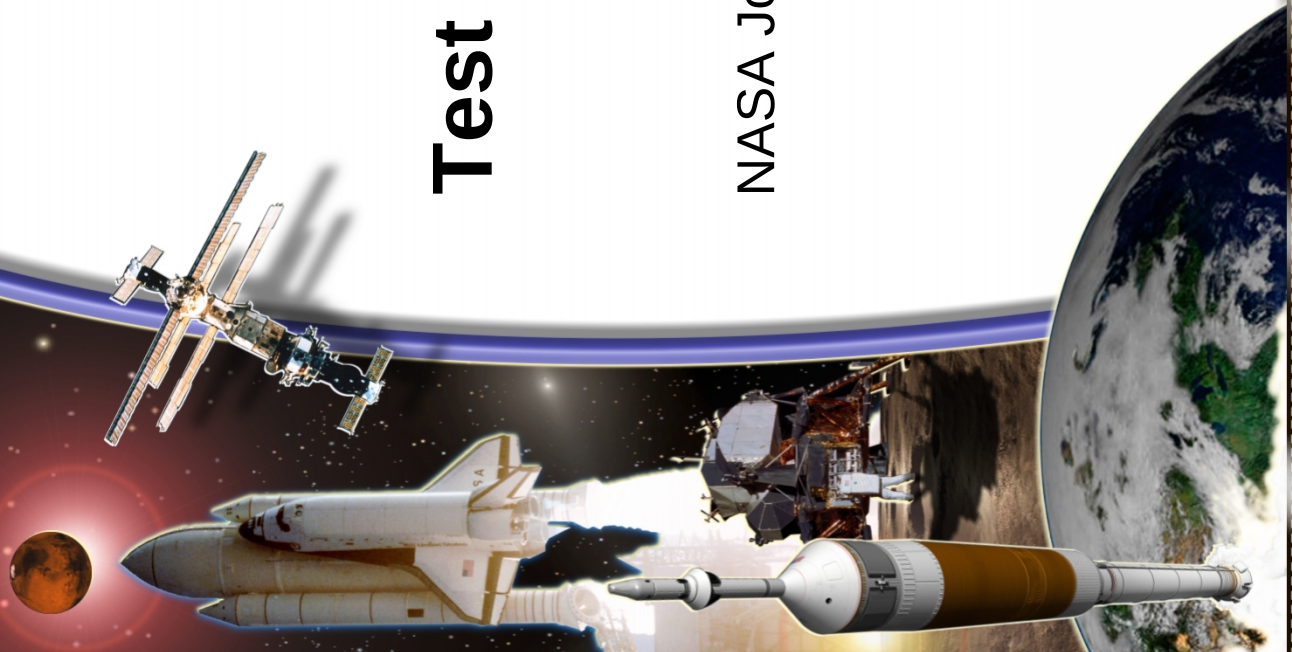




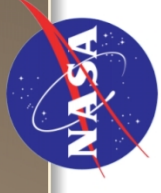
Data compiled by:
NASA Johnson Space Center White Sands Test Facility

Horacio Perez III
NASA/JAXA Technical Interchange Meeting
Tsukuba, Japan
June 4-8, 2007



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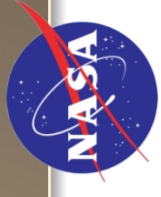
Agenda



- Statistical Analysis Definitions
- Odor Analysis Results
 - NASA Standard 6001 Test 6
- Toxic Offgassing Analysis Results
 - NASA Standard 6001 Test 7
- Gas Standard Results
 - NASA Standard 6001 Test 7
- Discussion
- Areas of Concern



Statistical Analysis Definitions



- Statistics Reported

Standard Deviation

$$S = \sqrt{\frac{\sum_{i=1}^N X_i^2 - \frac{\left(\sum_{i=1}^N X_i\right)^2}{N}}{N-1}}$$

% Relative Standard
Deviation
(%RSD)

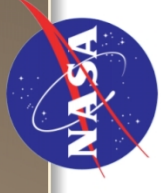
$$\%RSD = \frac{S}{\bar{X}} \times 100\%$$

Relative Percent
Difference
(RPD)

$$RPD = \frac{\left(X_1 - X_2\right)}{\bar{X}} \times 100$$



Odor Analysis Results



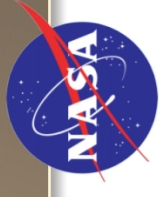
- Odor Round Robin Participants
 - JAXA
 - NASA WSTF



-
- A vertical film strip with 12 frames. The frames show a sequence of images related to space exploration: a bright orange flame, a view of the International Space Station, a close-up of a rocket engine, a view of the Space Shuttle Challenger, a close-up of a rocket engine, a view of the International Space Station, a bright orange flame, a view of the Space Shuttle Challenger, a close-up of a rocket engine, a view of the International Space Station, and a bright orange flame.

Sample Selection by NASA WSTF

Odor Analysis Results (continued)



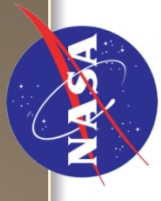
- Odor Round Robin Sample for 2007 (continued)
 - 06-40778, K-Flex ECO Closed Cell Elastomeric Foam

Center	Average Odor Value	RPD	RPD
JAXA (1/10 dilution)	0	--	--
NASA (1/10 dilution)	0.8	200	30
JAXA(no dilution)	1	--	--
NASA (no dilution)	1.2	18.18	18

Sample Selection by NASA WSTF



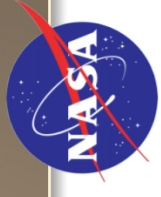
Toxic Offgassing Analysis Results



- Round Robin Participants
 - JAXA
 - ESA
 - NASA JSC
 - NASA MSFC
 - NASA WSTF



Toxic Offgassing Analysis Results (continued)



T-Values

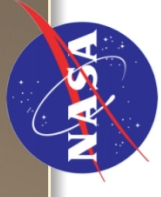
Material	JAXA	JSC	MSFC	WSTF	Average	STDEV	% RSD
06-40779, 3M 425 Aluminum	9.99766	0.00226	18.48	7.763	9.06	7.60	83.63
Tape06-40778, K-Flex ECO Closed Cell Elastomeric Foam	0.417765	0.00002	0.142816	0.17	0.18	0.17	46.11



- $$T = \frac{Q_{pg}}{\sum TL}$$

Closed Cell Elastomeric Foam





- JSC Intra-laboratory Comparison
 - T-Values Calculation and Values Provided by JSC

$$T = \sum \frac{Q_{pg}}{TL}$$

Where:

Qpg = micrograms of compound per gram of sample

TL = Toxic Limit ($\mu\text{g/g}$) = $\text{SMAC}(\text{in mg/m}^3) * (1.433 \text{ m}^3/\text{kg})$

(The $1.433 \text{ m}^3/\text{kg} = (65 \text{ m}^3/45.359 \text{ kg})$ conversion factor is based on the usage of 100 lbs. of material in a 65 m^3 space craft.)

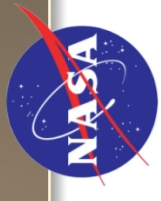
Material:

06-40779, 3M 425 Aluminum $T = 0.00226$

Tape06-40778, K-Flex ECO $T = 0.00002$

Closed Cell Elastomeric Foam





- MSFC Intra-laboratory Comparison
 - T-Values Calculation Used for MSFC Results

$$T = \sum \frac{Q_{pg}}{TL}$$

Where:

Qpg = micrograms of compound per gram of sample

TL = Toxic Limit ($\mu\text{g/g}$) = $\text{SMAC}(\text{in mg/m}^3) * (1.433 \text{ m}^3/\text{kg})$

(The $1.433 \text{ m}^3/\text{kg} = (65 \text{ m}^3/45.359 \text{ kg})$ conversion factor is based on the usage of 100 lbs. of material in a 65 m^3 space craft.)

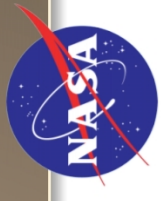
Material:

06-40779, 3M 425 Aluminum T = 18.480

Tape06-40778, K-Flex ECO T = 0.142816

Closed Cell Elastomeric Foam





- WSTF Intra-laboratory Comparison
 - T-Values Calculation Used for WSTF Results

$$T = \sum \frac{Q_{pg}}{TL}$$

Where:

μg_n = micrograms of compound n

TL_n = Toxic Limit (μg) for compound n

TL = SMAC (mg/m^3) X 65000

SMAC (ppm) Conversion = $0.4089 = 22.4 \text{ L/mole} \times (298/273)$

Material:

06-40779, 3M 425 Aluminum

$T = 7.763$

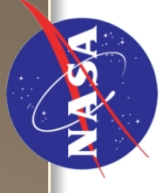
Tape06-40778, K-Flex ECO

$T = 0.170$

Closed Cell Elastomeric Foam



Gas Standard Results*

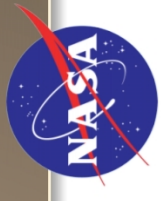


Compound	JAXA	JSC	MSFC	WSTF	Scott Specialty Gas Standard	Average	STDEV	% RSD
CARBON MONOXIDE	4.96	4.6	6.1	6.1	4.99	5.35	0.70	13.11
3-CHLORO-1-PROPENE	0.951	0.17	0.2	0.2	0.215	0.35	0.34	97.33
1,2-DICHLOROETHANE	0.181	0.22	0.41	0.41	0.21	0.29	0.11	39.80
METHYLENE CHLORIDE	4.37	5.9	2.15	2.15	5.35	3.98	1.76	44.22
VINYL CHLORIDE	-	1	1.2	1.2	1.07	1.12	0.10	8.90

* Values in PPM



Discussion



Areas of Concern

