**JSC TOXICOLOGY AND ENVIRONMENTAL CHEMISTRY GROUP**

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SUBJECT: Toxicological Assessment of ISS Air and Water Quality: September 11, 2015 – December 11, 2015 (Increment 45), Including OA-4 First Ingress

SUMMARY: Based on these data, air quality was acceptable on ISS for this period, and potable water remains acceptable for crew consumption.

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## AIR QUALITY

Seven mini grab sample containers (mGSCs) were collected on ISS during Increment 45 and were returned on 43S and SpX-8. Six mGSCs were collected as routine monthly samples in the US Laboratory (Lab) and the Russian Service Module (SM), the Japanese Pressurized Module (JPM), or Columbus (Col). Due to the loss of a formaldehyde resupply kit on 59P, nominal deployment of two pairs of passive-diffusion formaldehyde badges in the Lab and SM was not possible. Instead, a single passive-diffusion formaldehyde badge was deployed in the Lab on October 5, and another on October 29. A summary of the analytical results is provided in Table 1.

Table 1. Analytical summary of ISS air analyses

| Sample Location | Sample Date | NMVOCs[a] ($mg/m^3$) | Freon 218 ($mg/m^3$) | Alcohols[b] ($mg/m^3$) | T-Value[c] (units) | $CO_2$ ($mg/m^3$) | Formaldehyde ($\mu g/m^3$) |
|---|---|---|---|---|---|---|---|
| Lab | 10/5/2015 | 9.2 | 89 | 8.7 | 0.2 | 6800 | 32 |
| SM | 10/5/2015 | 12 | 73 | 9.2 | 0.4 | 5500 | -- |
| Lab | 10/29/2015 | 8.2 | 76 | 7.8 | 0.2 | 5600 | 39 |
| JPM | 10/29/2015 | 8.5 | 77 | 8.1 | 0.2 | 6000 | -- |
| Lab | 11/30/2015 | 7.7 | 45 | 7.2 | 0.2 | 6800 | -- |
| Col | 11/30/2015 | 8.3 | 43 | 7.6 | 0.2 | 6800 | -- |
| OA-4 Ingress | 12/10/2015 | 23 | 195 | 5.7 | (2.2) 2.9 | 3100 | -- |
| *Guideline* | | *<25* | --- | *<5* | *<1*[d] | *<7100*[e] | *<120* |

[a]Non-methane volatile organic hydrocarbons, excluding Freon 218
[b]Includes acetone
[c]Sum of the ratios of the measured concentration and the corresponding 180-day SMAC for each compound, excluding $CO_2$; parentheses indicate value based on 7-day SMACs and applicable to first ingress
[d]T-value <1 used to evaluate routine monthly sampling; <3 used to evaluate first ingress
[e]$CO_2$ to be controlled as low as reasonably achievable (ALARA) – currently 3 mmHg (7100 $mg/m^3$) or lower

Data tables containing concentrations and corresponding T-values based on appropriate SMACs for compounds present at levels above the detection limit are enclosed. Complete data tables including compounds assessed but not detected are available upon request. The average relative recoveries of the 3 surrogate standards from the mGSCs were as follows: 13C-acetone, 95 ± 5%; fluorobenzene-d5, 100 ± 5%; and chlorobenzene-d5, 98 ± 7%. For the passive-diffusion formaldehyde badges, in-flight positive control

badges were not returned for analysis, so 2 positive laboratory controls were used instead. Recoveries were 112 and 91%, respectively.

Simultaneous automated sampling sessions are scheduled on the Air Quality Monitors (AQMs) every 73 hours, which results in 2-3 sampling sessions per unit per week. Monthly average concentrations as well as the Increment average concentrations are presented in Table 2. During Increment 45, AQM unit 1 (S/N 1003) remained inoperable, so data reported were obtained from AQM unit 2 (S/N 1004), which was located in the US Lab for the duration of the Increment. Underreporting of ethanol on AQM S/N 1004 is thought to have occurred during the last part of Increment 45 due to decreased sensitivity, but this is not expected to have impacted crew health. The instrument was replaced on February 3, after which ethanol levels returned to higher levels that are more consistent with Increment 45 mGSC monthly sample results.

Table 2. Average monthly concentrations ($mg/m^3$) of AQM target compounds.

| | Sept | Oct | Nov | Dec | Average |
|---|---|---|---|---|---|
| 2-Propanol† | -- | -- | -- | -- | -- |
| Acetone† | -- | -- | -- | -- | -- |
| Acrolein† | -- | -- | -- | -- | -- |
| Benzene† | -- | -- | -- | -- | -- |
| 1,2-Dichloroethane† | -- | -- | -- | -- | -- |
| Decamethylcyclopentasiloxane& | 1.6# | 1.5# | 1.3# | 1.1# | 1.4# |
| Hexanal† | -- | -- | -- | -- | -- |
| Hexane† | -- | -- | -- | -- | -- |
| m,p-Xylenes | ND# | ND# | ND# | ND# | ND# |
| Methanol† | -- | -- | -- | -- | -- |
| o-Xylene | TRACE# | TRACE# | TRACE# | TRACE# | TRACE# |
| Octamethylcylcotetrasiloxane | ND# | ND# | ND# | ND# | ND# |
| Toluene | ND# | ND# | ND# | ND# | ND# |
| 2-Butanone | ND | ND | ND | ND | ND |
| Acetaldehyde | 0.3 | 0.2 | 0.3 | 0.1 | 0.2 |
| Dichloromethane | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Ethanol | 5.6 | 3.6 | 3.5 | 3.3 | 4.0 |
| Ethyl Acetate | TRACE | 0.1 | 0.1 | 0.1 | 0.1 |
| Hexamethycyclotrisiloxane | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| n-Butanol | TRACE | TRACE | TRACE | 0.1 | TRACE |
| Trimethylsilanol | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |

&Trending only

#Data reported are from the non-prime Unit 2 as available

†No values reported due to inoperational AQM unit 1 (S/N 1003)

**Toxicological Evaluation of ISS Air Quality**

Routine monthly mGSC sampling provides a limited set of samples but is complementary to in-flight air monitoring data collected by the AQM. **All measured values (mGSC and AQM) met T-value guideline criteria (T < 1 for monthly samples and T < 3 for first ingress sample), indicating no concern for crew health.** The average T-value for Increment 45 calculated from the routine mGSC samples was 0.2 (Figure 1). Despite the loss of AQM Unit 1, the average T-value calculated from the AQM data (Figure 2) was comparable (0.2), because the primary contributors to the T-value, hexamethylcyclotrisiloxane (HMCTS), acetaldehyde, and trimethylsilanol (TMS), are all measured on Unit 2. The reported values continue to be approximately half of historical averages, likely due to installation of carbon filters in Node 1 in May 2015.

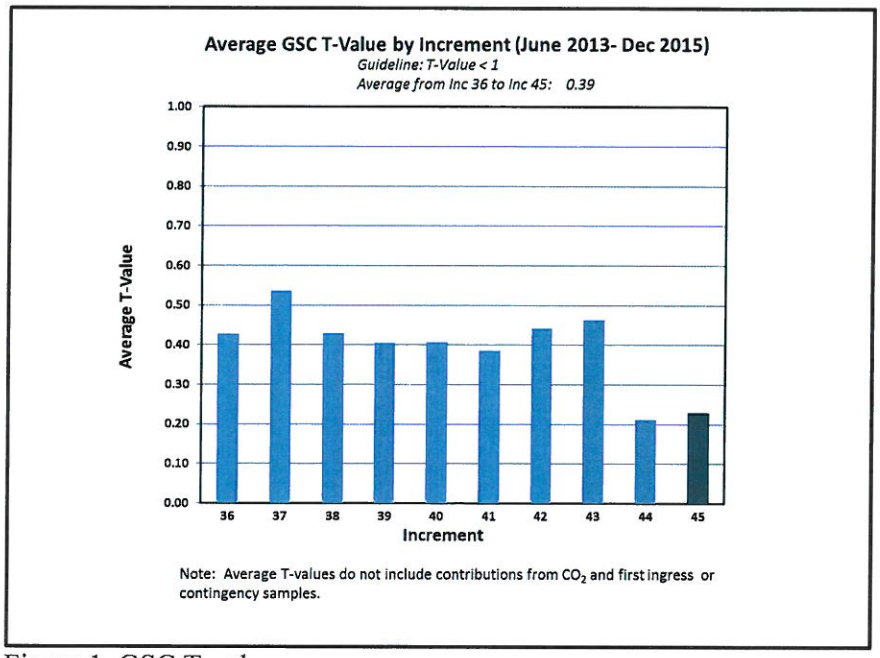


Figure 1. GSC T-values

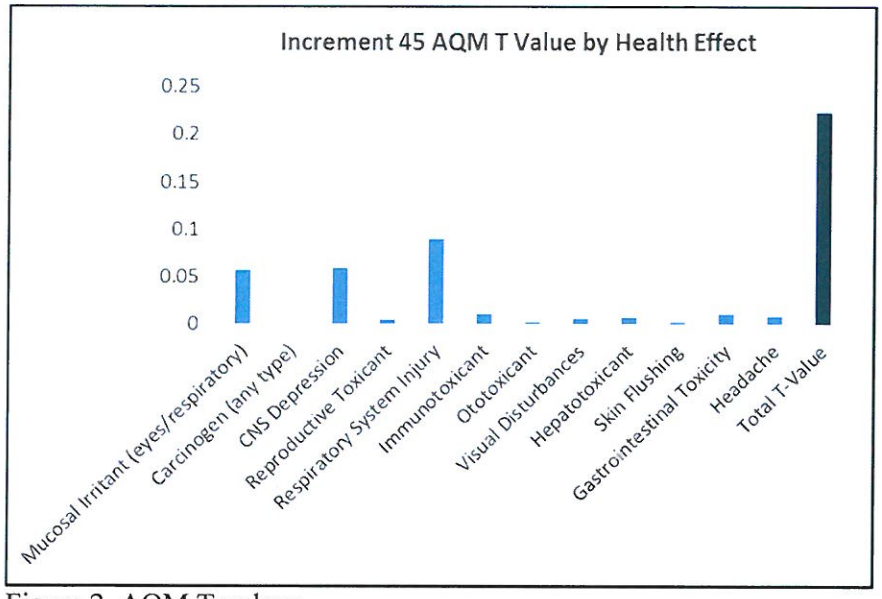


Figure 2. AQM T-values

Carbon dioxide concentrations measured from mGSC samples did not exceed the 3 mmHg (7100 mg/m$^3$) limit as requested for this Increment in Chit 013695. However, the mGSCs provide only a snapshot of conditions and are not ideal for evaluating potential $CO_2$ exposures. The major constituent analyzer (MCA) provides routine monitoring of $CO_2$ levels. Reported MCA 24 hour average levels in October, November, and December frequently exceeded 3 mmHg (7100 mg/m$^3$). During a one week period in mid-October, the Carbon Dioxide Removal Assemblies (CDRAs) were deactivated during a multiplexer/demultiplexer (MDM) memory refresh followed by a Node 3 CDRA failure which resulted in the Lab CDRA being used for primary $CO_2$ control. Also, to preserve bed life, the Lab unit was operated at a lower fan speed which limits performance. Symptoms reported by the crew during this period were described as "tolerable." In November and December, 24 hour $CO_2$ concentrations averaged approximately 3.0 mmHg, but slightly

exceeded the Increment limit several times due to issues with CDRAs. Node 3 CDRA was periodically inoperable throughout this period.

**Alcohol values in all routine monthly samples continue to exceed the alcohol guideline of <5 mg/m$^3$, which is intended to protect the water recovery system from risk of overloading.** These levels are primarily due to a sustained increase in ethanol levels on ISS. Elevated ethanol levels were also detected in US water samples during this Increment (see Water Quality discussion below). Formaldehyde levels in the US Lab (shown in Table 1 and Figure 3) are generally consistent with historic levels and remain below the SMAC of 120 μg/m$^3$.

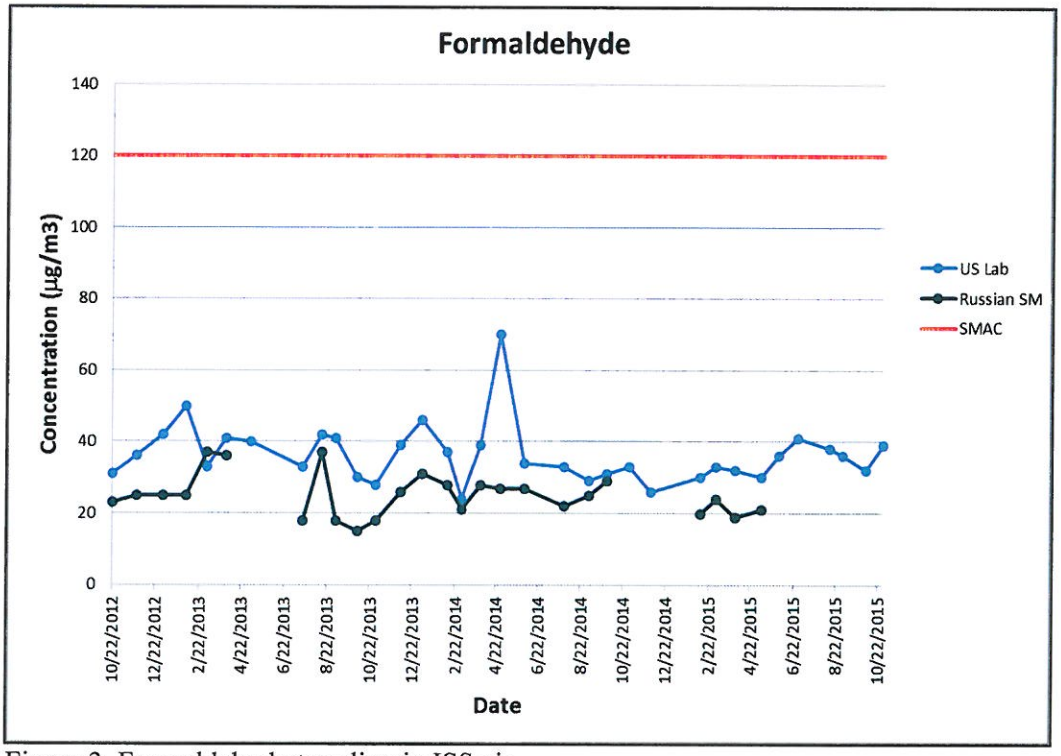


Figure 3. Formaldehyde trending in ISS air.

*OA-4 First Ingress*

Overall, contaminant levels at first ingress were higher than levels seen for OA-2. The difference was primarily attributable to CO (1.4 mg/m$^3$ versus 11 mg/m$^3$), TMS (0.41 mg/m$^3$ versus 2.4 mg/m$^3$), isopropanol (1.2 mg/m$^3$ versus 2.1 mg/m$^3$), and octafluoropropane (Freon 218). However, there were significant decreases in HMCTS (6.4 mg/m$^3$ versus 2.0 mg/m$^3$) and methane (9.8 mg/m$^3$ versus 2.9 mg/m$^3$). The concentration of Freon 218, a relatively non-toxic compound typically present on ISS, was significantly higher in the OA-4 ingress sample than for the other three Orbital vehicle ingress samples and ISS background levels. The amount of Freon 218 in a first ingress sample would typically be used to estimate the degree of dilution with the ISS atmosphere prior to sample collection. However, six units containing 115-134 mL of Freon 218 were flown as part of a microsatellite propulsion payload on OA-4. Since MCA data in COL2 and Node 3 recorded at the time of OA-4 first ingress indicate that $CO_2$ in the ingress sample was only 45% of the ISS background, this suggests that payload leakage, in addition to ISS air infiltration, may have contributed to elevated Freon 218 levels. The calculated T-value at first ingress was consistent with the predicted T-value of 2.4 based on pre-flight off-gas testing conducted by the Toxicology and Environmental Chemistry Laboratory. TMS and fluorotrimethylsilane were the only compounds that contributed significantly to the pre-flight total T-value. In flight, CO contributed to the T-value in addition to TMS and fluorotrimethylsilane.

## WATER QUALITY

Archive samples were collected from the potable water dispenser (PWD) in the US segment and the SVO-ZV and SRV-K systems in the Russian segment during Increment 45. In addition, samples of wastewater and condensate were also collected from the US segment during this increment and returned on Soyuz 43. Due to limited sample volume, total solids were not measured on any of the Increment 45 samples, but all other organic and inorganic analyses were performed. Complete data tables with results from these analyses can be found in report #2016-TEC-WQ-002. A summary of select analytical results is provided in Tables 3-5 below. Expanded summary tables containing organic carbon recoveries and results for analytes detected in the samples at concentrations above reporting limits are included as attachments to this report.

Table 3. Analytical Summary of ISS Water Analyses

| Sample Location | Sample Date | TOC (mg/L) | DMSD (mg/L) | Conductivity (µS/cm) | Total Iodine (mg/L) | Total Silver (µg/L) | Manganese (µg/L) |
|---|---|---|---|---|---|---|---|
| PWD (ambient) | 12/1/2015 | <0.1 | <1 | 2 | <0.05 | <1 | <1 |
| PWD (hot) | 11/10/2015 | <0.1 | <1 | 2 | <0.05 | <1 | <1 |
| US Wastewater (composite) | 11/19/2015 11/30/2015 | 27 [b] | 13 | 124 | N/A | 4 | 5 |
| US Condensate | 10/29/2015 | 97 [b] | 49 | 350 | N/A | 12 | 25 |
| SVO-ZV | 12/1/2015 | 1.1 | <1 | 320[a] | <0.05 | 102 | 67[c] |
| SRV-K (warm) | 12/1/2015 | 0.8 | <1 | 260[a] | <0.05 | 77 | 59[c] |

[a]Russian water system is intentionally mineralized.
[b]TOC levels are high in wastewater and humidity condensate, but the water recovery system successfully scrubs these compounds prior to consumption.
[c]Level exceeds MORD limit (50 µg/L), but is below the US SWEG (300 µg/L).

**Toxicological Evaluation of ISS Water Quality:** Routine water quality monitoring is performed in-flight using the total organic carbon analyzer (TOCA). The colorimetric water quality monitor kit (CWQMK) is also available to monitor biocide levels on an as needed basis. Results from these analyses provide a general indication of overall water quality. Archive water samples are collected during each increment and returned for analysis in ground laboratories. Data from the ground analyses complement the in-flight data and provide a more complete understanding of water quality on the ISS.

*Potable Water*

All chemical parameters measured in U.S. potable water samples collected during Increment 45 met the requirements listed in SSP 41000. Total organic carbon (TOC) data from in-flight and archival (ground analyzed) sampling of the U.S. potable water system conducted between September 11, 2015 and December 11, 2015 are shown in Figure 4. The TOC concentrations measured by the TOCA in the U.S. potable water samples (designated as "PWD TOC") were below the method reporting limit (0.285 mg/L). The TOC concentrations measured for the U.S. archive samples ("Archive TOC"), which were collected in November and December, were well below the 3.0 mg/L Spacecraft Water Exposure Guideline (SWEG). Product water samples (WPA PFU2) analyzed prior to iodine removal illustrate the decrease in TOC levels following installation of new multifiltration beds. **Importantly, TOC levels in the US potable water system were below the Spacecraft Water Exposure Guideline (SWEG) of 3.0 mg/L throughout the increment.** Although dimethylsilanediol (DMSD) was present in the wastewater and humidity condensate, it was not detected in any of the archive potable water samples collected in November and December. Only

trace levels of other organics were detected. Silicon was detected in both samples (ambient = 30 µg/L and hot = 62 µg/L) at levels typically found when no DMSD is present. Detectable levels of aluminum, nickel, and zinc were also present in the US potable water samples.

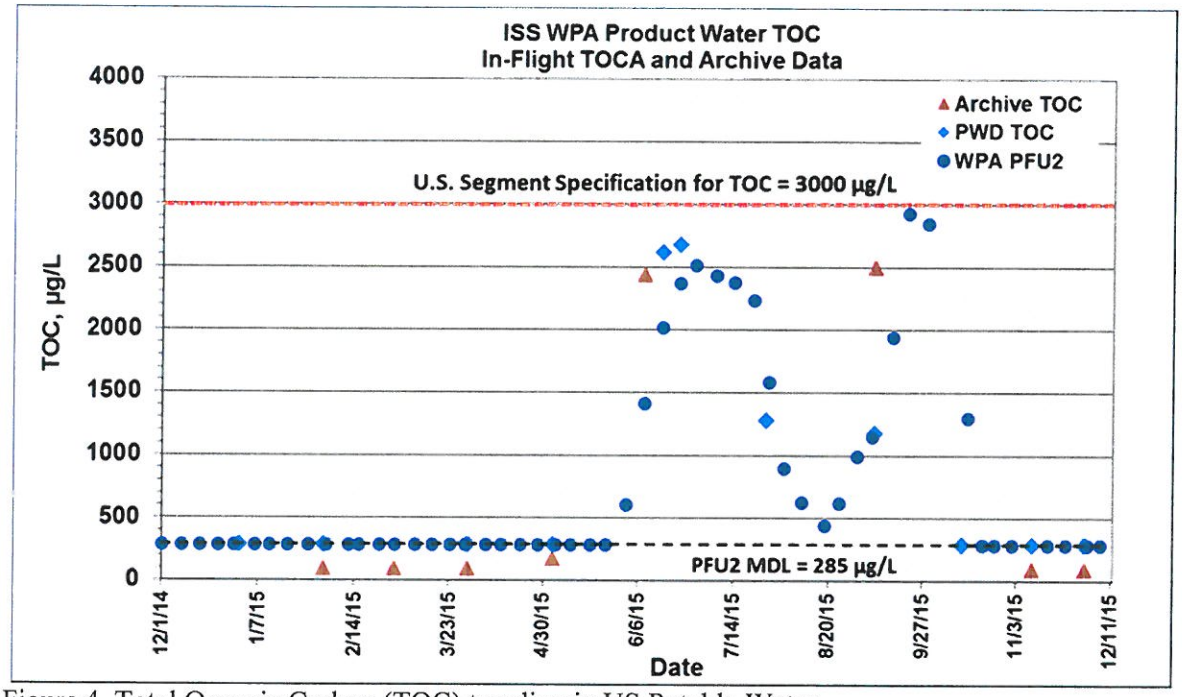


Figure 4. Total Organic Carbon (TOC) trending in US Potable Water

**Aside from the manganese detected in the Russian segment samples, all compounds measured in these archive samples were below MORD limits.** Manganese has consistently exceeded the MORD limit of 50 µg/L in samples from the SVO-ZV and SRV-K, but remains well below the US SWEG of 300 µg/L. Turbidity was above the MORD limit (1.5 mg/L) for the SRV-K sample, but this only affects the aesthetic quality of the water and therefore does not indicate toxicological risk. In addition to inorganic silicon, detectable levels of zinc, aluminum, barium, nickel, iron, and copper were present in at least one of the Russian samples. Inorganic levels are higher in Russian water, which is mineralized to improve palatability. All other inorganic compounds measured in archive samples were below MORD limits, indicating no concern for crew consumption.

Iodine and silver are biocides used on the US and Russian segments, respectively. Iodine is added to the water produced by the Water Processor Assembly (WPA), but it is removed prior to crew consumption to avoid potential thyroid dysfunction. Total iodine levels in the samples collected from the PWD were below detection limits (0.05 mg/L), indicating effective removal of iodine. Conversely, silver levels in Russian water samples are expected to remain above the minimal effective biocidal level of 0.1 mg/L or 100 µg/L. Levels in the SVO-ZV met this minimum, but levels in the SRV-K warm (77 µg/L) were below the minimal effective biocide level, which increases the risk of microbial growth. For additional information regarding microbial analyses, please contact the Environmental Microbiology Laboratory for post-flight reports for Increment 45.

*Wastewater*

US Wastewater is a composite of humidity condensate and urine distillate that is stored in the waste tank of the WPA prior to being processed into potable water. The TOC concentration in the sample was 27.1 mg/L, which is higher than Increment 44 (11.6 mg/L), but still less than typical U.S. wastewater concentrations (> 40 mg/L). Multiple compounds were detected at concentrations above 1 mg/L, including

DMSD (13.0 mg/L), acetone (5.5 mg/L), ethanol (16.0 mg/L), methanol (5.3 mg/L), acetate (1.7 mg/L), ethylene glycol (1.1 mg/L), and propylene glycol (2.8 mg/L). The silicon concentration in the sample (4.7 mg/L) was below the historical average while ammonium (14.2 mg/L, as N) was comparable to previous samples. The observed levels of alcohols do not pose a concern for crew health, but may negatively impact the performance of the water recovery system. Metals detected above 0.1 mg/L included zinc (2.9 mg/L) and nickel (0.3 mg/L). Traces of aluminum, chromium, iron, manganese, and silver were also present, but levels in potable water were within acceptable limits.

*Condensate*

The TOC concentration in the Lab condensate tank (collected on October 29, 2015) was 97 mg/L, which is below the historical average of 173 mg/L. Multiple compounds were detected at concentrations above 1.0 mg/L, but were comparable to those previously reported. The ethanol concentration (41.7 mg/L) was significantly lower than in the Increment 43 condensate sample (180 mg/L) and was within the normal range. This finding is consistent with data from the ISS AQM, which showed a lower than expected ethanol concentration over the course of the increment. DMSD and silicon were higher than Increment 43 condensate (49.0 mg/L vs. 34.0 mg/L for DMSD; 16.0 mg/L vs. 12.6 mg/L for silicon).

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Concurrence by Valerie Ryder, Ph.D., DABT
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Date

Enclosures

Tables 1 and 1A: Analytical concentrations of compounds quantified in mGSCs returned on 43S and SpX-8

Table 2: T-values corresponding to concentrations in Table 1, based on 180-day SMACs

Table 2A: T-values corresponding to concentrations for OA-4 first ingress in Table 1A, based on 7-day and 180-day SMACs

Table 3: Analytical concentrations of compounds quantified in US potable water samples returned on 43S

Table 4: Analytical concentrations of compounds quantified in Russian potable water samples returned on 43S

Table 5: Analytical concentrations of compounds quantified in US wastewater and condensate samples returned on 43S

**TABLE 1**
**ANALYTICAL RESULTS OF SOYUZ 43 RETURN GRAB AIR SAMPLES**

| CHEMICAL CONTAMINANT | CONCENTRATION (mg/M3) | | | | | |
|---|---|---|---|---|---|---|
| | **AQ160019 SN 2004 LAB 10/05/15 @ 14:45 GMT** | **AQ160020 SN 2005 SM 10/05/15 @ 14:48 GMT** | **AQ160021 SN 2006 LAB 10/29/15 @ 14:43 GMT** | **AQ160022 SN 2010 JPM 10/29/15 @ 14:44 GMT** | **AQ160023 SN 2011 LAB 11/30/15 @ 11:48 GMT** | **AQ160024 SN 2094 COL 11/30/15 @ 11:51 GMT** |
| **TARGET COMPOUNDS (TO-15) **** | | | | | | |
| Octafluoropropane (Perfluoropropane) * | **89** | **73** | **76** | **77** | **45** | **43** |
| Perfluoro(2-methylpentane) | <0.050 | 0.24 | <0.050 | <0.050 | <0.050 | <0.050 |
| Methanol | 0.59 | 0.40 | 0.41 | 0.62 | 0.40 | 0.61 |
| Acetaldehyde | 0.21 | 0.22 | 0.18 | 0.19 | 0.20 | 0.23 |
| 2-Methyl-1-propene | <0.025 | 0.054 | <0.025 | <0.025 | <0.025 | <0.025 |
| Ethanol * | **7.3** | **7.4** | **6.7** | **6.8** | **6.0** | **6.1** |
| Acetone | 0.44 | 0.36 | 0.39 | 0.37 | 0.42 | 0.44 |
| 2-Propanol (Isopropanol) * | 0.35 | 1.0 | 0.30 | 0.24 | 0.35 | 0.39 |
| Isoprene (2-Methyl-1,3-butadiene) | TRACE | <0.050 | TRACE | TRACE | TRACE | TRACE |
| 2-Methyl-2-propanol | <0.025 | 0.026 | <0.025 | <0.025 | <0.025 | <0.025 |
| Methyl acetate | 0.039 | 0.034 | TRACE | TRACE | TRACE | TRACE |
| Carbon disulfide | TRACE | TRACE | <0.025 | <0.025 | <0.025 | <0.025 |
| 1-Propanol | TRACE | 0.031 | 0.025 | 0.025 | TRACE | TRACE |
| Trimethylsilanol | 0.089 | 0.73 | 0.069 | 0.13 | 0.072 | 0.13 |
| Butanal (Butyraldehyde) | <0.025 | TRACE | <0.025 | <0.025 | <0.025 | <0.025 |
| 2-Butanone (Methyl ethyl ketone) | TRACE | TRACE | <0.025 | <0.025 | TRACE | TRACE |
| Ethyl acetate | 0.068 | 0.081 | 0.027 | 0.027 | 0.029 | 0.031 |
| 1,2-Dichloroethane | TRACE | <0.025 | TRACE | TRACE | TRACE | TRACE |
| 1-Butanol | TRACE | 0.050 | TRACE | 0.026 | 0.029 | 0.032 |
| 3-Methylhexane | TRACE | TRACE | TRACE | TRACE | TRACE | TRACE |
| Pentanal | <0.025 | TRACE | <0.025 | <0.025 | <0.025 | <0.025 |
| 4-Methyl-2-pentanone (MIBK) | <0.025 | TRACE | <0.025 | <0.025 | <0.025 | <0.025 |
| Toluene | TRACE | TRACE | <0.025 | TRACE | TRACE | TRACE |
| Butyl acetate | <0.025 | TRACE | <0.025 | <0.025 | <0.025 | <0.025 |
| Ethylbenzene | <0.025 | TRACE | <0.025 | <0.025 | TRACE | TRACE |
| m & p-Xylene | <0.050 | TRACE | <0.050 | <0.050 | <0.050 | <0.050 |
| o-Xylene | 0.033 | 0.072 | <0.025 | <0.025 | <0.025 | <0.025 |
| Decamethylcyclopentasiloxane | <0.15 | <0.15 | <0.15 | <0.15 | <0.15 | 0.15 |
| | | | | | | |
| **SPECIAL INTEREST COMPOUNDS ***** | | | | | | |
| Hexamethylcyclotrisiloxane # | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | TRACE |
| | | | | | | |
| **NON-TARGET COMPOUNDS ***** | | | | | | |
| 1,1-Difluoroethane | <0.050 | 0.12 | <0.050 | <0.050 | <0.050 | <0.050 |
| Carbonic acid, dimethyl ester | TRACE | <0.050 | TRACE | TRACE | TRACE | TRACE |
| C12-Alkane | <0.050 | 0.18 | <0.050 | <0.050 | <0.050 | <0.050 |
| C12-Alkane | <0.050 | 0.15 | <0.050 | <0.050 | <0.050 | <0.050 |
| C12-Alkane | <0.050 | 0.18 | <0.050 | <0.050 | <0.050 | <0.050 |
| C12-Alkane | <0.050 | 0.13 | <0.050 | <0.050 | <0.050 | <0.050 |
| C12-Alkane | <0.050 | 0.11 | <0.050 | <0.050 | <0.050 | <0.050 |
| C12-Alkane | <0.050 | TRACE | <0.050 | <0.050 | <0.050 | <0.050 |
| | | | | | | |
| **TOTAL ALCOHOLS PLUS ACETONE** | **8.7** | **9.2** | **7.8** | **8.1** | **7.2** | **7.6** |
| | | | | | | |
| **TARGET COMPOUNDS (GC) **** | | | | | | |
| Carbon Monoxide | 1.1 | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 |
| Methane | 7.4 | 6.5 | 5.5 | 5.4 | 4.8 | 4.8 |
| Hydrogen | 5.2 | 4.4 | 6.5 | 6.6 | 6.7 | 6.7 |
| Carbon Dioxide | 6800 | 5500 | 5600 | 6000 | 6800 | 6800 |
| | | | | | | |
| **TOTAL CONCENTRATION (NON-METHANE HYDROCARBONS)** | **98** | **85** | **84** | **85** | **52** | **51** |
| | | | | | | |
| **TOTAL CONCENTRATION - OFP (NON-METHANE HYDROCARBONS)** | **9.2** | **12** | **8.2** | **8.5** | **7.7** | **8.3** |

* GC/FID data results are in bold

** Quantified using a multi-point calibration

*** Quantified using "B" response factor except where noted; concentrations are estimates only.

# Response factor generated from an internal study

< : Value is less than the laboratory report detection limit.

TRACE: Amount detected is sufficient for compound identification only.

OFP - Octafluoropropane

**TABLE 1A**
**ANALYTICAL RESULTS OF**
**SPACEX-8 RETURN OA-4 INGRESS GRAB AIR SAMPLE**

| CHEMICAL CONTAMINANT | CONCENTRATION ($mg/M^3$) AQ160100 SN 2015 OA-4 Ingress 12/10/15 @ 09:50 GMT |
|---|---|
| **TARGET COMPOUNDS (TO-15) **** | |
| Octafluoropropane (Perfluoropropane) * | **195** |
| Propene | TRACE |
| Propane | 0.030 |
| Carbonyl sulfide (Carbon oxide sulfide) | 0.096 |
| Chloromethane | TRACE |
| Isobutane | 0.71 |
| Methanol | 0.44 |
| Acetaldehyde | 0.26 |
| 2-Methyl-1-propene | 0.29 |
| Butane | 0.027 |
| Ethanol | **2.7** |
| Acetone | 0.45 |
| Propanal (Propionaldehyde) | TRACE |
| 2-Propanol (Isopropanol) | **2.1** |
| Isoprene (2-Methyl-1,3-butadiene) | TRACE |
| 2-Methyl-2-propanol | 0.045 |
| Methyl acetate | TRACE |
| Methylene chloride (Dichloromethane) | TRACE |
| Carbon disulfide | 0.088 |
| 1-Propanol | 0.042 |
| Trimethylsilanol | 2.4 |
| Butanal (Butyraldehyde) | TRACE |
| 2-Butanone (Methyl ethyl ketone) | 0.24 |
| Ethyl acetate | 0.10 |
| 1-Butanol | 0.060 |
| 3-Methylhexane | 0.039 |
| 4-Methyl-2-pentanone (MIBK) | TRACE |
| Toluene | 0.089 |
| Hexanal | TRACE |
| m & p-Xylene | TRACE |
| o-Xylene | TRACE |
| Octamethylcyclotetrasiloxane | 0.17 |
| Decamethylcyclopentasiloxane | TRACE |
| | |
| **SPECIAL INTEREST COMPOUNDS ***** | |
| 2-Methyl-2-propenal | TRACE |
| Hexamethylcyclotrisiloxane # | 2.0 |
| | |
| **NON-TARGET COMPOUNDS ***** | |
| 1,1,1,2-Tetrafluoroethane | 0.52 |
| Chlorotrifluoroethene | 0.068 |
| Pentafluoropropane | 6.0 |
| Fluorotrimethylsilane | 0.93 |
| Carbonic acid, dimethyl ester | 0.072 |
| 2-Methyl-1-propanol | 0.054 |
| Cyclohexane | TRACE |
| Hexamethyldisiloxane | 0.91 |
| C11-Alkane | 0.23 |
| C11-Alkane | 0.053 |
| C11-Alkane | TRACE |
| C11-Alkane | 0.062 |
| C12-Alkane | 0.074 |
| C12-Alkane | 0.35 |
| C12-Alkane | 0.15 |
| C12-Alkane | 0.43 |
| C12-Alkane | 0.072 |
| C12-Alkane | 0.33 |
| C12-Alkane | 0.35 |
| C12-Alkane | 0.14 |
| C12-Alkane | TRACE |
| | |
| **TOTAL ALCOHOLS PLUS ACETONE** | **5.7** |
| | |
| **TARGET COMPOUNDS (GC) **** | |
| Carbon monoxide | 11 |
| Methane | 2.9 |
| Hydrogen | 3.1 |
| Carbon dioxide | 3100 |
| | |
| **TOTAL CONCENTRATION (NON-METHANE HYDROCARBONS)** | **220** |
| | |
| **TOTAL CONCENTRATION - OFP (NON-METHANE HYDROCARBONS)** | **23** |

* GC/FID data results are in bold
** Quantified using a multi-point calibration
*** Quantified using "B" response factor except where noted;
concentrations are estimates only.
# Response factor generated from an internal study
< : Value is less than the laboratory report detection limit.
TRACE: Amount detected is sufficient for compound identification only.
OFP - Octafluoropropane

**TABLE 2**
**T-VALUES FOR 43S RETURN GRAB AIR SAMPLES**

| CHEMICAL CONTAMINANT | T-VALUE (180-d SMAC) | | | | | |
|---|---|---|---|---|---|---|
| | **AQ160019 SN 2004 LAB 10/05/15 @ 14:45 GMT** | **AQ160020 SN 2005 SM 10/05/15 @ 14:48 GMT** | **AQ160021 SN 2006 LAB 10/29/15 @ 14:43 GMT** | **AQ160022 SN 2010 JPM 10/29/15 @ 14:44 GMT** | **AQ160023 SN 2011 LAB 11/30/15 @ 11:48 GMT** | **AQ160024 SN 2094 COL 11/30/15 @ 11:51 GMT** |
| **TARGET COMPOUNDS (TO-15)** | | | | | | |
| Octafluoropropane (Perfluoropropane) | 0.00105 | 0.00086 | 0.00089 | 0.00090 | 0.00052 | 0.00050 |
| Perfluoro(2-methylpentane) & | ND | 0.00000 | ND | ND | ND | ND |
| Isobutane | ND | 0.00020 | ND | ND | ND | ND |
| Methanol | 0.00661 | 0.00446 | 0.00460 | 0.00689 | 0.00443 | 0.00676 |
| Acetaldehyde | 0.05334 | 0.05402 | 0.04561 | 0.04852 | 0.04932 | 0.05803 |
| 2-Methyl-1-propene | ND | 0.00005 | ND | ND | ND | ND |
| Ethanol | 0.00363 | 0.00368 | 0.00334 | 0.00338 | 0.00301 | 0.00305 |
| Acetone | 0.00847 | 0.00701 | 0.00752 | 0.00717 | 0.00803 | 0.00844 |
| 2-Propanol (Isopropanol) | 0.00231 | 0.00693 | 0.00201 | 0.00162 | 0.00232 | 0.00261 |
| Isoprene (2-Methyl-1,3-butadiene) | 0.00833 | ND | 0.00833 | 0.00833 | 0.00833 | 0.00833 |
| 2-Methyl-2-propanol | ND | 0.00022 | ND | ND | ND | ND |
| Methyl acetate | 0.00032 | 0.00029 | 0.00010 | 0.00010 | 0.00010 | 0.00010 |
| Carbon disulfide | 0.00078 | 0.00078 | ND | ND | ND | ND |
| 1-Propanol | 0.00013 | 0.00032 | 0.00026 | 0.00026 | 0.00013 | 0.00013 |
| Trimethylsilanol | 0.02236 | 0.18198 | 0.01720 | 0.03195 | 0.01793 | 0.03333 |
| Butanal (Butyraldehyde) | ND | 0.00096 | ND | ND | ND | ND |
| 2-Butanone (Methyl ethyl ketone) | 0.00042 | 0.00042 | ND | ND | 0.00042 | 0.00042 |
| Ethyl acetate | 0.00038 | 0.00045 | 0.00015 | 0.00015 | 0.00016 | 0.00017 |
| 1,2-Dichloroethane | 0.00781 | ND | 0.00781 | 0.00781 | 0.00781 | 0.00781 |
| 1-Butanol | 0.00031 | 0.00124 | 0.00031 | 0.00064 | 0.00073 | 0.00080 |
| 3-Methylhexane | 0.00104 | 0.00104 | 0.00104 | 0.00104 | 0.00104 | 0.00104 |
| Pentanal | ND | 0.00078 | ND | ND | ND | ND |
| 4-Methyl-2-pentanone (MIBK) | ND | 0.00009 | ND | ND | ND | ND |
| Toluene | 0.00083 | 0.00083 | ND | 0.00083 | 0.00083 | 0.00083 |
| Butyl acetate | ND | 0.00007 | ND | ND | ND | ND |
| Ethylbenzene | ND | 0.00025 | ND | ND | 0.00025 | 0.00025 |
| m & p-Xylene | ND | 0.00068 | ND | ND | ND | ND |
| o-Xylene | 0.00090 | 0.00196 | ND | ND | ND | ND |
| Decamethylcyclopentasiloxane | ND | ND | ND | ND | ND | 0.01020 |
| | | | | | | |
| **SPECIAL INTEREST COMPOUNDS** | | | | | | |
| Hexamethylcyclotrisiloxane | ND | ND | ND | ND | ND | 0.00556 |
| | | | | | | |
| **NON-TARGET COMPOUNDS** | | | | | | |
| 1,1-Difluoroethane | ND | 0.00181 | ND | ND | ND | ND |
| Carbonic acid, dimethyl ester | 0.00250 | ND | 0.00250 | 0.00250 | 0.00250 | 0.00250 |
| C12-Alkane | ND | 0.00341 | ND | ND | ND | ND |
| C12-Alkane | ND | 0.00287 | ND | ND | ND | ND |
| C12-Alkane | ND | 0.00352 | ND | ND | ND | ND |
| C12-Alkane | ND | 0.00242 | ND | ND | ND | ND |
| C12-Alkane | ND | 0.00220 | ND | ND | ND | ND |
| C12-Alkane | ND | 0.00048 | ND | ND | ND | ND |
| | | | | | | |
| **TARGET COMPOUNDS (GC)** | | | | | | |
| CARBON MONOXIDE | 0.06293 | 0.06293 | 0.06005 | 0.06037 | 0.05888 | 0.06158 |
| METHANE | 0.00212 | 0.00186 | 0.00158 | 0.00156 | 0.00137 | 0.00137 |
| HYDROGEN | 0.01516 | 0.01300 | 0.01906 | 0.01927 | 0.01984 | 0.01984 |
| CARBON DIOXIDE | 0.52491 | 0.42611 | 0.43155 | 0.46329 | 0.52432 | 0.52432 |
| | | | | | | |
| **TOTAL T-VALUE** | **0.72664** | **0.79014** | **0.61394** | **0.66660** | **0.71230** | **0.75800** |
| | | | | | | |
| **TOTAL T-VALUE - CO2** | **0.20173** | **0.36403** | **0.18239** | **0.20331** | **0.18798** | **0.23367** |

ND : Value is less than the laboratory report detection limit.
Note: Number of decimal places in T-Values do not represent significant figures of measurements.

**TABLE 2A**
**T-VALUES FOR OA-4 INGRESS GRAB AIR SAMPLE**

| CHEMICAL CONTAMINANT | T-VALUE (7-d SMAC) | T-VALUE (180-d SMAC) |
|---|---|---|
| | **AQ160100 SN 2015 OA-4 Ingress 12/10/15 @ 09:50 GMT** | **AQ160100 SN 2015 OA-4 Ingress 12/10/15 @ 09:50 GMT** |
| **TARGET COMPOUNDS (TO-15)** | | |
| Octafluoropropane (Perfluoropropane) | 0.00229 | 0.00229 |
| Propene | 0.00029 | 0.00029 |
| Propane | 0.00028 | 0.00543 |
| Carbonyl sulfide (Carbon oxide sulfide) | 0.00803 | 0.00803 |
| Chloromethane | 0.00030 | 0.00030 |
| Isobutane | 0.00297 | 0.00349 |
| Methanol | 0.00490 | 0.00436 |
| Acetaldehyde | 0.06577 | 0.06577 |
| 2-Methyl-1-propene | 0.00026 | 0.00026 |
| Butane | 0.00019 | 0.00383 |
| Ethanol | 0.00134 | 0.00134 |
| Acetone | 0.00863 | 0.00863 |
| Propanal (Propionaldehyde) | 0.00114 | 0.00114 |
| 2-Propanol (Isopropanol) | 0.01378 | 0.01378 |
| Isoprene (2-Methyl-1,3-butadiene) | 0.00208 | 0.00417 |
| 2-Methyl-2-propanol | 0.00030 | 0.00038 |
| Methyl acetate | 0.00010 | 0.00010 |
| Methylene chloride (Dichloromethane) | 0.00026 | 0.00125 |
| Carbon disulfide | 0.00550 | 0.00550 |
| 1-Propanol | 0.00043 | 0.00043 |
| Trimethylsilanol | 0.59798 | 0.59798 |
| Butanal (Butyraldehyde) | 0.00096 | 0.00096 |
| 2-Butanone (Methyl ethyl ketone) | 0.00816 | 0.00816 |
| Ethyl acetate | 0.00057 | 0.00057 |
| 1-Butanol | 0.00075 | 0.00150 |
| 3-Methylhexane | 0.00016 | 0.00324 |
| 4-Methyl-2-pentanone (MIBK) | 0.00009 | 0.00009 |
| Toluene | 0.00596 | 0.00596 |
| Hexanal | 0.00069 | 0.00069 |
| m & p-Xylene | 0.00034 | 0.00068 |
| o-Xylene | 0.00034 | 0.00068 |
| Octamethylcyclotetrasiloxane | 0.00062 | 0.01444 |
| Decamethylcyclopentasiloxane | 0.00088 | 0.00583 |
| | | |
| **SPECIAL INTEREST COMPOUNDS** | | |
| 2-Methyl-2-propenal | 0.01471 | 0.01471 |
| Hexamethylcyclotrisiloxane | 0.02169 | 0.21693 |
| | | |
| **NON-TARGET COMPOUNDS** | | |
| 1,1,2,2-Tetrafluoroethane | 0.00497 | 0.00497 |
| Chlorotrifluoroethene | 0.00014 | 0.00014 |
| Pentafluoropropane | 0.04344 | 0.04344 |
| Fluorotrimethylsilane | 1.16065 | 1.16065 |
| Carbonic acid, dimethyl ester | 0.00719 | 0.00719 |
| 2-Methyl-1-propanol | 0.00044 | 0.00044 |
| Cyclohexane | 0.00012 | 0.00012 |
| Hexamethyldisiloxane | 0.00908 | 0.00908 |
| C11-Alkane | 0.00488 | 0.00488 |
| C11-Alkane | 0.00111 | 0.00111 |
| C11-Alkane | 0.00052 | 0.00052 |
| C11-Alkane | 0.00129 | 0.00129 |
| C12-Alkane | 0.00142 | 0.00142 |
| C12-Alkane | 0.00676 | 0.00676 |
| C12-Alkane | 0.00288 | 0.00288 |
| C12-Alkane | 0.00819 | 0.00819 |
| C12-Alkane | 0.00138 | 0.00138 |
| C12-Alkane | 0.00637 | 0.00637 |
| C12-Alkane | 0.00668 | 0.00668 |
| C12-Alkane | 0.00265 | 0.00265 |
| C12-Alkane | 0.00048 | 0.00048 |
| | | |
| **TARGET COMPOUNDS (GC)** | | |
| Carbon monoxide | 0.17980 | 0.66632 |
| Methane | 0.00082 | 0.00082 |
| Hydrogen | 0.00914 | 0.00914 |
| Carbon dioxide | 0.23607 | 0.23607 |
| | | |
| **TOTAL T-VALUE** | 2.46876 | 3.14649 |
| | | |
| **TOTAL T-VALUE - CO2** | 2.23269 | 2.91041 |

ND : Value is less than the laboratory report detection limit.
Note: Number of decimal places in T-Values do not represent significant figures of measurements.

# Table 3. Expedition 45 Water Sample Summary Report
# US Potable Water Samples

| Mission | | | | | Soyuz 43/Expedition 45 | |
|---|---|---|---|---|---|---|
| Sample Location | | | | | WPA PWD Hot | WPA PWD Ambient |
| Sample Description | | Test | Potable Water Maximum Contaminant Level | Maximum Contaminant Level | Potable Water | Potable Water |
| Sample Date | | Conducted | | | 11/10/2015 | 12/1/2015 |
| Analysis/Sample ID | Units | by | (MCL) | Source | 20151214001 | 20151214002 |
| | | | | | | |
| **Physical Characteristics** | | | | | | |
| pH | pH units | U.S. | 4.5-8.5 | 41000 | 5.59 | 5.46 |
| Conductivity | µS/cm | U.S. | | | 2 | 2 |
| **Trace Metals (ICP/MS)** | | | | | | |
| Potassium | mg/L | U.S. | 340 | 41000 | 0.01 | <0.01 |
| Sodium | mg/L | U.S. | | | 0.05 | 0.05 |
| Aluminum | µg/L | U.S. | | | 5 | <1 |
| Barium | µg/L | U.S. | 10,000 | SWEG&41000 | <1 | 1 |
| Nickel | µg/L | U.S. | 300 | SWEG&41000 | 8 | 2 |
| Zinc | µg/L | U.S. | 2,000 | SWEG&41000 | 2 | 2 |
| **Silicon (ICP/MS)** | | | | | | |
| Silicon (ICP/MS) | µg/L | U.S. | | | 62 | 30 |
| **Total Organic Carbon (Sievers)** | | | | | | |
| Total Inorganic Carbon (TIC) | mg/L | U.S. | | | 0.84 | 0.72 |
| Total Organic Carbon (TOC) | mg/L | U.S. | 3 | 41000 | <0.10 | <0.10 |
| **Semi-volatiles (GC/MS) - Target List** | | | | | | |
| Methyl sulfone | µg/L | U.S. | | | <8 | 115 |
| Diethylphthalate | µg/L | U.S. | | | 13 | <16 |
| **Organic Carbon Recovery** | percent | U.S. | | | N/A | N/A |
| **Unaccounted Organic Carbon** | mg/L | U.S. | | | N/A | N/A |

NA=Not analyzed
MI=Matrix Interference
N/A=Not applicable

# Table 4. Expedition 45
# Water Sample Summary Report
# Russian Potable Water Samples

| Mission | | | | | Soyuz 43/Expedition 45 | |
|---|---|---|---|---|---|---|
| **Sample Location** | | | **Potable Water Maximum Contaminant Level (MCL)** | **Maximum Contaminant Level Source** | SVO-ZV | SRV-K Warm |
| **Sample Description** | | **Test Conducted by** | | | Potable Water | Potable Water |
| **Sample Date** | | | | | 12/1/2015 | 12/1/2015 |
| **Analysis/Sample ID** | **Units** | | | | **20151214003** | **20151214004** |
| | | | | | | |
| **Physical Characteristics** | | | | | | |
| pH | pH units | U.S. | 5.5-9.0 | MORD | 7.91 | 7.92 |
| Conductivity | µS/cm | U.S. | | | 320 | 260 |
| Turbidity | NTU | U.S. | 1.5* | MORD | NA | **2.4** |
| **Anions (IC)** | | | | | | |
| Chloride | mg/L | U.S. | 250 | MORD | 11.7 | 8.8 |
| Fluoride | mg/L | U.S. | 1.5/4 | MORD/EPA | 0.3 | 0.2 |
| Sulfate | mg/L | U.S. | 250 | MORD | 21.1 | 14.8 |
| **Metals (ICP/MS)** | | | | | | |
| Calcium | mg/L | U.S. | 100 | MORD | 42.4 | 32.7 |
| Magnesium | mg/L | U.S. | 50 | MORD | 10.4 | 8.52 |
| Potassium | mg/L | U.S. | | | 2.17 | 1.68 |
| Sodium | mg/L | U.S. | | | 10.1 | 7.88 |
| Aluminum | µg/L | U.S. | | | 232 | 90 |
| Barium | µg/L | U.S. | 1,000/10,000 | MORD/SWEG | 68 | 53 |
| Copper | µg/L | U.S. | 1,000/1,300 | MORD/EPA | 2 | 6 |
| Iron | µg/L | U.S. | 300 | MORD | 16 | 18 |
| Manganese | µg/L | U.S. | 50/300 | MORD/SWEG | **67** | **59** |
| Nickel | µg/L | U.S. | 100/300 | MORD/SWEG | 3 | 2 |
| Silver | µg/L | U.S. | 500/400 | MORD/SWEG | 102 | 77 |
| Silver, Dissolved | µg/L | U.S. | | | 8 | 10 |
| Zinc | µg/L | U.S. | 5,000/2,000 | MORD/SWEG | 61 | 35 |
| **Silicon (ICP/MS)** | | | | | | |
| Silicon | µg/L | U.S. | | | 2950 | 2290 |
| **Total Organic Carbon OI)** | | | | | | |
| Total Inorganic Carbon (TIC) | mg/L | U.S. | | | 31.3 | 25.0 |
| Nonpurgeable Organic Carbon (NPOC) | mg/L | U.S. | 20 | MORD | 1.12 | 0.78 |
| **Organic Carbon Recovery** | percent | U.S. | | | 0.00 | 0.00 |
| **Unaccounted Organic Carbon** | mg/L | U.S. | | | 1.12 | 0.78 |

NA=Not analyzed; MI=Matrix interference
*MORD limit 1.5 mg/L (Russian method)
#allowable limit after mineralization

# Table 5. Expedition 45 Water Sample Summary Report
# US Wastewater and Condensate Samples

| Mission | | | Soyuz 43/Expedition 45 | |
|---|---|---|---|---|
| Sample Location | | | WPA Wastewater ORU | US Lab Condensate Tank |
| Sample Description | | Test | WPA Wastewater | US Condensate sample |
| Sample Date | | Conducted | 11/19/15 & 11/30/15 | 10/29/2015 |
| Analysis/Sample ID | Units | by | 20151214005 | 20151214006 |
| | | | | |
| **Physical Characteristics** | | | | |
| pH | pH units | U.S. | 7.26 | 8.01 |
| Conductivity | µS/cm | U.S. | 124 | 350 |
| **Anions (IC)** | | | | |
| Fluoride | mg/L | U.S. | 0.5 | 0.5 |
| **Cations (IC)** | | | | |
| Ammonia as Nitrogen (NH3-N) | mg/L | U.S. | 14.2 | 38.7 |
| **Trace Metals (ICP/MS)** | | | | |
| Calcium | mg/L | U.S. | 0.06 | 0.12 |
| Potassium | mg/L | U.S. | 0.10 | 0.06 |
| Sodium | mg/L | U.S. | 0.15 | 0.10 |
| Aluminum | µg/L | U.S. | 7 | 4 |
| Chromium | µg/L | U.S. | 27 | 3 |
| Iron | µg/L | U.S. | 52 | <10 |
| Manganese | µg/L | U.S. | 5 | 25 |
| Nickel | µg/L | U.S. | 280 | 503 |
| Silver | µg/L | U.S. | 4 | 12 |
| Zinc | µg/L | U.S. | 2920 | 7160 |
| **Silicon (ICP/MS)** | | | | |
| Silicon | µg/L | U.S. | 4690 | 16,000 |
| **Total Organic Carbon OI)** | | | | |
| Total Inorganic Carbon (TIC) | mg/L | U.S. | 12.4 | 31.6 |
| Nonpurgeable Organic Carbon (NPOC) | mg/L | U.S. | 27.1 | 97.0 |
| **Volatile Organics** | | | | |
| Acetone | µg/L | U.S. | 5520 | 2010 |
| **Volatile Organics -Special Interest Compounds (Semi-quantitative)** | | | | |
| Trimethylsilanol | µg/L | U.S. | 110 | 240 |
| **Semi-volatiles (GC/MS) - Target List** | | | | |
| Benzothiazole | µg/L | U.S. | 88 | 99 |
| N-n-Butylbenzenesulfonamide | µg/L | U.S. | <16 | 52 |
| Tris(2-Chloroethyl)phosphate | µg/L | U.S. | <40 | 64 |
| Decamethylcyclopentasiloxane | µg/L | U.S. | 44 | 127 |
| Dodecamethylcyclohexasiloxane | µg/L | U.S. | 38 | 92 |
| Methyl sulfone | µg/L | U.S. | 170 | 165 |
| Benzoic acid | µg/L | U.S. | <200 | 3430 |
| Phenol | µg/L | U.S. | 234 | 88 |
| Benzyl alcohol | µg/L | U.S. | 63 | 9820 |
| Dibutylphthalate | µg/L | U.S. | 38 | 196 |
| Diethylphthalate | µg/L | U.S. | 13 | 1450 |
| Dimethylphthalate | µg/L | U.S. | <16 | 34 |
| **Semi-volatiles (GC/MS) - Special Interest Compounds (Semi-quantitative - 2 pt curve)** | | | | |
| Acetophenone | µg/L | U.S. | not found | 20 |
| Benzaldehyde | µg/L | U.S. | not found | 65 |
| 2-Butoxyethanol | µg/L | U.S. | not found | 98 |
| 2-(2-Butoxyethoxy)ethanol | µg/L | U.S. | not found | 2100 |
| N,N-Dimethyl acetamide | µg/L | U.S. | 420 | 740 |
| N,N-Dimethylformamide | µg/L | U.S. | 300 | 410 |
| 2-Ethoxyethanol | µg/L | U.S. | not found | 200 |
| 2-Ethylhexanoic acid | µg/L | U.S. | not found | 340 |
| Ibuprofen | µg/L | U.S. | 820 | not found |
| p-Menth-1-en-8-ol (alpha-Terpineol) | µg/L | U.S. | <40 | 59 |
| 1-Methyl-2-pyrrolidinone | µg/L | U.S. | 390 | 700 |
| Monomethyl phthalate | µg/L | U.S. | >120 | 310 |

NA=Not analyzed
MI=Matrix Interference
N/A=Not applicable

# Table 5. Expedition 45 Water Sample Summary Report
# US Wastewater and Condensate Samples

| Mission | | | Soyuz 43/Expedition 45 | |
|---|---|---|---|---|
| **Sample Location** | | | WPA Wastewater ORU | US Lab Condensate Tank |
| **Sample Description** | | **Test** | WPA Wastewater | US Condensate sample |
| **Sample Date** | | **Conducted** | 11/19/15 & 11/30/15 | 10/29/2015 |
| **Analysis/Sample ID** | **Units** | **by** | **20151214005** | **20151214006** |
| 2-Phenoxyethanol | µg/L | U.S. | not found | 110 |
| Phenethyl alcohol | µg/L | U.S. | not found | 48 |
| 1,3,5-Triallyl-1,3,5-triazine-2,4,6(1H,3H,5H)-trione | µg/L | U.S. | <20 | 120 |
| Tributyl phosphate | µg/L | U.S. | not found | 34 |
| Triethyl phosphate | µg/L | U.S. | not found | 38 |
| **Alcohols (DAI/GC/MS)** | | | | |
| Ethanol | µg/L | U.S. | 16,000 | 41,700 |
| Methanol | µg/L | U.S. | 5280 | 5520 |
| **Glycols (DAI/GC/MS)** | | | | |
| 1,2-Ethanediol (Ethylene glycol) | µg/L | U.S. | 1070 | 2360 |
| 1,2-Propanediol (Propylene glycol) | µg/L | U.S. | 2770 | 10300 |
| **Silanols (LC/RI) (R & D Method -NIST traceable standard not available)** | | | | |
| Dimethylsilanediol (DMSD) | µg/L | U.S. | 13,000 | 49,000 |
| **Carboxylates (IC)** | | | | |
| Acetate | µg/L | U.S. | 1,710 | 13,500 |
| Formate | µg/L | U.S. | <500 | 547 |
| **Organic Carbon Recovery** | percent | U.S. | **78.30** | **66.82** |
| **Unaccounted Organic Carbon** | mg/L | U.S. | **5.88** | **32.19** |

**Data Qualifiers:** **20151214005** - Possible high bias: methanol
**20151214006** - Possible high bias: ethanol

NA=Not analyzed
MI=Matrix Interference
N/A=Not applicable