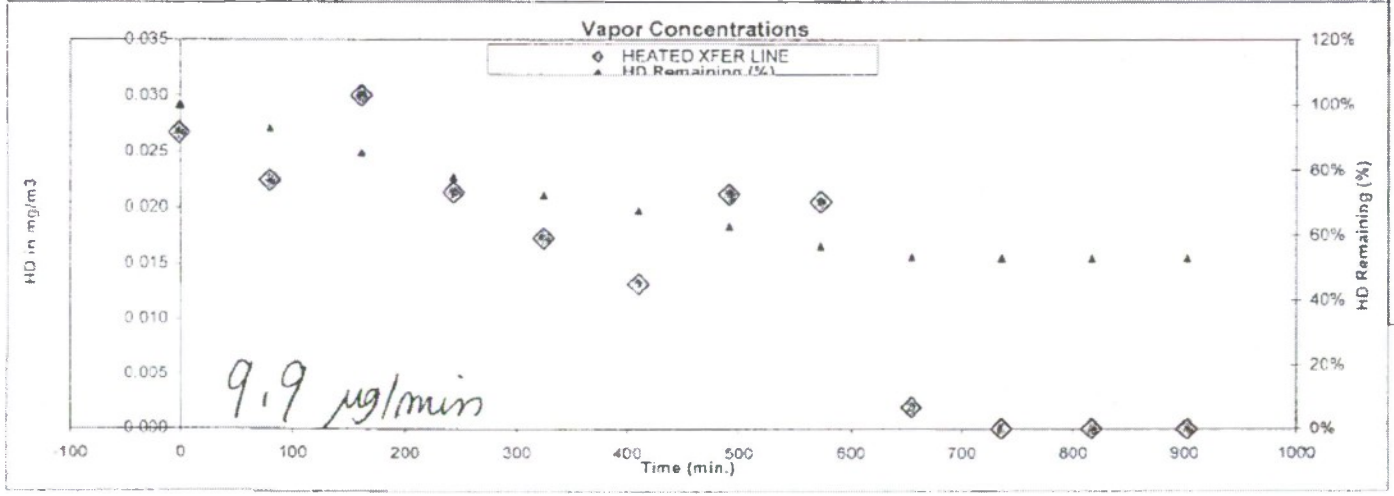
Data Evaluation Grade: **Modeling Grade**

Tunnel:	3d	
Instruments:	HEATED XFER LINE/HAPSITE	
Date/Experiment #:	11/30/05	10
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	9	µL
Mass of agent disseminated:	11.71	mg
Corrected mass on 100% agent purity:	11.41	mg
Average substrate temperature:	15.11	°C
Average air flow rate:	405.37	SLPM
Average air temperature above drop:	14.66	°C
Mass % recovery in vapor:	46.9	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	46.9	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	No	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	76.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.1	0.97%	Go
0.5	0.11%	Go
0.2	1.32%	Go
-	-	Go

Time (min)	Conc. mg/m³	HD rem. (%)
-1.48	2.67E-02	100.07%
79.98	2.25E-02	92.95%
161.45	3.00E-02	85.36%
243.37	2.14E-02	77.88%
324.37	1.73E-02	72.31%
409.88	1.31E-02	67.69%
491.35	2.12E-02	62.71%
572.78	2.05E-02	56.68%
654.22	1.99E-03	53.42%
735.65	0.00E+00	53.13%
817.08	0.00E+00	53.13%
902.70	0.00E+00	53.13%



G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(-++-)\20051130_3d_10.

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(-++-)\20051219_3d_16.xls

Data Sheet Droplet Evaporation in ECBC Wind Tunnel

Tunnel: 3d
Date: December 19, 2005
Experiment Number: 16
File Name: 20051219_3d_16.xls

Substrate			
type of substrate :	Glass		
substrate sample size (mm):	36.6	0.00105 m^2	
Agent			
test agent:	HD		
agent neat / thickened:	neat		
agent purity:	97.4%		
nonminal density:	1.27	mg/uL	
Contamination			
number of drops:	1		
nominal drop volume:	9	µL	
actual calculated drop volume:	9.212	µL	
weight of clean substrate:	1690.268	mg	
weight of contaminated substrate:	1701.967	mg	
mass of agent disseminated:	11.699	mg	
corrected mass on 100% agent purity:	11.395	mg	
actual contamination density:	11.12	g/m^2	
actual contamination density based on 100% agent purity:	10.83	g/m^2	
Control Parameters			
Miller Nelson temperature:	68.1	°C	1.1
air flow temperature:	15.4	°C	3.1
Aalborg Flowmeter air flow rate:	405.85	SLPM	5.2
transition section wall temperature:	13.0	°C	0.0
fetch section wall temperature:	11.0	°C	0.0
substrate temperature:	15.2	°C	0.1
piston zone temperature:	9999.0	°C	0.0
post-test section wall temperature:	16.2	°C	0.4
mixing box wall temperature:	35.0	°C	0.0
sampling duct wall temperature:	35.2	°C	1.05
test section air flow speed:	3.21	m/s	0.0
air flow relative humidity:	0.00	%	0.1
Sampling Parameters			
sampling technique:	HEATED XFER LINE		
introduction technique:			
analysis technique:	HAPSITE		
Experiment Timing			
start time contamination (time drop hits substrate):	12/19/05 15:37:25		
end time contamination:			Delta
start time data acquisition (desired wind velocity achieved):	12/19/05 15:40:15		2.83 min.
end time data acquisition- end of vapor experiment:	12/20/05 10:04:15		1104.00 min.
Additional Information			
weight of substrate after evaporation:	1690.3980	mg	11:30 AM, 12/21/05
residual mass of agent after evaporation:	0.1300	mg	
Extraction liquid			
extraction liquid:	n/a		TGA SLOPE: 12.4
volume extraction liquid:	n/a	mL	
extraction time (ultrasonicate):	n/a	min	ng/min
concentration of agent in extraction liquid:	n/a	µg/mL	
recovered mass:	n/a	mg	
Remarks			
drop delivered by:	Ken Sumpter		
description:	high flow, low temp, 9 mic on glass		
video monitoring:	20051219_3d_16.xls	YES	

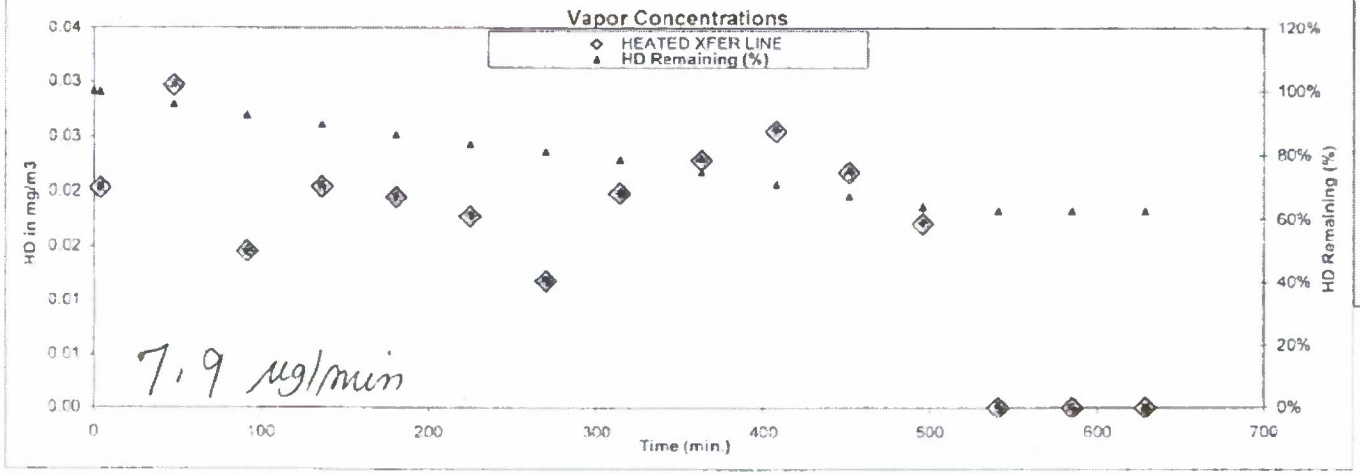
20051219_3d_17

Tunnel:	3d		Date:	12/21/05
Parameters:	HEATED XFER LINE	HAPSITE	Exp. #:	17
type of substrate:	Glass Borofloat			
test agent:	HD			
agent grade:	neat			
agent purity:	97.4%	Date/Chem:	KS	7/26/2005
number of drops:	1			
nominal drop volume:	9 µL			
mass of agent disseminated:	11.58 mg			
corrected mass on 100% agent purity:	11.27 mg		SD	P/F
Miller Nelson temperature:	68.16 °C		0.1	Pass
transition section wall temperature:	12.96 °C		0.2	Pass
fetch section wall temperature:	10.06 °C		0.2	Pass
post-test section wall temperature:	16.22 °C		0.4	Pass
mixing box wall temperature:	35.00 °C		0.0	Pass
sampling duct wall temperature:	35.15 °C		1.03	Fail
description:				
Tube #s consistant:	YES			
Daily CCV < +/- 15%	Fail			

Substrate temp: 15.1

SCAM 406

Time (min)	Conc. mg/m³	HD rem. (%)
3.83	2.03E-02	99.86%
47.83	2.97E-02	95.89%
91.83	1.46E-02	92.39%
136.83	2.05E-02	89.55%
180.83	1.95E-02	86.38%
224.83	1.78E-02	83.42%
269.83	1.18E-02	81.03%
313.83	1.99E-02	78.52%
362.83	2.29E-02	74.75%
407.83	2.55E-02	70.83%
451.83	2.17E-02	67.09%
495.83	1.71E-02	64.01%
540.83	0.00E+00	62.63%
584.83	0.00E+00	62.63%
628.83	0.00E+00	62.63%



G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(-++-)\20051219_3d_17.

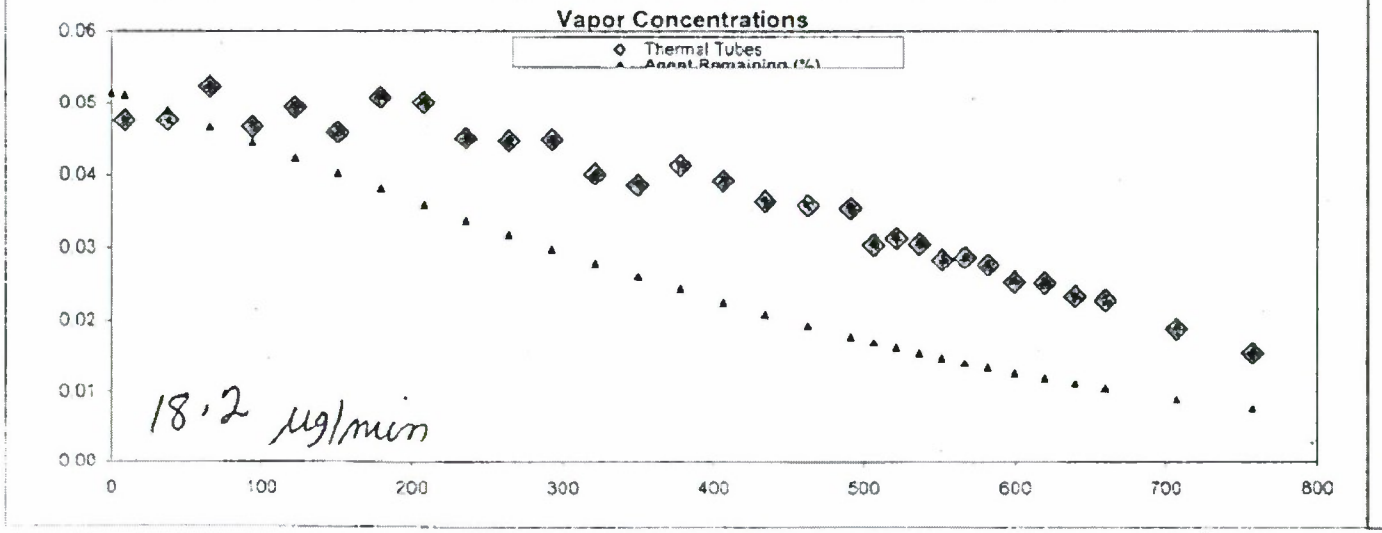
20060117_3d_26

Data Evaluation Grade: Modeling Grade

Tunnel:	3d	
Instruments:	VTS#2/GCMSD	
Date/Experiment #:	01/17/06	26
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	9 µL	
Mass of agent disseminated:	11.42 mg	
Corrected mass on 100% agent purity:	11.13 mg	
Average substrate temperature:	15.54 °C	
Average air flow rate:	406.04 SLPM	
Average air temperature above drop:	15.14 °C	
Mass % recovery in vapor:	102.4 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	102.4 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.5	3.03%	Go
0.7	0.16%	Go
0.4	2.42%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
8.98	4.76E-02	99.22%
37.37	4.77E-02	94.28%
65.77	5.23E-02	89.10%
94.15	4.68E-02	83.96%
122.55	4.95E-02	78.97%
150.93	4.60E-02	74.02%
179.33	5.08E-02	69.01%
207.73	5.01E-02	63.78%
236.12	4.51E-02	58.85%
264.52	4.48E-02	54.19%
292.90	4.50E-02	49.54%
321.30	4.02E-02	45.13%
349.68	3.87E-02	41.04%
378.08	4.14E-02	36.89%
406.47	3.93E-02	32.71%
434.87	3.64E-02	28.79%
463.27	3.59E-02	25.04%
491.65	3.54E-02	21.34%
506.72	3.04E-02	19.53%
521.78	3.13E-02	17.84%
536.83	3.06E-02	16.14%
551.90	2.64E-02	14.52%
566.95	2.87E-02	12.95%
582.02	2.77E-02	11.40%
599.58	2.53E-02	9.70%
619.63	2.52E-02	7.85%
639.70	2.34E-02	6.08%
659.75	2.28E-02	4.39%
707.32	1.88E-02	0.77%
757.38	1.55E-02	-2.36%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(-++-)\20060117_3d_26.

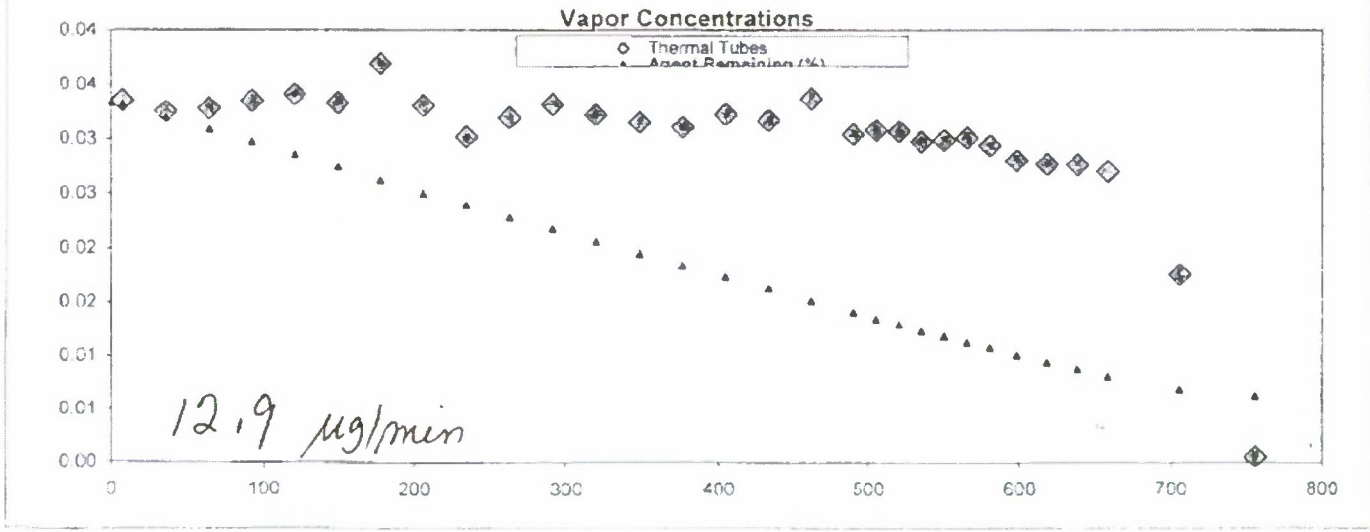
20060130_3d_32

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3d	
Instruments:	VTS#2/GCMSD	
Date/Experiment #:	01/30/06	32
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	9	µL
Mass of agent disseminated:	11.49	mg
Corrected mass on 100% agent purity:	11.19	mg
Average substrate temperature:	15.25	°C
Average air flow rate:	406.06	SLPM
Average air temperature above drop:	15.18	°C
Mass % recovery in vapor:	81.1	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	81.1	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.1	0.49%	Go
0.5	0.13%	Go
0.1	0.49%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
7.27	3.35E-02	99.56%
35.67	3.26E-02	96.15%
64.07	3.28E-02	92.78%
92.49	3.35E-02	89.36%
120.89	3.41E-02	85.88%
149.29	3.33E-02	82.40%
177.71	3.70E-02	78.77%
206.10	3.31E-02	75.16%
234.50	3.03E-02	71.90%
262.92	3.20E-02	68.69%
291.32	3.32E-02	65.33%
319.72	3.23E-02	61.96%
348.14	3.16E-02	58.66%
376.54	3.11E-02	55.43%
404.96	3.23E-02	52.16%
433.35	3.17E-02	48.86%
461.77	3.37E-02	45.49%
490.17	3.05E-02	42.18%
505.24	3.09E-02	40.50%
520.30	3.07E-02	38.82%
535.37	2.98E-02	37.16%
550.44	2.99E-02	35.53%
565.50	3.01E-02	33.89%
580.57	2.94E-02	32.26%
598.14	2.80E-02	30.43%
618.20	2.77E-02	28.40%
638.27	2.77E-02	26.36%
658.34	2.71E-02	24.39%
705.92	1.76E-02	20.53%
756.01	5.38E-04	18.89%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(-++-)\20060130_3d_32

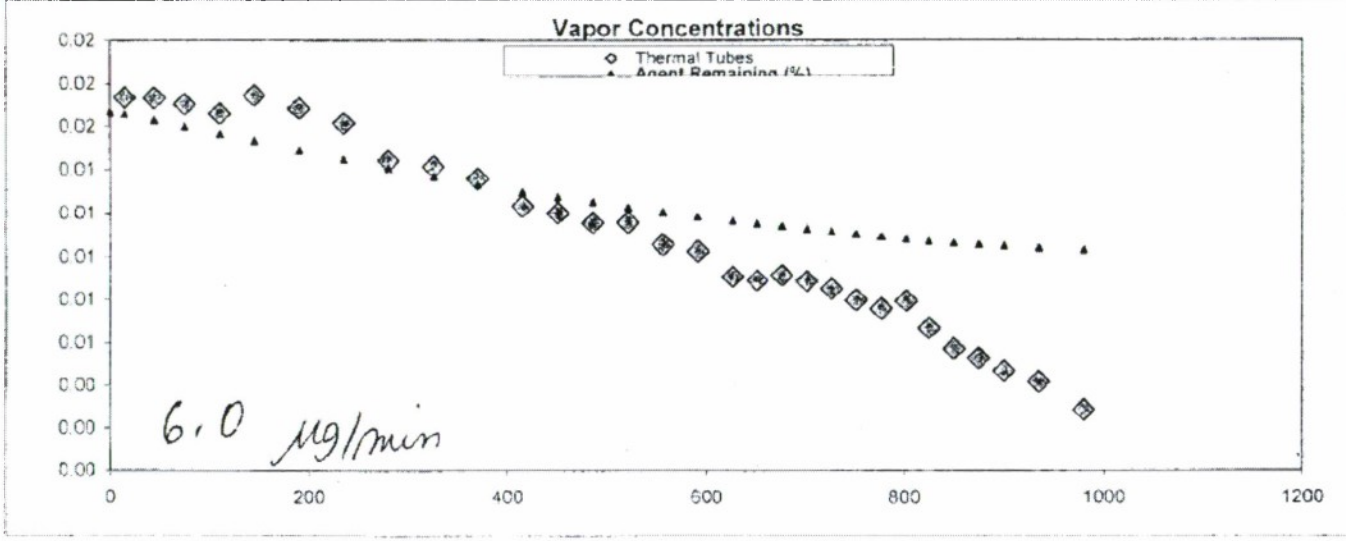
20060207_3d_37

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3d	
Instruments:	VTS#2/GCMSD	
Date/Experiment #:	02/07/06	37
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	9	µL
Mass of agent disseminated:	12.14	mg
Corrected mass on 100% agent purity:	11.83	mg
Average substrate temperature:	15.17	°C
Average air flow rate:	405.60	SLPM
Average air temperature above drop:	15.07	°C
Mass % recovery in vapor:	38.2	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	38.2	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.2	1.30%	Go
0.6	0.14%	Go
0.1	0.65%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
14.45	1.74E-02	99.57%
44.57	1.73E-02	97.78%
74.68	1.70E-02	96.00%
109.80	1.66E-02	93.98%
144.93	1.74E-02	91.93%
190.08	1.68E-02	89.27%
235.22	1.62E-02	86.72%
280.37	1.44E-02	84.35%
325.51	1.44E-02	82.14%
370.67	1.36E-02	80.00%
415.80	1.23E-02	77.99%
450.93	1.20E-02	76.52%
486.06	1.16E-02	75.10%
521.18	1.16E-02	73.71%
556.32	1.06E-02	72.37%
591.45	1.03E-02	71.12%
626.56	9.06E-03	69.96%
651.68	8.88E-03	69.16%
676.78	9.13E-03	68.41%
701.85	8.85E-03	67.63%
726.90	8.49E-03	66.89%
751.97	7.95E-03	66.18%
777.02	7.56E-03	65.52%
802.08	7.92E-03	64.85%
824.65	6.62E-03	64.29%
849.70	5.67E-03	63.76%
874.77	5.22E-03	63.29%
899.82	4.65E-03	62.87%
934.88	4.15E-03	62.34%
979.95	2.83E-03	61.80%

G:\Agent\FateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(-++-)\20060207_3d_37

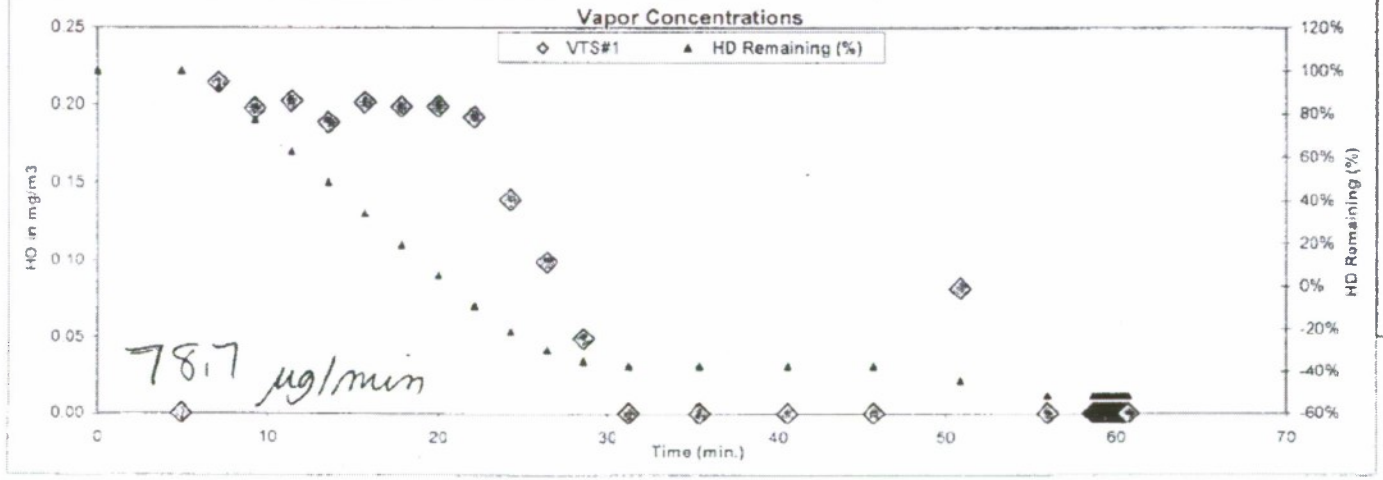
20050919_3c_22

Data Evaluation Grade: Test Grade (requires further evaluation)

Tunnel:	3c	
Instruments:	VTS#1/GCMSD	
Date/Experiment #:	09/19/05	22
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	1 µL	
Mass of agent disseminated:	1.21 mg	
Corrected mass on 100% agent purity:	1.18 mg	
Average substrate temperature:	50.32 °C	
Average air flow rate:	398.06 SLPM	
Average air temperature above drop:	49.84 °C	
Mass % recovery in vapor:	151.8 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	151.8 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.8	1.64%	Go
1.5	0.38%	Go
0.7	1.45%	Go
-	-	Flag



Time (min)	Conc. mg/m³	HD rem. (%)
4.95	0.00E+00	100.00%
7.10	2.15E-01	92.19%
9.25	1.98E-01	77.19%
11.40	2.03E-01	62.62%
13.55	1.89E-01	48.37%
15.70	2.02E-01	34.15%
17.85	1.99E-01	19.58%
20.00	1.99E-01	5.10%
22.15	1.92E-01	-9.13%
24.30	1.39E-01	-21.20%
26.45	9.92E-02	-29.88%
28.60	4.93E-02	-35.28%
31.25	0.00E+00	-37.49%
35.40	0.00E+00	-37.49%
40.55	0.00E+00	-37.49%
45.70	0.00E+00	-37.49%
50.85	8.20E-02	-44.64%
56.00	0.00E+00	-51.78%
58.67	0.00E+00	-51.78%
58.85	0.00E+00	-51.78%
59.04	0.00E+00	-51.78%
59.22	0.00E+00	-51.78%
59.40	0.00E+00	-51.78%
59.59	0.00E+00	-51.78%
59.79	0.00E+00	-51.78%
59.97	0.00E+00	-51.78%
60.15	0.00E+00	-51.78%
60.34	0.00E+00	-51.78%
60.52	0.00E+00	-51.78%
60.70	0.00E+00	-51.78%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+-+-)\20050919_3c_22

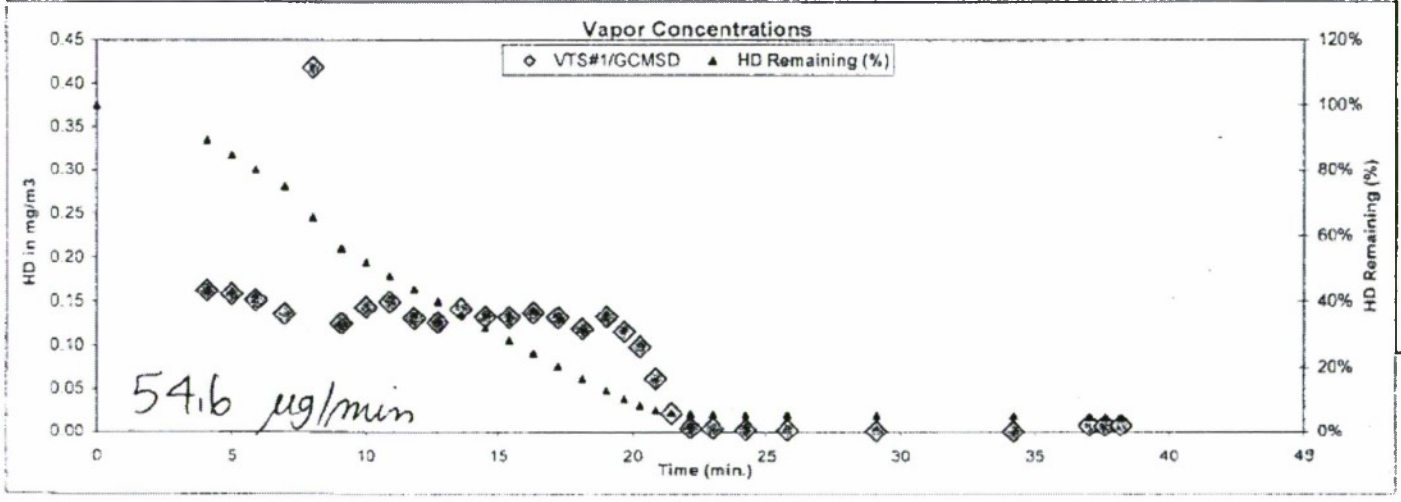
20051025_3c_41

Data Evaluation Grade: Modeling Grade

Tunnel:	3c	
Instruments:	VTS#1/GCMSD	
Date/Experiment #:	10/25/05	41
Type of substrate :	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	1 µL	
Mass of agent disseminated:	1.28 mg	
Corrected mass on 100% agent purity:	1.25 mg	
Average substrate temperature:	49.84 °C	
Average air flow rate:	403.94 SLPM	
Average air temperature above drop:	50.12 °C	
Mass % recovery in vapor:	95.7 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	95.7 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.4	0.74%	Go
1.7	0.43%	Go
0.9	1.62%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
4.10	1.62E-01	89.22%
5.00	1.59E-01	84.54%
5.90	1.52E-01	80.01%
6.97	1.36E-01	75.04%
8.03	1.19E-01	65.46%
9.10	1.25E-01	56.07%
10.02	1.43E-01	52.08%
10.92	1.50E-01	47.81%
11.82	1.31E-01	43.72%
12.72	1.27E-01	39.96%
13.62	1.42E-01	36.05%
14.52	1.33E-01	32.05%
15.42	1.33E-01	28.18%
16.32	1.38E-01	24.24%
17.22	1.32E-01	20.31%
18.13	1.19E-01	16.58%
19.03	1.33E-01	12.90%
19.68	1.16E-01	10.28%
20.27	9.89E-02	8.25%
20.85	6.21E-02	6.73%
21.43	2.16E-02	5.93%
22.14	4.41E-03	5.64%
22.98	4.01E-03	5.52%
24.18	2.41E-03	5.40%
25.77	2.11E-03	5.28%
29.10	8.15E-04	5.12%
34.20	7.33E-04	5.00%
37.03	7.81E-03	4.60%
37.62	7.24E-03	4.46%
38.20	7.96E-03	4.32%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+-+-)\20051025_3c_41.

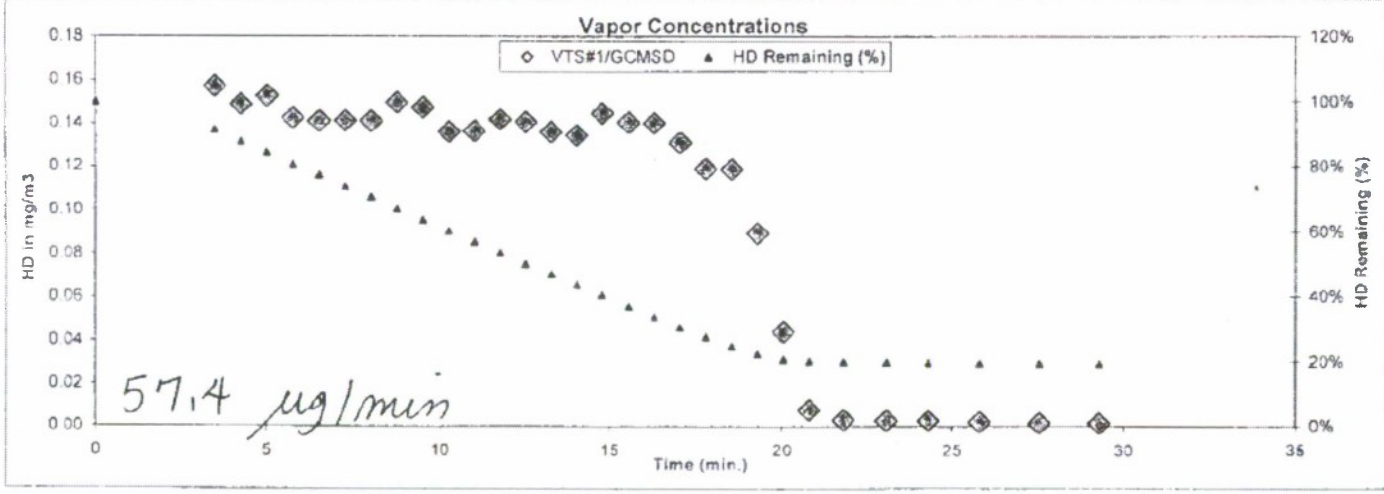
20051025_3c_43

Data Evaluation Grade: **Test Grade (requires further evaluation)**

Tunnel:	3c	
Instruments:	VTS#1/GCMSD	
Date/Experiment #:	10/26/05	43
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	1 µL	
Mass of agent disseminated:	1.32 mg	
Corrected mass on 100% agent purity:	1.29 mg	
Average substrate temperature:	n/a 1427.76 °C	
Average air flow rate:	405.04 SLPM	
Average air temperature above drop:	50.25 °C	
Mass % recovery in vapor:	80.4 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	80.4 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	ignore avg substrate temp - sensor died, air temp seems too high at first	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
76.9	5.39%	Flag
0.9	0.22%	Go
0.8	1.66%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
3.48	1.57E-01	91.39%
4.25	1.49E-01	87.70%
5.00	1.53E-01	84.15%
5.75	1.42E-01	80.66%
6.52	1.41E-01	77.25%
7.27	1.41E-01	73.91%
8.02	1.41E-01	70.58%
8.77	1.50E-01	67.15%
9.52	1.47E-01	63.65%
10.28	1.36E-01	60.23%
11.03	1.37E-01	57.01%
11.78	1.42E-01	53.72%
12.53	1.41E-01	50.39%
13.28	1.36E-01	47.12%
14.03	1.35E-01	43.93%
14.78	1.45E-01	40.63%
15.55	1.41E-01	37.19%
16.30	1.40E-01	33.88%
17.05	1.31E-01	30.68%
17.80	1.19E-01	27.73%
18.55	1.19E-01	24.93%
19.30	8.94E-02	22.47%
20.05	4.39E-02	20.90%
20.80	7.68E-03	20.29%
21.80	3.05E-03	20.12%
23.05	2.75E-03	20.01%
24.30	2.72E-03	19.90%
25.80	2.07E-03	19.79%
27.55	1.71E-03	19.68%
29.30	1.62E-03	19.59%

G:\Agent\FateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GI (+-+-)\20051026_3c_43

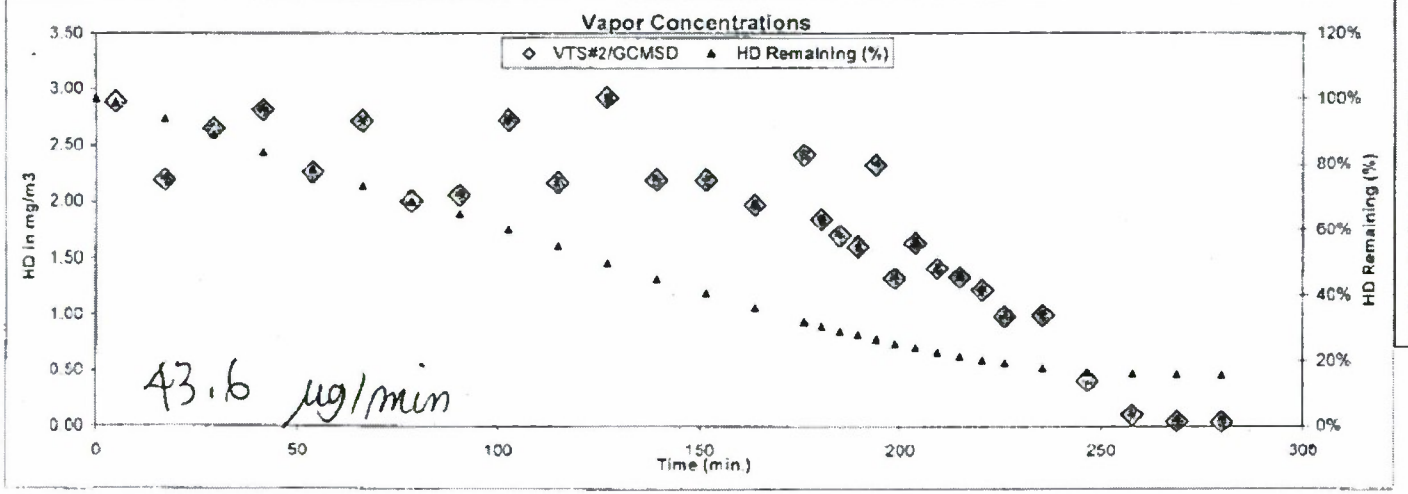
20050908_3a_63

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3a	
Instruments:	VTS#2/GCMSD	
Date/Experiment #:	09/08/05	63
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	9 µL	
Mass of agent disseminated:	11.44 mg	
Corrected mass on 100% agent purity:	11.15 mg	
Average substrate temperature:	49.59 °C	
Average air flow rate:	18.14 SLPM	
Average air temperature above drop:	50.77 °C	
Mass % recovery in vapor:	84.2 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	84.2 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.2	0.49%	Go
0.2	0.93%	Go
0.2	0.41%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
4.93	2.89E+00	98.84%
17.17	2.20E+00	93.76%
29.40	2.65E+00	88.95%
41.63	2.82E+00	83.50%
53.85	2.27E+00	78.45%
66.08	2.72E+00	73.49%
78.32	2.01E+00	68.79%
90.55	2.06E+00	64.73%
102.78	2.72E+00	59.97%
115.02	2.17E+00	55.10%
127.23	2.92E+00	50.04%
139.47	2.19E+00	44.95%
151.71	2.19E+00	40.58%
163.93	1.97E+00	36.45%
176.17	2.42E+00	32.08%
180.48	1.84E+00	30.58%
185.05	1.70E+00	29.27%
189.60	1.60E+00	28.05%
194.17	2.32E+00	26.59%
198.73	1.32E+00	25.24%
203.80	1.63E+00	24.02%
209.37	1.41E+00	22.64%
214.93	1.33E+00	21.40%
220.50	1.21E+00	20.25%
226.05	9.82E-01	19.26%
235.62	9.88E-01	17.73%
246.68	4.04E-01	16.47%
257.75	1.02E-01	16.02%
268.82	4.34E-02	15.89%
279.88	3.68E-02	15.81%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(++--)\20050908_3a_63.

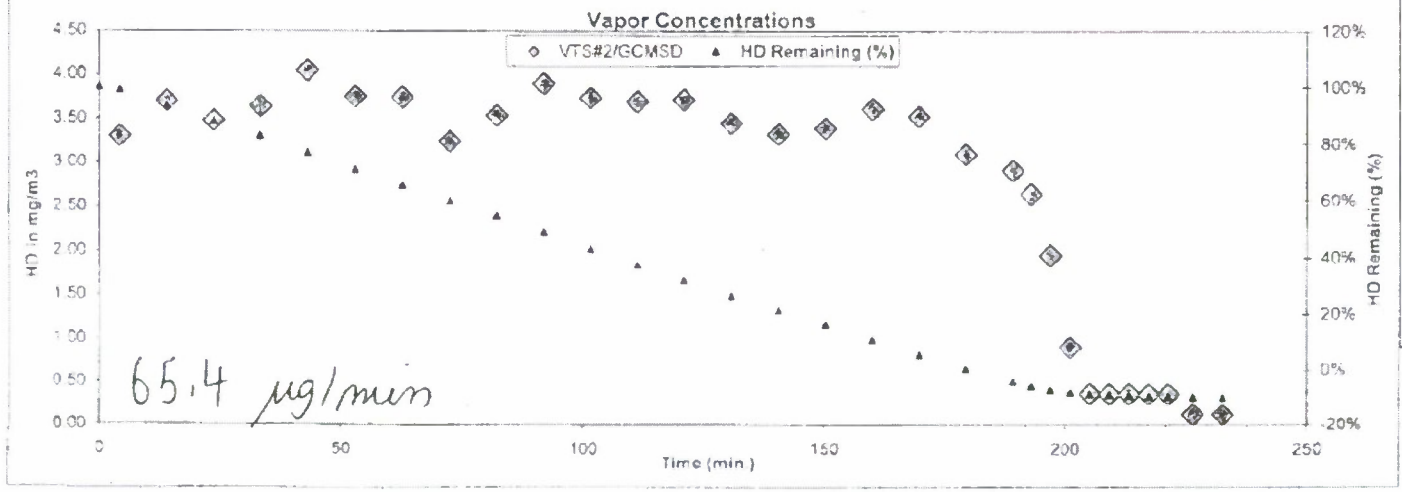
20051107_3a_83

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3a	
Instruments:	VTS#2/GCMSD	
Date/Experiment #:	11/07/05	83
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	9	µL
Mass of agent disseminated:	11.85	mg
Corrected mass on 100% agent purity:	11.54	mg
Average substrate temperature:	49.54	°C
Average air flow rate:	18.06	SLPM
Average air temperature above drop:	49.50	°C
Mass % recovery in vapor:	110.0	%
Mass % recovery by extraction:	n/a	%
Total agent % mass recovery:	110.0	%
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.3	0.63%	Go
0.1	0.81%	Go
0.2	0.36%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
4.25	3.30E+00	98.90%
13.98	3.70E+00	93.57%
23.72	3.48E+00	88.10%
33.45	3.64E+00	82.67%
43.20	4.05E+00	76.81%
52.93	3.75E+00	70.87%
62.67	3.74E+00	65.16%
72.40	3.24E+00	59.84%
82.13	3.54E+00	54.67%
91.87	3.90E+00	49.00%
101.60	3.74E+00	43.18%
111.33	3.70E+00	37.52%
121.07	3.72E+00	31.87%
130.82	3.45E+00	26.40%
140.55	3.32E+00	21.24%
150.28	3.39E+00	16.13%
160.02	3.61E+00	10.79%
169.75	3.53E+00	5.35%
179.50	3.10E+00	0.29%
189.23	2.91E+00	-4.29%
193.05	2.65E+00	-5.95%
197.12	1.96E+00	-7.41%
201.18	9.08E-01	-8.32%
205.25	3.64E-01	-8.73%
209.32	3.60E-01	-8.96%
213.38	3.60E-01	-9.19%
217.47	3.59E-01	-9.42%
221.53	3.60E-01	-9.65%
225.60	1.22E-01	-9.84%
232.67	1.22E-01	-9.95%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(++--)\20051107_3a_83

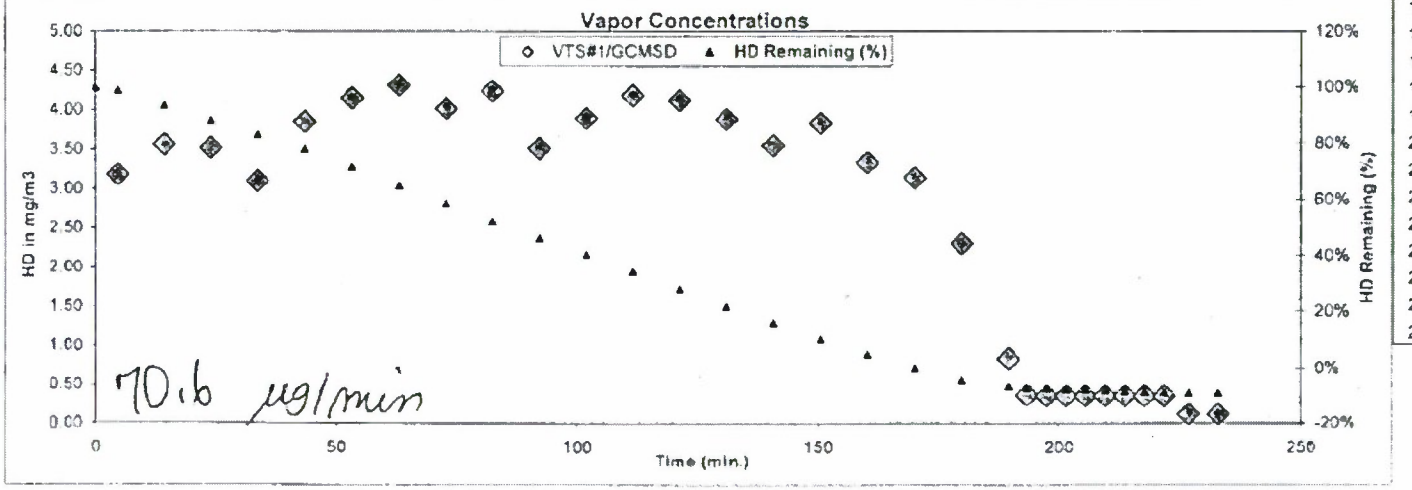
20051107_3c_49

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3c	
Instruments:	VTS#1/GCMSD	
Date/Experiment #:	11/07/05	49
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	9 µL	
Mass of agent disseminated:	11.69 mg	
Corrected mass on 100% agent purity:	11.38 mg	
Average substrate temperature:	49.99 °C	
Average air flow rate:	18.05 SLPM	
Average air temperature above drop:	50.19 °C	
Mass % recovery in vapor:	109.1 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	109.1 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.2	0.42%	Go
0.0	0.22%	Go
0.3	0.58%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
4.60	3.18E+00	98.84%
14.33	3.56E+00	93.63%
24.07	3.52E+00	88.17%
33.80	3.10E+00	83.07%
43.53	3.85E+00	77.71%
53.28	4.15E+00	71.54%
63.02	4.31E+00	65.01%
72.75	4.01E+00	58.59%
82.48	4.23E+00	52.23%
92.22	3.51E+00	46.25%
101.95	3.89E+00	40.55%
111.68	4.18E+00	34.32%
121.42	4.12E+00	27.92%
131.15	3.88E+00	21.75%
140.88	3.54E+00	16.03%
150.63	3.83E+00	10.33%
160.37	3.33E+00	4.81%
170.10	3.13E+00	-0.17%
179.84	2.29E+00	-4.36%
189.57	6.33E-01	-6.78%
193.38	3.68E-01	-7.14%
197.47	3.59E-01	-7.37%
201.53	3.59E-01	-7.61%
205.60	3.58E-01	-7.84%
209.67	3.58E-01	-8.07%
213.73	3.58E-01	-8.30%
217.80	3.58E-01	-8.53%
221.87	3.58E-01	-8.76%
226.93	1.20E-01	-8.95%
233.02	1.20E-01	-9.07%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(++--)\20051107_3c_49.

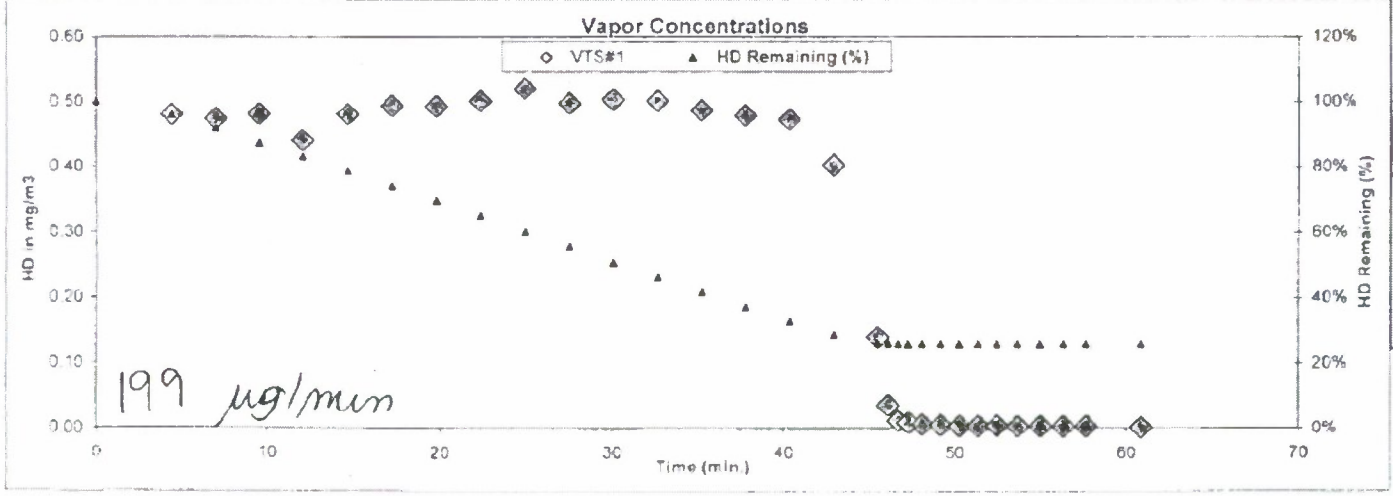
20051025_3c_42

Data Evaluation Grade: **Modeling Grade**

Tunnel:	3c	
Instruments:	VTS#1/GCMSD	
Date/Experiment #:	10/25/05	42
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	9 µL	
Mass of agent disseminated:	11.49 mg	
Corrected mass on 100% agent purity:	11.19 mg	
Average substrate temperature:	49.96 °C	
Average air flow rate:	403.90 SLPM	
Average air temperature above drop:	50.31 °C	
Mass % recovery in vapor:	74.2 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	74.2 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.6	1.24%	Go
1.3	0.31%	Go
0.8	1.67%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
4.40	4.81E-01	96.18%
6.97	4.74E-01	91.76%
9.53	4.82E-01	87.33%
12.10	4.41E-01	83.06%
14.68	4.81E-01	78.76%
17.25	4.94E-01	74.25%
19.82	4.93E-01	69.68%
22.38	5.01E-01	65.07%
24.95	5.20E-01	60.34%
27.52	4.98E-01	55.63%
30.08	5.04E-01	50.99%
32.67	5.01E-01	46.31%
35.23	4.87E-01	41.73%
37.80	4.79E-01	37.26%
40.37	4.73E-01	32.85%
42.95	4.03E-01	28.77%
45.52	1.40E-01	26.26%
46.10	3.56E-02	26.08%
46.68	1.16E-02	26.03%
47.27	8.70E-03	26.00%
48.10	5.82E-03	25.98%
49.18	5.05E-03	25.96%
50.28	3.82E-03	25.94%
51.37	3.51E-03	25.93%
52.45	4.01E-03	25.91%
53.66	3.22E-03	25.90%
54.99	3.11E-03	25.88%
56.32	2.87E-03	25.87%
57.66	3.20E-03	25.85%
60.87	1.33E-03	25.83%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+++-)\20051025_3c_42

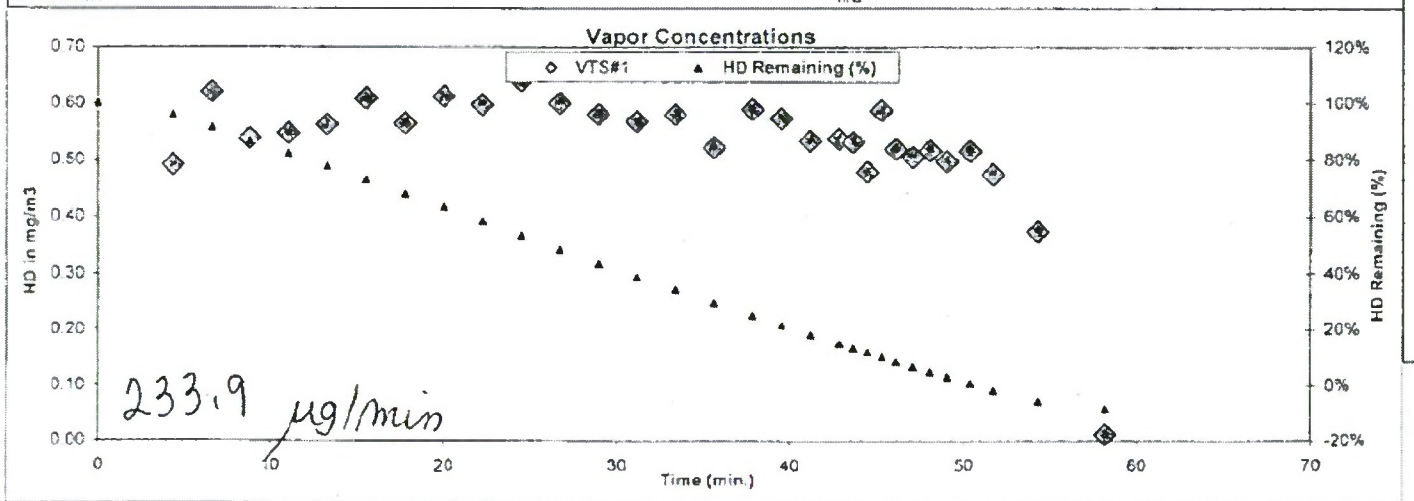
20051026_3c_44

Data Evaluation Grade: Modeling Grade

Tunnel:	3c	
Instruments:	VTS#1/GCMSD	
Date/Experiment #:	10/26/05	44
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	9 µL	
Mass of agent disseminated:	11.38 mg	
Corrected mass on 100% agent purity:	11.08 mg	
Average substrate temperature:	50.13 °C	
Average air flow rate:	405.43 SLPM	
Average air temperature above drop:	50.13 °C	
Mass % recovery in vapor:	108.5 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	108.5 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.9	1.81%	Go
1.44	0.36%	Go
0.9	1.81%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
4.37	4.92E-01	96.07%
6.60	6.21E-01	91.52%
8.83	5.39E-01	86.79%
11.07	5.47E-01	82.35%
13.30	5.62E-01	77.82%
15.53	6.09E-01	73.04%
17.78	5.65E-01	68.21%
20.02	6.13E-01	63.40%
22.25	5.97E-01	58.46%
24.48	6.40E-01	53.40%
26.72	6.00E-01	48.33%
28.95	5.81E-01	43.51%
31.18	5.68E-01	38.82%
33.42	5.80E-01	34.13%
35.65	5.22E-01	29.63%
37.90	5.90E-01	25.05%
39.57	5.73E-01	21.51%
41.22	5.34E-01	18.17%
42.87	5.37E-01	14.94%
43.68	5.32E-01	13.34%
44.50	4.79E-01	11.83%
45.32	5.87E-01	10.24%
46.13	5.19E-01	8.59%
47.12	5.05E-01	6.74%
48.10	5.16E-01	4.91%
49.08	4.98E-01	3.08%
50.40	5.16E-01	0.64%
51.72	4.75E-01	-1.74%
54.30	3.74E-01	-5.75%
58.20	1.13E-02	-8.50%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+++-)\20051026_3c_44

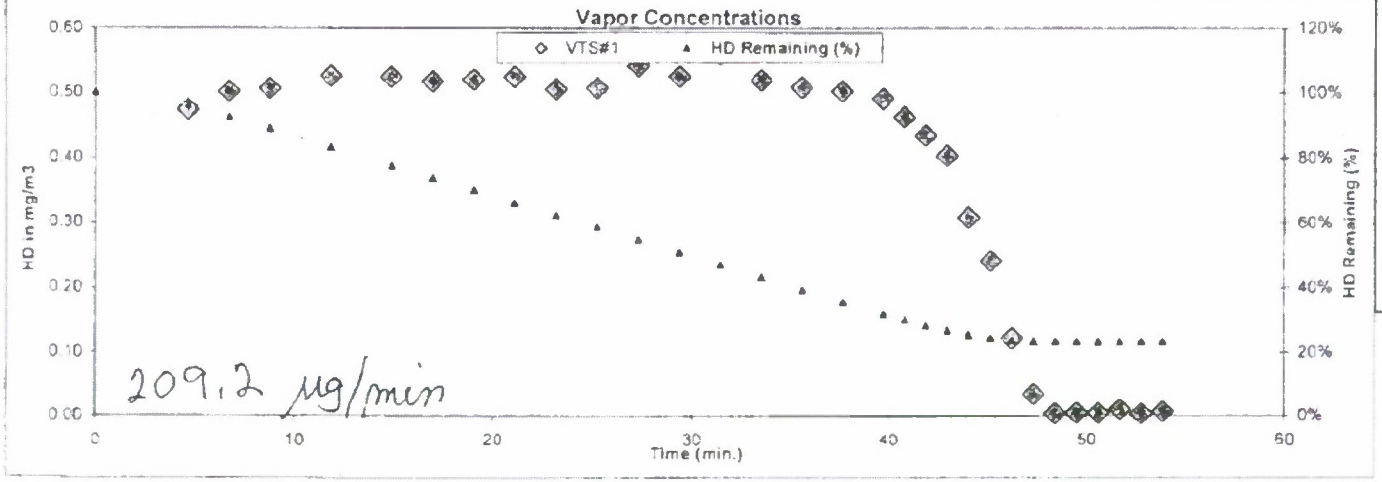
20051130_3c_53

Data Evaluation Grade: Modeling Grade

Tunnel:	3c	
Instruments:	VTS#1/GCMSD	
Date/Experiment #:	11/30/05	53
Type of substrate:	Glass	
Test agent/purity:	HD	
Number of drops:	1	
Nominal drop volume:	9 µL	
Mass of agent disseminated:	11.81 mg	
Corrected mass on 100% agent purity:	11.50 mg	
Average substrate temperature:	50.12 °C	
Average air flow rate:	405.75 SLPM	
Average air temperature above drop:	49.55 °C	
Mass % recovery in vapor:	76.7 %	
Mass % recovery by extraction:	n/a %	
Total agent % mass recovery:	76.7 %	
Tube #s consistant:	Yes	
Daily CCV < +/- 15%:	Yes	
Comments:	n/a	

Agent Purity		
CASARM	97.4%	2/28/2006
Munitions	75.1%	1/18/2006
Munitions	78.2%	2/27/2006

Data Evaluation		
SD	%SD	Status
0.6	1.14%	Go
1.8	0.45%	Go
0.4	0.87%	Go
-	-	Go



Time (min)	Conc. mg/m³	HD rem. (%)
4.65	4.74E-01	96.11%
6.72	5.01E-01	92.56%
8.78	5.06E-01	88.88%
11.85	5.26E-01	83.30%
14.92	5.24E-01	77.62%
16.98	5.17E-01	73.63%
19.07	5.20E-01	70.02%
21.13	5.25E-01	66.21%
23.20	5.05E-01	62.45%
25.27	5.07E-01	58.76%
27.33	5.41E-01	54.94%
29.40	5.25E-01	51.06%
31.47	5.61E-01	47.10%
33.53	5.19E-01	43.16%
35.62	5.08E-01	39.39%
37.68	5.02E-01	35.70%
39.75	4.91E-01	32.08%
40.83	4.63E-01	30.26%
41.92	4.35E-01	28.54%
43.00	4.04E-01	26.94%
44.08	3.09E-01	25.58%
45.17	2.42E-01	24.53%
46.25	1.22E-01	23.83%
47.35	3.44E-02	23.53%
48.43	4.02E-03	23.46%
49.52	4.74E-03	23.44%
50.60	4.59E-03	23.42%
51.68	1.01E-02	23.39%
52.77	3.25E-03	23.37%

G:\AgentFateTech\Wind Tunnel\Archieved Excel Sheets (NOT POLISHED)\HD GL(+++-)\20051130_3c_53