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DATE: August 12, 2026

SUBJECT: Toxicological Assessment of ISS Air and Water Quality: September 23, 2024 - April 19, 2025 (Increment 72) Including SpaceX-31 Ingress

SUMMARY: Based on these data, air and water quality on ISS were acceptable during this Increment.

### AIR QUALITY

Eleven archive air samples, 10 routine and 1 ingress, were collected in mini grab sample containers (mGSCs) on ISS during Increment 72. Samples were also collected during the ascents of Space-X Crew-9 and Crew-10, on September 28, 2024 and March 15, 2025, respectively. A summary of the key air quality indicators from the Increment 72 mGSC samples is provided in Table 1. The deployment of passive formaldehyde badges as part of the Formaldehyde Monitoring Kit (FMK) has been discontinued due to difficulties with procuring the equipment and concerns with reliability of the results.

Data tables containing measured concentrations and corresponding T-values based on appropriate Spacecraft Maximum Allowable Concentrations (SMACs) for compounds present at levels above the laboratory reporting limits are attached to this report. Complete data tables, which include compounds assessed but not detected, are available upon request. Pressure readings for the mGSCs indicate that all samples collected during Increment 72 were within acceptable limits, except for three samples. The samples collected in Columbus on October 14, 2024, the US Lab on November 27, 2024, and in the JPM on April 3, 2025, had low pressure, indicating that incomplete samples were collected. The pressure in the mGSC used in the US Lab on November 27, 2024 was low enough to indicate that no sample had been collected.

### Toxicological Evaluation of ISS Air Quality

Archive air samples (mGSCs) are collected during each Increment and returned for analysis in the Environmental Chemistry Laboratory. Data from the ground analyses complement the in-flight data and provide a more complete understanding of air quality on the ISS. Analytical results from the routine mGSC samples that returned on SpaceX-31 and SpaceX-32 confirmed that air quality was acceptable during this Increment. **T-values calculated using data from all routine archive samples met the 180-d T-value guideline ( $T < 1$ ), indicating no concern for crew health.**

**Table 1. Analytical summary of ISS air analyses from mGSCs during Increment 72**

| Return Flight    | Sample Location | Sample Date | Alcohols <sup>a</sup><br>(mg/m <sup>3</sup> ) | T-Value <sup>b</sup><br>(units) |
|------------------|-----------------|-------------|-----------------------------------------------|---------------------------------|
| Crew-9           | Ascent          | 9/28/2024   | 0.26                                          | <0.1                            |
| SpaceX-31        | US Lab          | 10/14/2024  | 4.7                                           | 0.2                             |
| SpaceX-31        | Columbus*       | 10/14/2024  | 4.9                                           | 0.2                             |
| SpaceX-31        | Ingress         | 11/5/2024   | 1.2                                           | 0.1 (0.1)                       |
| SpaceX-31        | US Lab*         | 11/27/2024  | 1.7                                           | <0.1                            |
| SpaceX-31        | JPM             | 11/27/2024  | 6.4                                           | 0.2                             |
| SpaceX-32        | US Lab          | 1/8/2025    | 7.8                                           | 0.4                             |
| SpaceX-32        | Columbus        | 1/8/2025    | 6.4                                           | 0.3                             |
| SpaceX-32        | US Lab          | 2/17/2025   | 8.7                                           | 0.4                             |
| SpaceX-32        | SM              | 2/17/2025   | 9.4                                           | 0.2                             |
| Crew-10          | Ascent          | 3/15/2025   | 0.27                                          | 0.1                             |
| SpaceX-32        | US Lab          | 4/3/2025    | 6.8                                           | 0.2                             |
| SpaceX-32        | JPM*            | 4/3/2025    | 5.3                                           | <0.1                            |
| <i>Guideline</i> |                 |             | <5                                            | <1 <sup>c</sup>                 |

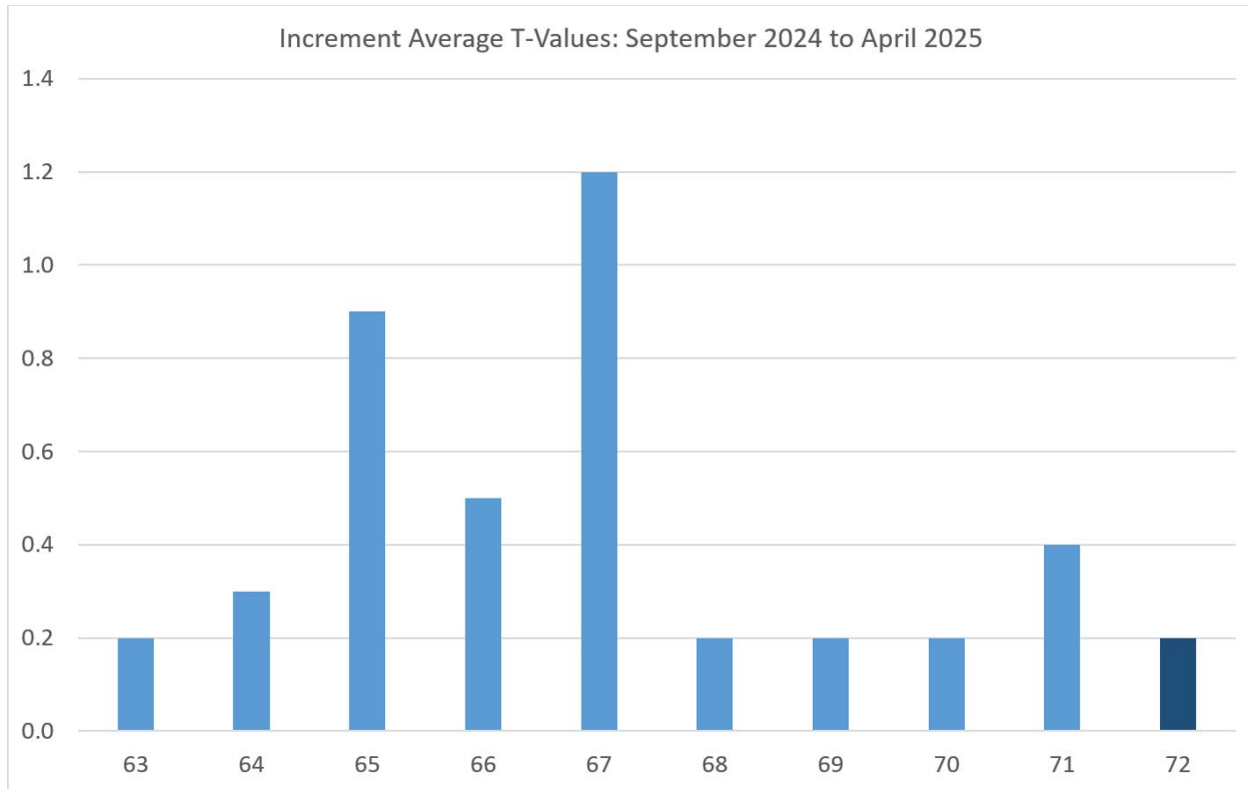
<sup>a</sup> Includes acetone<sup>b</sup> Sum of the ratios of the measured concentrations and the corresponding 180-day SMAC for each compound; parenthesis indicate value based on 7-day SMACs and applicable to first ingress<sup>c</sup> T-value <1 used to evaluate routine monthly sampling; <3 used to evaluate first ingress.

\* indicates that the sample pressure was low.

The average, rounded T-value calculated from the nominal Increment 72 mGSC samples was 0.2 (Figure 1). This value is a slight decrease from Increment 71 but consistent with Increments 68-70. Acrylonitrile was the primary contributor to the T-value in two samples in which it was detected during Increment 72, in the US Lab in January and February 2025. In the other archive samples, carbon monoxide and acetaldehyde were the primary contributors to the T-value.

ANITA-2 began operations on ISS as a technological demonstration unit in March 2022 and provides data on up to 48 analytes every 6-10 minutes. Initially, ANITA-2 was installed in the US Lab but has since been relocated to the Columbus module. In early 2025, NASA selected ANITA-2 as its primary trace contaminants monitor for ISS after a review of its performance against archive samples and Air Quality Monitor (AQM) readings. Monthly average readings for several of ANITA-2's target compounds are presented in Table 2. Detailed information about the ANITA-2 hardware is available upon request.

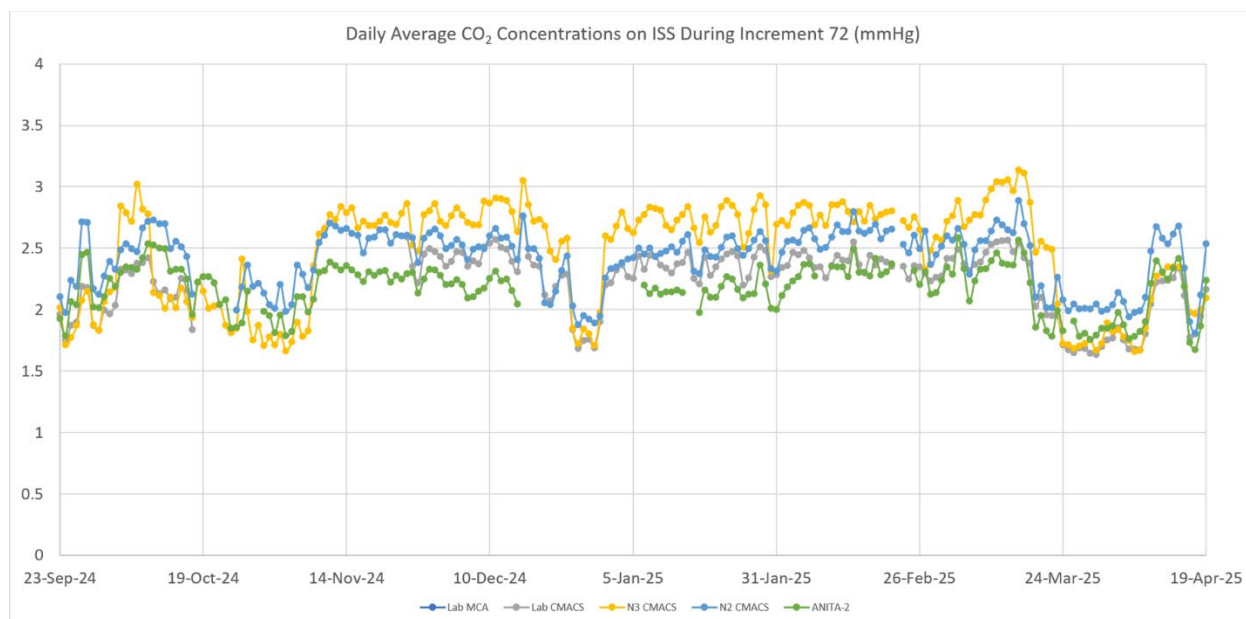
From 2013 to 2025, ISS air quality monitoring was performed in-flight using the Air Quality Monitors (AQMs). During this Increment, NASA received additional information on trace contaminant levels in ISS from the ESA tech demo, ANITA-2 (Analyzing Interferometer for Ambient Air, a Fourier-transform infrared spectrometer built by Sintef and flown to ISS by the European Space Agency). Both AQMs failed during Increment 69 and were replaced during Increment 70. Review of data from the AQMs suggests that AQM1 was overly sensitive to several analytes during this period; ground personnel developed an ad hoc adjustment to the process for developing concentrations from the instruments. This adjustment relied on data from ANITA-2, and as such there is little value in reporting data from AQM. AQMs were decommissioned in April 2025 and returned on SpaceX-32 (May 2025).



**Figure 1. mGSC-Derived T-Values for Increments 63-72  
(does not include CO<sub>2</sub>, first ingress, or contingency samples)**

**Alcohol values for seven of the ten routine mGSC samples returned on SpaceX-31 and -32 exceeded the ECLS guideline of < 5 mg/m<sup>3</sup>.** The levels are mostly attributable to ethanol. Measured levels do not present a risk to crew health but are a potential concern for the US Water Recovery System (WRS). Data from ANITA-2 indicates that ethanol levels rose between September 2024 and February 2025 but fell in March and April 2025.

None of the reported routine mGSC samples collected and analyzed during Increment 72 contained a CO<sub>2</sub> concentration above the limit documented in Flight Note F091532D, which requests that the 24-hour average concentration not exceed 3.0 mmHg (7100 mg/m<sup>3</sup>, 4000 ppm) on the US segment. While mGSC CO<sub>2</sub> sampling provides a snapshot of the CO<sub>2</sub> concentration, real-time CO<sub>2</sub> data are available from the Commercial Major Atmospheric Constituents Sensors (CMACS), from ANITA-2 in Columbus, and intermittently from the Major Constituent Analyzers (MCAs) in Node 3 and the US Lab (daily average CO<sub>2</sub> concentrations are represented in Figure 2). To preserve the longevity of the instrumentation, MCAs are only activated during EVA activities, crew metabolic characterization, tech demo analysis, anomaly resolution, and when requested by crew surgeons.



**Figure 2. Environmental ppCO<sub>2</sub> Concentrations on ISS During Increment 72 (mmHg)**

Levels of octafluoropropane (Freon 218) continue to be very low in ISS air compared with historical measurements due to continued operation of a CO<sub>2</sub> removal technology demonstration unit that very efficiently scrubs octafluoropropane from the ISS atmosphere. ANITA-2 observed very low average octafluoropropane concentrations throughout the Increment.

**Table 2: Monthly average concentrations (mg/m<sup>3</sup>) of ANITA-2 target compounds (Increment 72)**

| Compound         | September 2024 | October 2024 | November 2024 | December 2024 | January 2025 | February 2025 | March 2025 | April 2025 | Increment Average |
|------------------|----------------|--------------|---------------|---------------|--------------|---------------|------------|------------|-------------------|
| Methanol         | 0.31           | 0.31         | 0.32          | 0.36          | 0.35         | 0.34          | 0.33       | 0.31       | 0.33              |
| Ethanol          | 2.14           | 3.86         | 4.64          | 5.18          | 5.39         | 6.85          | 5.84       | 4.99       | 4.86              |
| 2-Propanol       | 1.31           | 1.24         | 0.66          | 0.55          | 0.46         | 0.48          | 0.48       | 0.45       | 0.70              |
| PFP              | 11.93          | 3.89         | 2.06          | 1.71          | 0.25         | 0.22          | 0.11       | 0.07       | 2.53              |
| R134a            | ND             | 0.12         | 0.15          | ND            | ND           | ND            | ND         | ND         | ND                |
| DMCPS            | ND             | ND           | ND            | ND            | ND           | ND            | ND         | ND         | ND                |
| TMS              | ND             | ND           | ND            | ND            | ND           | ND            | ND         | ND         | ND                |
| HMCTS            | ND             | ND           | ND            | ND            | ND           | ND            | ND         | ND         | ND                |
| OCTMS            | ND             | ND           | ND            | ND            | ND           | ND            | ND         | ND         | ND                |
| SF <sub>6</sub>  | 0.08           | 0.06         | 0.05          | 0.04          | 0.02         | 0.01          | 0.03       | 0.07       | 0.04              |
| Ammonia          | 0.03           | ND           | 0.02          | 0.03          | 0.04         | 0.02          | 0.03       | 0.03       | 0.03              |
| CO               | 1.75           | 2.04         | 1.88          | 1.88          | 2.07         | 2.11          | 2.32       | 2.33       | 2.05              |
| Methane          | 98.26          | 119.46       | 120.51        | 111.36        | 108.29       | 109.40        | 108.24     | 77.55      | 106.63            |
| CO <sub>2</sub>  | 2.16           | 2.22         | 2.21          | 2.20          | 2.14         | 2.29          | 2.16       | 1.92       | 2.16              |
| Isobutane        | ND             | ND           | ND            | ND            | ND           | ND            | ND         | ND         | ND                |
| N <sub>2</sub> O | 0.40           | 0.08         | 0.05          | 0.05          | ND           | ND            | 0.15       | 0.06       | 0.13              |
| CF <sub>4</sub>  | 0.17           | 0.16         | 0.14          | 0.13          | 0.13         | 0.13          | 0.12       | 0.10       | 0.13              |

ND: not detected during that month.

Though NASA has discontinued the use of formaldehyde badges on ISS, ANITA-2 has the capability to measure formaldehyde at levels on the order of  $80 \mu\text{g}/\text{m}^3$ . Formaldehyde was detected only once during Increment 72: on December 3, 2024, near the detection limit of  $80 \mu\text{g}/\text{m}^3$ .

#### *SpaceX-31 Ingress*

An mGSC sample was collected upon ingress on SpaceX-31 on November 5, 2024. The sample was collected at approximately 16:19, immediately after ingress. Analytical results from the sample indicate a considerably lower level of methane ( $9 \text{ mg}/\text{m}^3$ ) than found on ISS ( $\sim 110 \text{ mg}/\text{m}^3$ ), which indicates low levels of mixing between the visiting vehicle and the full ISS volume at the time of sample collection. Levels of ethanol were also markedly lower ( $0.6 \text{ mg}/\text{m}^3$  vs.  $\sim 4 \text{ mg}/\text{m}^3$ ). **The T-value for this sample was 0.1, well below levels of concern for crew health.**

#### *Crew-9 and Crew-10 Ascent*

mGSC samples were collected in SpaceX Crew-9 and Crew-10, on September 28, 2024 and March 15, 2025, respectively. The T-values for these samples were very low, indicative of excellent air quality in these vehicles. **As NASA now has data from ten crewed vehicles indicating a consistent record of excellent air quality, no further ascent samples will be taken in SpaceX crewed vehicles.**

### WATER QUALITY

In total, 7 water samples were collected from the US Segment during Increment 72 and returned on SpaceX-31 and Crew-9. Alternating ambient and hot water samples from PWD and xPWD were collected in November 2024 and March 2025; these samples fall under the ISS Crew Health Care System (CHeCS). The remaining three samples were non-potable water, including product water, wastewater, and condensate samples (ECLS). Summaries of selected analytical results from the Increment 72 samples are provided in Tables 3A and 3B.

**Table 3A. Analytical Summary of ISS Water Analyses for CHeCS Samples (Increment 72)**

| Return Mission | Sample Location | Sample Date | TOC (mg/L) | DMSD (mg/L) | Methyl Sulfone (mg/L) | Conductivity ( $\mu\text{S}/\text{cm}$ ) | Total Iodine (mg/L) |
|----------------|-----------------|-------------|------------|-------------|-----------------------|------------------------------------------|---------------------|
| SpaceX-31      | xPWD Ambient    | 11/19/2024  | 0.4        | <1          | 0.2                   | 1                                        | 0.09                |
| SpaceX-31      | PWD Hot         | 11/25/2024  | 0.6        | <1          | 0.3                   | 1                                        | <0.05               |
| Crew-9         | PWD Ambient     | 3/4/2025    | 0.5        | <1          | 0.2                   | <1                                       | 0.08                |
| Crew-9         | xPWD Hot        | 3/11/2025   | 0.7        | <1          | 0.2                   | 2                                        | <0.05               |

**Table 3B. Analytical Summary of ISS Water Analyses for ECLS Samples (Increment 72)**

| Return Mission | Sample Location   | Sample Date | TOC (mg/L) | DMSD (mg/L) | Methyl Sulfone (mg/L) | Conductivity ( $\mu\text{S}/\text{cm}$ ) | Total Iodine (mg/L) |
|----------------|-------------------|-------------|------------|-------------|-----------------------|------------------------------------------|---------------------|
| SpaceX-31      | US Condensate     | 11/19/2024  | 101        | 6.7         | 0.4                   | 250                                      | 0.003               |
| SpaceX-31      | WPA Product Water | 11/25/2024  | 0.4        | <1          | 0.2                   | 2                                        | 2.5                 |
| SpaceX-31      | Wastewater        | 11/27/2024  | 23.3       | 2.8         | 0.2                   | 121                                      | 0.25                |

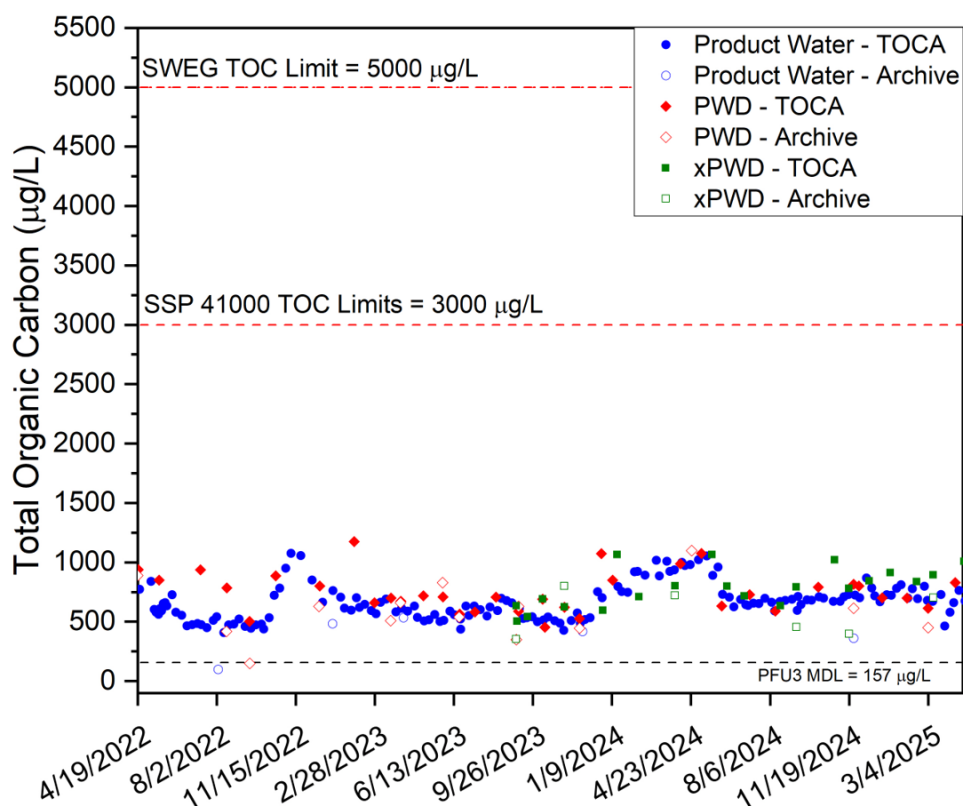
### Toxicological Evaluation of ISS Water Quality

Routine water quality monitoring is performed in-flight using the total organic carbon analyzer (TOCA). Results from these analyses provide a general indication of overall water quality. Typically, archive water samples are also collected during each Increment and returned for comprehensive analysis in ground laboratories (Table 3A, 3B). Data from the ground analyses complement the in-flight data and provide a more complete understanding of water quality on the ISS.

#### Potable Water

**Concentrations of all chemicals detected in the potable water samples met the requirements listed in SSP 41000, System Specification for the International Space Station and JSC 63414, Spacecraft Water Exposure Guidelines (SWEGs).** Total organic carbon (TOC) concentrations from in-flight (PWD TOC and WPA TOC) and ground analyses (Archive TOC) performed between April 2022 and April 2025 are shown in Figure 3. The TOC concentrations in the potable samples continued to be low and were well below both the specification for the US segment (<3 mg/L) and the 100-day SWEG (5 mg/L). Elevated levels of alcohols did not translate into noteworthy increases in TOCA in potable water. Methyl sulfone was detected in all potable water samples at levels well below the SWEG of 1,500 mg/L.

Iodine is a biocide used on the US Segment. It is added to the water produced by the WPA but removed prior to crew consumption to avoid potential thyroid dysfunction. The total iodine level in two of the four potable samples collected from the PWD were below the reporting limit and the others contained 0.08 - 0.09 mg/L, indicating effective removal of iodine in water intended for consumption. For additional information regarding microbial analyses, see the Increment 72 post-flight report generated by the JSC Microbiology Laboratory.



**Figure 3. Total Organic Carbon (TOC) trending in US Potable Water from Archive Water Samples and On-Orbit TOCA (PFU3) for April 2022 to April 2025**

*Condensate*

The condensate sample collected on November 19, 2024, contained TOC levels of 101 mg/L, well below the historical average of 143 mg/L. Organic compounds detected at or above 1 mg/L are listed in Table 4. Zinc (10.3) and nickel (0.3) were detected above 0.1 mg/L. The concentration of ammonium was 27.5 mg/L.

**Table 4: Organic Compounds Detected >1 mg/L in US Condensate Sampled During Increment 72**

| Compound           | Condensate (mg/L) | Historical average (mg/L) |
|--------------------|-------------------|---------------------------|
|                    | November 19, 2024 |                           |
| Ethanol            | 70                | 49                        |
| Acetate            | 35                | 39                        |
| 1,2-propanediol    | 24                | 26                        |
| Acetone            | 6.8               | 2.1                       |
| Dimethylsilanediol | 6.7               | 33                        |
| Methanol           | 5.5               | 4.9                       |
| 2-propanol         | 3.1               | 1.4                       |
| Formate            | 1.7               | 7.2                       |
| Benzyl alcohol     | 1.5               | 12                        |
| Formaldehyde       | 1.0               | 1.0                       |

*Wastewater*

The wastewater sample collected on November 27, 2024, contained TOC levels of 23.3 mg/L, below the historical average of 38 mg/L. Organic compounds detected above 1 mg/L are listed in Table 5. Nickel (0.2) and zinc (4.5) were the only metals detected at levels above 0.1 mg/L. Ammonium was present at a concentration of 12.3 mg/L.

**Table 5: Organic Compounds Detected >1 mg/L in Wastewater Sampled During Increment 72**

| Compound                  | Wastewater (mg/L) | Historical average (mg/L) |
|---------------------------|-------------------|---------------------------|
|                           | November 27, 2024 |                           |
| Methanol                  | 5.5               | 4.3                       |
| 1,2-propanediol           | 5.2               | 4.7                       |
| Dimethylsilanediol (DMSD) | 2.8               | 14                        |

Given the results from wastewater and condensate, the cleanliness of potable water dispensed from the PWD and xPWD provide strong evidence that the Water Recovery System is performing well on ISS. Expanded summary tables containing organic carbon recoveries and results for all analytes present at concentrations above reporting limits are included as attachments to this report.

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#### Enclosures

- Table S-1: Analytical concentrations of compounds quantified in mGSCs collected during Increment 72 and returned on SpaceX-31 and -32, and Crew-9 and Crew-10
- Table S-2A: T-values corresponding to concentrations for routine mGSC samples returned on SpaceX-31 and -32, and Crew-9 and Crew-10
- Table S-2B: T-values corresponding to concentrations for SpaceX-31 ingress air samples based on 7-day and 180-day SMACs
- Table S-3A: Analytical concentrations of compounds quantified in hot and ambient water samples returned on SpaceX-31 and Crew-9
- Table S-3B: Analytical concentrations of compounds quantified in US product water, condensate, and wastewater returned on SpaceX-31

TABLE S-1: ANALYTICAL RESULTS FOR SPACEX-31, SPACEX-32, CREW-9, AND CREW-10

| Increment<br>Mission<br>Sample Location<br>Sample Description<br>Sample Date<br>Sample Time<br>Analysis/Sample ID | 72                              |                              |                              |                              |                              |                              |                              |                              |                              |                              |                            |                             |                                 |
|-------------------------------------------------------------------------------------------------------------------|---------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|----------------------------|-----------------------------|---------------------------------|
|                                                                                                                   | SpaceX-31                       |                              |                              |                              | SpaceX-32                    |                              |                              |                              |                              |                              | Crew-9                     | Crew-10                     | SpaceX-31                       |
|                                                                                                                   | Lab                             | Columbus Module              | Lab                          | JPM                          | Lab                          | Columbus Module              | Lab                          | Service Module               | Lab                          | JPM                          | Dragon Module              | Dragon Cabin                | CARGO DRGN<br>(SpX-31)          |
|                                                                                                                   | Nominal air sample,<br>S/N 2028 | Nominal air sample, S/N 2050 | Nominal air sample, S/N 2061 | Nominal air sample, S/N 2063 | Nominal air sample, S/N 2024 | Nominal air sample, S/N 2026 | Nominal air sample, S/N 2029 | Nominal air sample, S/N 2049 | Nominal air sample, S/N 2066 | Nominal air sample, S/N 2072 | Crew 9 Ascent,<br>S/N 2096 | Crew-10 Ascent,<br>S/N 2040 | Ingress air sample,<br>S/N 2048 |
|                                                                                                                   | 10/14/2024                      | 10/14/2024                   | 11/27/2024                   | 11/27/2024                   | 1/8/2025                     | 1/8/2025                     | 2/17/2025                    | 2/17/2025                    | 4/3/2025                     | 4/3/2025                     | 9/28/2024                  | 3/15/2025                   | 11/5/2024                       |
|                                                                                                                   | 14:45                           | 14:47                        | 14:01                        | 14:04                        | 09:03                        | 09:05                        | 14:50                        | 15:10                        | 10:25                        | 10:27                        | 20:10                      | 14:40                       | 16:19                           |
|                                                                                                                   | AQ250262                        | AQ250263                     | AQ250264                     | AQ250265                     | AQ250680                     | AQ250681                     | AQ250682                     | AQ250683                     | AQ250684                     | AQ250685                     | AQ250334                   | AQ250767                    | AQ250266                        |
| <b>Volatiles Targets GCMS (TO-15 mod)</b>                                                                         |                                 |                              |                              |                              |                              |                              |                              |                              |                              |                              |                            |                             |                                 |
| 1,1,1,2-Tetrafluoroethane                                                                                         | 0.054                           | <0.10                        | <0.99                        | 0.089                        | 0.061                        | 0.057                        | 0.066                        | 0.066                        | 0.055                        | <0.59                        | <0.042                     | 0.052                       | 0.39                            |
| 1-Butanol                                                                                                         | <0.018                          | <0.044                       | <0.43                        | 0.021                        | 0.032                        | 0.032                        | 0.028                        | 0.038                        | 0.030                        | <0.25                        | <0.018                     | <0.018                      | 0.022                           |
| 1-Propanol                                                                                                        | 0.023                           | <0.036                       | <0.35                        | 0.035                        | 0.040                        | 0.031                        | 0.026                        | 0.026                        | 0.026                        | <0.21                        | <0.015                     | <0.015                      | <0.015                          |
| 2-Methyl-1-propene                                                                                                | <0.014                          | <0.033                       | <0.32                        | 0.015                        | 0.020                        | 0.022                        | 0.020                        | 0.021                        | <0.014                       | <0.19                        | <0.014                     | <0.014                      | <0.014                          |
| 2-Propanol (Isopropanol)                                                                                          | See GC-FID                      | 0.66                         | <0.56                        | 0.66                         | See GC-FID                   | See GC-FID                   | See GC-FID                   | See GC-FID                   | 0.63                         | <0.34                        | 0.074                      | 0.067                       | 0.28                            |
| Acetaldehyde                                                                                                      | 0.10                            | 0.13                         | <0.42                        | 0.33                         | 0.27                         | 0.30                         | 0.31                         | 0.30                         | 0.25                         | <0.25                        | <0.018                     | <0.018                      | 0.089                           |
| Acetone                                                                                                           | 0.26                            | 0.33                         | 1.1                          | 0.31                         | 0.49                         | 0.50                         | 0.54                         | 0.56                         | 0.53                         | 1.1                          | 0.11                       | 0.086                       | 0.13                            |
| Acrylonitrile                                                                                                     | <0.013                          | <0.031                       | <0.31                        | <0.013                       | 0.016                        | <0.013                       | 0.013                        | <0.014                       | <0.013                       | <0.18                        | <0.013                     | <0.013                      | <0.013                          |
| Ethanol                                                                                                           | See GC-FID                      | See GC-FID                   | 0.60                         | See GC-FID                   | See GC-FID                   | See GC-FID                   | See GC-FID                   | See GC-FID                   | See GC-FID                   | 3.8                          | 0.035                      | 0.072                       | See GC-FID                      |
| Ethyl acetate                                                                                                     | <0.022                          | <0.053                       | <0.52                        | 0.033                        | 0.039                        | 0.031                        | 0.038                        | 0.036                        | 0.044                        | <0.31                        | <0.022                     | <0.022                      | 0.023                           |
| Isobutane                                                                                                         | 0.022                           | <0.034                       | <0.33                        | <0.014                       | <0.015                       | 0.042                        | <0.014                       | <0.015                       | <0.014                       | <0.20                        | 0.015                      | <0.014                      | 0.11                            |
| Isoprene (2-Methyl-1,3-butadiene)                                                                                 | 0.040                           | 0.043                        | <0.39                        | 0.040                        | 0.046                        | 0.037                        | 0.050                        | 0.050                        | 0.049                        | <0.24                        | <0.017                     | <0.017                      | <0.017                          |
| Methanol                                                                                                          | 0.27                            | 0.28                         | <0.31                        | 0.34                         | See GC-FID                   | See GC-FID                   | See GC-FID                   | See GC-FID                   | See GC-FID                   | 0.42                         | 0.044                      | 0.051                       | 0.13                            |
| Methylene chloride (Dichloromethane)                                                                              | <0.020                          | <0.048                       | <0.47                        | 0.029                        | <0.021                       | <0.020                       | <0.020                       | <0.021                       | <0.020                       | <0.28                        | <0.020                     | <0.020                      | 0.041                           |
| Perfluoro(2-methylpentane)                                                                                        | <0.082                          | <0.20                        | <1.9                         | <0.082                       | 0.096                        | <0.082                       | 0.12                         | 0.11                         | 0.13                         | <1.1                         | <0.082                     | <0.082                      | 0.084                           |
| Trimethylsilanol                                                                                                  | 0.028                           | <0.053                       | <0.52                        | 0.048                        | 0.044                        | 0.27                         | 0.031                        | 0.038                        | 0.035                        | <0.31                        | <0.022                     | <0.022                      | 0.063                           |
| <b>Volatiles Targets GCFID</b>                                                                                    |                                 |                              |                              |                              |                              |                              |                              |                              |                              |                              |                            |                             |                                 |
| 2-Propanol (Isopropanol)                                                                                          | 0.75                            | NR                           | NR                           | NR                           | 0.52                         | 0.50                         | 0.51                         | 0.52                         | NR                           | NR                           | NR                         | NR                          | NR                              |
| Ethanol                                                                                                           | 3.4                             | 3.6                          | NR                           | 5.0                          | 6.3                          | 5.0                          | 7.3                          | 7.9                          | 5.2                          | NR                           | NR                         | NR                          | 0.61                            |
| Methanol                                                                                                          | NR                              | NR                           | NR                           | NR                           | 0.40                         | 0.30                         | 0.31                         | 0.39                         | 0.37                         | NR                           | NR                         | NR                          | NR                              |
| Octafluoropropane (Perfluoropropane)                                                                              | 1.7                             | <3.7                         | <36                          | <1.5                         | <1.6                         | <1.5                         | <1.5                         | <1.6                         | <1.5                         | <22                          | <0.77                      | <1.5                        | <1.5                            |
| <b>Volatiles Targets TGA</b>                                                                                      |                                 |                              |                              |                              |                              |                              |                              |                              |                              |                              |                            |                             |                                 |
| Carbon dioxide                                                                                                    | 5000                            | 5000                         | <17000                       | 4600                         | 4600                         | 3900                         | 4600                         | 5900                         | 4200                         | <10000                       | 960                        | 1900                        | 2500                            |
| Carbon monoxide                                                                                                   | 1.9                             | 2.3                          | <11                          | 1.3                          | 1.5                          | 1.3                          | 1.5                          | 1.6                          | 1.4                          | <6.4                         | 0.54                       | 1.6                         | 0.91                            |
| Hydrogen                                                                                                          | 8.1                             | 8.0                          | <8.0                         | 4.0                          | 5.1                          | 5.1                          | 4.9                          | 5.2                          | 4.7                          | <4.8                         | <0.34                      | 3.1                         | 0.55                            |
| Methane                                                                                                           | 110                             | 110                          | <61                          | 110                          | 110                          | 89                           | 100                          | 110                          | 8.6                          | 43                           | <2.6                       | <2.6                        | 8.8                             |
|                                                                                                                   | GMT 288                         | GMT 288                      | GMT 332                      | GMT 332                      | GMT 008                      | GMT 008                      | GMT 048                      | GMT 048                      | GMT 093                      | GMT 093                      | GMT 272                    | GMT 74                      | GMT 310                         |

Comments: NR= Not Reported

Not Found =No unknown peaks above the threshold limit

AQ250263: Low Pressure: 5.9 psia

AQ250264: Initial pressure 0.6 psia shows this cannister is still under pressure, suspected to be unused

AQ250767: This is an unlabeled cannister with an initial pressure of 13.9psi. Sampling date estimated as GMT 074

TABLE S-2A: T-VALUES FOR SPACEX-31, SPACEX-32, CREW-9, AND CREW-10

| Increment<br>Mission                 | 72                                 |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                               |                               |                                |                                |                                    |                                    |
|--------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|-------------------------------|-------------------------------|--------------------------------|--------------------------------|------------------------------------|------------------------------------|
|                                      | SpaceX-31                          |                                    |                                    |                                    | SpaceX-32                          |                                    |                                    |                                    |                                    |                                    | Crew-9                        |                               | Crew-10                        |                                | SpaceX-31                          |                                    |
|                                      | T-Value (180 day)                  |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                                    | T-Value (7-<br>Day)           | T-Value (180-<br>day)         | T-Value (7-<br>Day)            | T-Value (180-<br>day)          | T-Value (7-<br>Day)                | T-Value (180-<br>day)              |
|                                      | Lab                                | Columbus<br>Module                 | Lab                                | JPM                                | Lab                                | Columbus<br>Module                 | Lab                                | Service<br>Module                  | Lab                                | JPM                                | Dragon<br>Module              | Dragon<br>Module              | Dragon Cabin                   | Dragon Cabin                   | CARGO<br>DRGN (SpX-<br>31)         | CARGO<br>DRGN (SpX-<br>31)         |
|                                      | Nominal air<br>sample, S/N<br>2028 | Nominal air<br>sample, S/N<br>2050 | Nominal air<br>sample, S/N<br>2061 | Nominal air<br>sample, S/N<br>2063 | Nominal air<br>sample, S/N<br>2024 | Nominal air<br>sample, S/N<br>2026 | Nominal air<br>sample, S/N<br>2029 | Nominal air<br>sample, S/N<br>2049 | Nominal air<br>sample, S/N<br>2066 | Nominal air<br>sample, S/N<br>2072 | Crew 9<br>Ascent, S/N<br>2096 | Crew 9<br>Ascent, S/N<br>2096 | Crew-10<br>Ascent, S/N<br>2040 | Crew-10<br>Ascent, S/N<br>2040 | Ingress air<br>sample, S/N<br>2048 | Ingress air<br>sample, S/N<br>2048 |
| Sample Location                      | 10/14/2024<br>14:45                | 10/14/2024<br>14:47                | 11/27/2024<br>14:01                | 11/27/2024<br>14:04                | 1/8/2025<br>09:03                  | 1/8/2025<br>09:05                  | 2/17/2025<br>14:50                 | 2/17/2025<br>15:10                 | 4/3/2025<br>10:25                  | 4/3/2025<br>10:27                  | 9/28/2024<br>20:10            | 9/28/2024<br>20:10            | 3/15/2025<br>14:40             | 3/15/2025<br>14:40             | 11/5/2024<br>16:19                 | 11/5/2024<br>16:19                 |
| Sample Description                   | AQ250262                           | AQ250263                           | AQ250264                           | AQ250265                           | AQ250680                           | AQ250681                           | AQ250682                           | AQ250683                           | AQ250684                           | AQ250685                           | AQ250334                      | AQ250334                      | AQ250767                       | AQ250767                       | AQ250266                           | AQ250266                           |
| Sample Date                          |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                               |                               |                                |                                |                                    |                                    |
| Sample Time                          |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                               |                               |                                |                                |                                    |                                    |
| Analysis/Sample ID                   |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                               |                               |                                |                                |                                    |                                    |
| Volatiles Targets GCMS (TO-15 mod)   |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                               |                               |                                |                                |                                    |                                    |
| 1,1,1,2-Tetrafluoroethane            | <0.001                             | ND                                 | ND                                 | <0.001                             | <0.001                             | <0.001                             | <0.001                             | <0.001                             | <0.001                             | ND                                 | ND                            | ND                            | <0.001                         | <0.001                         | <0.001                             | <0.001                             |
| 1-Butanol                            | ND                                 | ND                                 | ND                                 | 0.001                              | 0.001                              | 0.001                              | 0.001                              | 0.001                              | 0.001                              | ND                                 | ND                            | ND                            | ND                             | ND                             | <0.001                             | 0.001                              |
| 1-Propanol                           | <0.001                             | ND                                 | ND                                 | <0.001                             | 0.001                              | <0.001                             | <0.001                             | <0.001                             | <0.001                             | ND                                 | ND                            | ND                            | ND                             | ND                             | ND                                 | ND                                 |
| 2-Methyl-1-propene                   | ND                                 | ND                                 | ND                                 | <0.001                             | <0.001                             | <0.001                             | <0.001                             | <0.001                             | <0.001                             | ND                                 | ND                            | ND                            | ND                             | ND                             | ND                                 | ND                                 |
| 2-Propanol (Isopropanol)             | See GC-FID                         | 0.004                              | ND                                 | 0.004                              | See GC-FID                         | See GC-FID                         | See GC-FID                         | See GC-FID                         | 0.004                              | ND                                 | 0.001                         | 0.001                         | <0.001                         | <0.001                         | 0.002                              | 0.002                              |
| Acetaldehyde                         | 0.026                              | 0.034                              | ND                                 | 0.083                              | 0.068                              | 0.074                              | 0.077                              | 0.075                              | 0.062                              | ND                                 | ND                            | ND                            | ND                             | ND                             | 0.022                              | 0.022                              |
| Acetone                              | 0.005                              | 0.006                              | 0.021                              | 0.006                              | 0.009                              | 0.010                              | 0.010                              | 0.011                              | 0.010                              | 0.021                              | 0.002                         | 0.002                         | 0.002                          | 0.002                          | 0.003                              | 0.003                              |
| Acrylonitrile                        | ND                                 | ND                                 | ND                                 | ND                                 | 0.225                              | ND                                 | 0.187                              | ND                                 | ND                                 | ND                                 | ND                            | ND                            | ND                             | ND                             | ND                                 | ND                                 |
| Ethanol                              | See GC-FID                         | See GC-FID                         | <0.001                             | See GC-FID                         | See GC-FID                         | See GC-FID                         | See GC-FID                         | See GC-FID                         | See GC-FID                         | 0.002                              | <0.001                        | <0.001                        | <0.001                         | <0.001                         | See GC-FID                         | See GC-FID                         |
| Ethyl acetate                        | ND                                 | ND                                 | ND                                 | <0.001                             | <0.001                             | <0.001                             | <0.001                             | <0.001                             | <0.001                             | ND                                 | ND                            | ND                            | ND                             | ND                             | <0.001                             | <0.001                             |
| Isobutane                            | <0.001                             | ND                                 | ND                                 | ND                                 | ND                                 | <0.001                             | ND                                 | ND                                 | ND                                 | ND                                 | <0.001                        | <0.001                        | ND                             | ND                             | 0.001                              | 0.001                              |
| Isoprene (2-Methyl-1,3-butadiene)    | 0.013                              | 0.014                              | ND                                 | 0.013                              | 0.015                              | 0.012                              | 0.017                              | 0.017                              | 0.016                              | ND                                 | ND                            | ND                            | ND                             | ND                             | ND                                 | ND                                 |
| Methanol                             | 0.011                              | 0.011                              | ND                                 | 0.013                              | See GC-FID                         | See GC-FID                         | See GC-FID                         | See GC-FID                         | See GC-FID                         | 0.016                              | 0.002                         | 0.002                         | 0.002                          | 0.002                          | 0.005                              | 0.005                              |
| Methylene chloride (Dichloromethane) | ND                                 | ND                                 | ND                                 | 0.003                              | ND                                 | ND                                 | ND                                 | ND                                 | ND                                 | ND                                 | ND                            | ND                            | ND                             | ND                             | 0.001                              | 0.004                              |
| Perfluoro(2-methylpentane)           | ND                                 | ND                                 | ND                                 | ND                                 | <0.001                             | ND                                 | <0.001                             | <0.001                             | <0.001                             | <0.001                             | ND                            | ND                            | ND                             | ND                             | <0.001                             | <0.001                             |
| Trimethylsilanol                     | 0.007                              | ND                                 | ND                                 | 0.012                              | 0.011                              | 0.066                              | 0.008                              | 0.009                              | 0.009                              | ND                                 | ND                            | ND                            | ND                             | ND                             | 0.016                              | 0.016                              |
| Volatiles Targets GCFID              |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                               |                               |                                |                                |                                    |                                    |
| 2-Propanol (Isopropanol)             | 0.005                              | NR                                 | NR                                 | NR                                 | 0.004                              | 0.003                              | 0.003                              | 0.004                              | NR                                 | NR                                 | NR                            | NR                            | NR                             | NR                             | NR                                 | NR                                 |
| Ethanol                              | 0.002                              | 0.002                              | NR                                 | 0.002                              | 0.003                              | 0.002                              | 0.004                              | 0.004                              | 0.003                              | NR                                 | NR                            | NR                            | NR                             | NR                             | <0.001                             | <0.001                             |
| Methanol                             | NR                                 | NR                                 | NR                                 | NR                                 | 0.016                              | 0.012                              | 0.012                              | 0.015                              | 0.014                              | NR                                 | NR                            | NR                            | NR                             | NR                             | NR                                 | NR                                 |
| Octafluoropropane (Perfluoropropane) | <0.001                             | ND                                 | ND                                 | ND                                 | ND                                 | ND                                 | ND                                 | ND                                 | ND                                 | ND                                 | ND                            | ND                            | ND                             | ND                             | ND                                 | ND                                 |
| Volatiles Targets TGA                |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                                    |                               |                               |                                |                                |                                    |                                    |
| Carbon monoxide                      | 0.109                              | 0.135                              | ND                                 | 0.075                              | 0.090                              | 0.079                              | 0.085                              | 0.092                              | 0.084                              | ND                                 | 0.009                         | 0.032                         | 0.025                          | 0.093                          | 0.014                              | 0.054                              |
| Total T-Value                        | 0.2                                | 0.2                                | < 0.1                              | 0.2                                | 0.4                                | 0.3                                | 0.4                                | 0.2                                | 0.2                                | < 0.1                              | < 0.1                         | < 0.1                         | < 0.1                          | 0.1                            | 0.1                                | 0.1                                |

Comments: ND= Value is less than the laboratory reporting limit.

NR= Not Reported

AQ250263: Low Pressure: 5.9 psia

AQ250264: Initial pressure 0.6 psia shows this cannister is still under pressure, suspected to be unused

AQ250767: This is an unlabeled cannister with an intial pressure of 13.9psi. Sampling date estimated as GMT 074

The individual T-value reporting limit for the compounds is 0.001, any T-value calculated lower than 0.001 is reported as <0.001, but the actual value is used in the total T-value calculation.

The total T-value reporting limit is 0.1, any calculated total T-value lower than 0.1 is reported as <0.1.

**TABLE S-2B: T-VALUES FOR SPACEX-31**

|                                           | Increment                    | 72                           |                              |
|-------------------------------------------|------------------------------|------------------------------|------------------------------|
|                                           | Mission                      | SpaceX-31                    |                              |
|                                           |                              | T-Value (7-Day)              | T-Value (180-day)            |
|                                           | Sample Location              | CARGO<br>DRGN (SpX-31)       | CARGO<br>DRGN (SpX-31)       |
| Sample Description                        | Ingress air sample, S/N 2048 | Ingress air sample, S/N 2048 | Ingress air sample, S/N 2048 |
| Sample Date                               | 11/5/2024                    | 11/5/2024                    | 11/5/2024                    |
| Sample Time                               | 16:19                        | 16:19                        | 16:19                        |
| Analysis/Sample ID                        | AQ250266                     | AQ250266                     | AQ250266                     |
| <b>Volatiles Targets GCMS (TO-15 mod)</b> |                              |                              |                              |
| 1,1,1,2-Tetrafluoroethane                 |                              | <0.001                       | <0.001                       |
| 1-Butanol                                 |                              | <0.001                       | 0.001                        |
| 2-Propanol (Isopropanol)                  |                              | 0.002                        | 0.002                        |
| Acetaldehyde                              |                              | 0.022                        | 0.022                        |
| Acetone                                   |                              | 0.003                        | 0.003                        |
| Ethanol                                   |                              | See GC-FID                   | See GC-FID                   |
| Ethyl acetate                             |                              | <0.001                       | <0.001                       |
| Isobutane                                 |                              | 0.001                        | 0.001                        |
| Methanol                                  |                              | 0.005                        | 0.005                        |
| Methylene chloride (Dichloromethane)      |                              | 0.001                        | 0.004                        |
| Perfluoro(2-methylpentane)                |                              | <0.001                       | <0.001                       |
| Trimethylsilanol                          |                              | 0.016                        | 0.016                        |
| <b>Volatiles Targets GCFID</b>            |                              |                              |                              |
| Ethanol                                   |                              | <0.001                       | <0.001                       |
| <b>Volatiles Targets TGA</b>              |                              |                              |                              |
| Carbon monoxide                           |                              | 0.014                        | 0.054                        |
| <b>Total T-Value</b>                      |                              | <b>0.1</b>                   | <b>0.1</b>                   |

**Comments:** ND= Value is less than the laboratory reporting limit.

NR= Not Reported

The individual T-value reporting limit for the compounds is 0.001, any T-value calculated lower than 0.001 is reported as <0.001, but the actual value is used in the total T-value calculation.

The total T-value reporting limit is 0.1, any calculated total T-value lower than 0.1 is reported as <0.1.

**TABLE S-3A: ANALYTICAL CONCENTRATIONS OF COMPOUNDS QUANTIFIED IN AMBIENT  
AND HOT POTABLE WATER RETURNED ON SPX-31 AND CREW-9**

| Increment<br>Mission<br>Sample Location<br>Sample Description<br>Sample Date<br>Analysis/Sample ID | Units    | Test<br>Conducted<br>by | Potable Water<br>Maximum<br>Contaminant<br>Level<br>(MCL) | Maximum<br>Contaminant<br>Level<br>Source                   | 72                                      |                                         |                                       |                                        |
|----------------------------------------------------------------------------------------------------|----------|-------------------------|-----------------------------------------------------------|-------------------------------------------------------------|-----------------------------------------|-----------------------------------------|---------------------------------------|----------------------------------------|
|                                                                                                    |          |                         |                                                           |                                                             | SpX-31                                  |                                         | Crew-9                                |                                        |
|                                                                                                    |          |                         |                                                           |                                                             | WPA xPWD<br>Ambient                     | WPA PWD<br>Hot                          | WPA PWD<br>Ambient                    | WPA xPWD<br>Hot                        |
|                                                                                                    |          |                         |                                                           |                                                             | Potable Water<br>11/19/2024<br>WQ240502 | Potable Water<br>11/25/2024<br>WQ240503 | Potable Water<br>3/4/2025<br>WQ250146 | Potable Water<br>3/11/2025<br>WQ250147 |
| Physical Characteristics                                                                           |          |                         |                                                           |                                                             |                                         |                                         |                                       |                                        |
| Conductivity                                                                                       | µS/cm    | U.S.                    |                                                           |                                                             | 1                                       | 1                                       | < 1                                   | 2                                      |
| pH                                                                                                 | pH units | U.S.                    | 4.5-8.5                                                   | 41000                                                       | 5.62                                    | 5.56                                    | 5.61                                  | 5.31                                   |
| Iodine LCV                                                                                         |          |                         |                                                           |                                                             |                                         |                                         |                                       |                                        |
| Iodine                                                                                             | mg/L     | U.S.                    | 1.0-4.0                                                   | 41000 (residual iodine in product water)                    | 0.09                                    | < 0.05                                  | 0.08                                  | < 0.05                                 |
| Total I                                                                                            | mg/L     | U.S.                    | 6/0.2                                                     | 41000 (tl I max in product water/tl I at pt of consumption) | 0.09                                    | < 0.05                                  | 0.08                                  | < 0.05                                 |
| Minerals ICPMS                                                                                     |          |                         |                                                           |                                                             |                                         |                                         |                                       |                                        |
| Calcium                                                                                            | mg/L     | U.S.                    | 30                                                        | 41000                                                       | < 0.01                                  | < 0.01                                  | < 0.01                                | 0.01                                   |
| Sodium                                                                                             | mg/L     | U.S.                    |                                                           |                                                             | < 0.01                                  | < 0.01                                  | < 0.01                                | 0.01                                   |
| Trace Metals ICPMS                                                                                 |          |                         |                                                           |                                                             |                                         |                                         |                                       |                                        |
| Aluminum                                                                                           | µg/L     | U.S.                    |                                                           |                                                             | < 1                                     | < 1                                     | 2                                     | 1                                      |
| Nickel                                                                                             | µg/L     | U.S.                    | 300                                                       | SWEG&41000                                                  | 5                                       | 2                                       | < 1                                   | 10                                     |
| Silicon ICPMS                                                                                      |          |                         |                                                           |                                                             |                                         |                                         |                                       |                                        |
| Silicon                                                                                            | µg/L     | U.S.                    |                                                           |                                                             | 74                                      | 160                                     | 160                                   | 150                                    |
| Total Organic Carbon-Sievers                                                                       |          |                         |                                                           |                                                             |                                         |                                         |                                       |                                        |
| Total Inorganic Carbon (TIC)                                                                       | mg/L     | U.S.                    |                                                           |                                                             | 0.902                                   | 0.688                                   | 0.860                                 | 0.851                                  |
| Total Organic Carbon (TOC)                                                                         | mg/L     | U.S.                    | 5 / 3                                                     | SWEG / 41000                                                | 0.396                                   | 0.615                                   | 0.452                                 | 0.701                                  |
| Volatile Organics-Targets                                                                          |          |                         |                                                           |                                                             |                                         |                                         |                                       |                                        |
| Acetone                                                                                            | µg/L     | U.S.                    | 15,000                                                    | SWEG                                                        | < 5                                     | < 25                                    | < 5                                   | 13                                     |
| Semi-volatile Organics-Targets                                                                     |          |                         |                                                           |                                                             |                                         |                                         |                                       |                                        |
| Methyl sulfone                                                                                     | µg/L     | U.S.                    | 1,500,000                                                 | interim SWEG (06-2017)                                      | 184                                     | 326                                     | 183                                   | 187                                    |
| Semi-volatile Organics-Special Interest Compounds (Semi-quantitative)                              |          |                         |                                                           |                                                             |                                         |                                         |                                       |                                        |
| 2-Ethylhexanoic acid                                                                               | µg/L     | U.S.                    |                                                           |                                                             | not found                               | not found                               | 39                                    | not found                              |
| Alcohols & Acetone GCMS                                                                            |          |                         |                                                           |                                                             |                                         |                                         |                                       |                                        |
| Acetone                                                                                            | µg/L     | U.S.                    | 15,000                                                    | SWEG                                                        | See Volatiles                           | See Volatiles                           | See Volatiles                         | See Volatiles                          |
| Aldehydes GCMS                                                                                     |          |                         |                                                           |                                                             |                                         |                                         |                                       |                                        |
| Formaldehyde (Methanal)                                                                            | µg/L     | U.S.                    | 12,000                                                    | SWEG                                                        | < 10                                    | < 10                                    | < 10                                  | 22                                     |
| Organic Carbon Recovery                                                                            | percent  | U.S.                    |                                                           |                                                             | 11.8                                    | 13.5                                    | 16.2                                  | 9.27                                   |
| Unaccounted Organic Carbon                                                                         | mg/L     | U.S.                    |                                                           |                                                             | 0.350                                   | 0.530                                   | 0.380                                 | 0.640                                  |

**Comments:** NR= Not Reported NA=Not Analyzed

NA=Not analyzed  
MI=Matrix Interference  
N/A=Not applicable  
#previously identified as bis(2-Chloroisopropyl) ether

TABLE S-3B: ANALYTICAL CONCENTRATIONS OF COMPOUNDS QUANTIFIED IN WASTEWATER AND US CONDENSATE WATER SAMPLES RETURNED ON SPX-31

| Increment Mission<br><br>Sample Location<br><br>Sample Description<br><br>Sample Date<br>Analysis/Sample ID | Units    | Test Conducted by | Potable Water Maximum Contaminant Level (MCL) | Maximum Contaminant Level Source                       | 72                         |                                    |                                   |
|-------------------------------------------------------------------------------------------------------------|----------|-------------------|-----------------------------------------------|--------------------------------------------------------|----------------------------|------------------------------------|-----------------------------------|
|                                                                                                             |          |                   |                                               |                                                        | SpX-31                     |                                    |                                   |
|                                                                                                             |          |                   |                                               |                                                        | WPA PWD Aux Port           | WPA Wastewater ORU                 | WPA Condensate Sample Port        |
|                                                                                                             |          |                   |                                               |                                                        | WPA Product Water WQ240504 | WPA Wastewater 11/27/2024 WQ240505 | US Condensate 11/19/2024 WQ240507 |
| Physical Characteristics                                                                                    |          |                   |                                               |                                                        |                            |                                    |                                   |
| Conductivity                                                                                                | µS/cm    | U.S.              |                                               |                                                        | 2                          | 121                                | 250                               |
| pH                                                                                                          | pH units | U.S.              | 4.5-8.5                                       | 41000                                                  | 5.45                       | 7.11                               | 7.53                              |
| Iodine IC PMS                                                                                               |          |                   |                                               |                                                        |                            |                                    |                                   |
| Total I                                                                                                     | mg/L     | U.S.              |                                               |                                                        | NA                         | 0.25                               | 0.003                             |
| Iodine LCV                                                                                                  |          |                   |                                               |                                                        |                            |                                    |                                   |
| Iodide                                                                                                      | mg/L     | U.S.              |                                               |                                                        | 0.620                      | NA                                 | NA                                |
| Iodine                                                                                                      | mg/L     | U.S.              | 1.0-4.0                                       | 41000 (residual iodine in product water)               | 1.83                       | NA                                 | NA                                |
| Total I                                                                                                     | mg/L     | U.S.              | 6/0.2                                         | 41000 (if 1 max in product water)(1 pt of consumption) | 2.45                       | NA                                 | NA                                |
| Anions IC                                                                                                   |          |                   |                                               |                                                        |                            |                                    |                                   |
| Fluoride                                                                                                    | mg/L     | U.S.              |                                               |                                                        | < 0.1                      | 0.2                                | < 0.1                             |
| Cations IC                                                                                                  |          |                   |                                               |                                                        |                            |                                    |                                   |
| Ammonium (as N)                                                                                             | mg/L     | U.S.              | 1                                             | SWEG&41000                                             | < 0.25                     | 12.3                               | 27.5                              |
| Minerals IC PMS                                                                                             |          |                   |                                               |                                                        |                            |                                    |                                   |
| Calcium                                                                                                     | mg/L     | U.S.              | 30                                            | 41000                                                  | < 0.01                     | 0.07                               | 0.04                              |
| Magnesium                                                                                                   | mg/L     | U.S.              | 50                                            | 41000                                                  | < 0.01                     | 0.01                               | < 0.01                            |
| Phosphate (as P)                                                                                            | mg/L     | U.S.              |                                               |                                                        | < 0.01                     | 0.41                               | < 0.01                            |
| Potassium                                                                                                   | mg/L     | U.S.              | 340                                           | 41000                                                  | < 0.01                     | 0.20                               | 0.02                              |
| Sodium                                                                                                      | mg/L     | U.S.              |                                               |                                                        | < 0.01                     | 0.20                               | < 0.01                            |
| Trace Metals IC PMS                                                                                         |          |                   |                                               |                                                        |                            |                                    |                                   |
| Aluminum                                                                                                    | µg/L     | U.S.              |                                               |                                                        | 2                          | 3                                  | 3                                 |
| Boron                                                                                                       | µg/L     | U.S.              |                                               |                                                        | < 1                        | 12                                 | 20                                |
| Chromium                                                                                                    | µg/L     | U.S.              | 230                                           | 41000                                                  | < 1                        | 70                                 | 2                                 |
| Copper                                                                                                      | µg/L     | U.S.              | 1,000                                         | 41000                                                  | < 1                        | < 1                                | 2                                 |
| Manganese                                                                                                   | µg/L     | U.S.              | 300                                           | SWEG&41000                                             | < 1                        | 4                                  | 7                                 |
| Nickel                                                                                                      | µg/L     | U.S.              | 300                                           | SWEG&41000                                             | 48                         | 169                                | 260                               |
| Silver                                                                                                      | µg/L     | U.S.              | 400                                           | SWEG&41000                                             | < 1                        | 2                                  | 52                                |
| Strontium                                                                                                   | µg/L     | U.S.              |                                               |                                                        | < 1                        | < 1                                | 2                                 |
| Zinc                                                                                                        | µg/L     | U.S.              | 2,000                                         | SWEG&41000                                             | < 1                        | 4500                               | 10300                             |
| Silicon IC PMS                                                                                              |          |                   |                                               |                                                        |                            |                                    |                                   |
| Silicon                                                                                                     | µg/L     | U.S.              |                                               |                                                        | 132                        | 1020                               | 2100                              |
| Total Organic Carbon-Sievers                                                                                |          |                   |                                               |                                                        |                            |                                    |                                   |
| Total Inorganic Carbon (TIC)                                                                                | mg/L     | U.S.              |                                               |                                                        | 0.767                      | 17.0                               | 19.6                              |
| Total Organic Carbon (TOC)                                                                                  | mg/L     | U.S.              | 5 / 3                                         | SWEG / 41000                                           | 0.362                      | 23.3                               | 101                               |
| Volatile Organics-Targets                                                                                   |          |                   |                                               |                                                        |                            |                                    |                                   |
| Acetone                                                                                                     | µg/L     | U.S.              | 15,000                                        | SWEG                                                   | < 5                        | 189                                | See Alcohols                      |
| Volatile Organics-Special Interest Compounds (Semi-quantitative)                                            |          |                   |                                               |                                                        |                            |                                    |                                   |
| Acetaldehyde                                                                                                | µg/L     | U.S.              |                                               |                                                        | not found                  | not found                          | 570                               |
| Trimethylsilanol                                                                                            | µg/L     | U.S.              |                                               |                                                        | not found                  | 53                                 | < 100                             |
| Semi-volatile Organics-Targets                                                                              |          |                   |                                               |                                                        |                            |                                    |                                   |
| Methyl sulfone                                                                                              | µg/L     | U.S.              | 1,500,000                                     | interim SWEG (06-2017)                                 | 183                        | 235                                | 421                               |
| Acid Extractables-EPA 625 List GCMS                                                                         |          |                   |                                               |                                                        |                            |                                    |                                   |
| 4-Methylphenol (p-Cresol)                                                                                   | µg/L     | U.S.              |                                               |                                                        | < 20                       | 258                                | < 20                              |
| Benzoic acid                                                                                                | µg/L     | U.S.              |                                               |                                                        | < 100                      | < 100                              | 424                               |
| Phenol                                                                                                      | µg/L     | U.S.              | 4,000                                         | SWEG                                                   | < 20                       | 94                                 | < 20                              |
| Base and Neutral Extractables-EPA 625 List GCMS                                                             |          |                   |                                               |                                                        |                            |                                    |                                   |
| Benzyl alcohol                                                                                              | µg/L     | U.S.              |                                               |                                                        | < 20                       | < 20                               | 1510                              |
| Diethylphthalate                                                                                            | µg/L     | U.S.              |                                               |                                                        | < 20                       | 31                                 | 44                                |
| Semi-volatile Organics-Special Interest Compounds (Semi-quantitative)                                       |          |                   |                                               |                                                        |                            |                                    |                                   |
| 1-Methyl-2-pyrrolidinone                                                                                    | µg/L     | U.S.              |                                               |                                                        | not found                  | not found                          | < 80                              |
| 2-(2-Butoxyethoxy)ethanol                                                                                   | µg/L     | U.S.              |                                               |                                                        | not found                  | not found                          | 41                                |
| 2-Butoxyethanol                                                                                             | µg/L     | U.S.              |                                               |                                                        | not found                  | not found                          | 45                                |
| 2-Ethoxyethanol                                                                                             | µg/L     | U.S.              |                                               |                                                        | not found                  | < 40                               | 75                                |
| 2-Ethylhexanoic acid                                                                                        | µg/L     | U.S.              |                                               |                                                        | not found                  | not found                          | 32                                |
| 2-Phenoxyethanol                                                                                            | µg/L     | U.S.              |                                               |                                                        | not found                  | not found                          | 48                                |
| Acetophenone                                                                                                | µg/L     | U.S.              |                                               |                                                        | not found                  | 11                                 | not found                         |
| Benzaldehyde                                                                                                | µg/L     | U.S.              |                                               |                                                        | not found                  | not found                          | < 20                              |
| Hexanoic acid (Caprolate)                                                                                   | µg/L     | U.S.              |                                               |                                                        | not found                  | not found                          | < 100                             |
| Ibuprofen                                                                                                   | µg/L     | U.S.              |                                               |                                                        | not found                  | 200                                | not found                         |
| N,N-Diethylformamide                                                                                        | µg/L     | U.S.              |                                               |                                                        | not found                  | 23                                 | 39                                |
| N,N-Dimethyl acetamide                                                                                      | µg/L     | U.S.              |                                               |                                                        | not found                  | 66                                 | 230                               |
| N,N-Dimethylformamide                                                                                       | µg/L     | U.S.              |                                               |                                                        | not found                  | 110                                | 220                               |
| Neomenthol                                                                                                  | µg/L     | U.S.              |                                               |                                                        | not found                  | 34                                 | not found                         |
| Phenethyl alcohol                                                                                           | µg/L     | U.S.              |                                               |                                                        | not found                  | not found                          | < 10                              |
| Alcohols & Acetone GCMS                                                                                     |          |                   |                                               |                                                        |                            |                                    |                                   |
| 1-Propanol                                                                                                  | µg/L     | U.S.              |                                               |                                                        | < 400                      | < 400                              | 442                               |
| 2-Propanol (Isopropanol)                                                                                    | µg/L     | U.S.              |                                               |                                                        | < 400                      | < 400                              | 3060                              |
| Acetone                                                                                                     | µg/L     | U.S.              | 15,000                                        | SWEG                                                   | See Volatiles              | See Volatiles                      | 6800                              |
| Ethanol                                                                                                     | µg/L     | U.S.              |                                               |                                                        | < 400                      | < 400                              | 70400                             |
| Methanol                                                                                                    | µg/L     | U.S.              | 40,000                                        | SWEG                                                   | < 400                      | 5490                               | 5500                              |
| Glycols GCMS                                                                                                |          |                   |                                               |                                                        |                            |                                    |                                   |
| 1,2-Propanediol (Propylene glycol)                                                                          | µg/L     | U.S.              | 1,700,000                                     | SWEG                                                   | < 1000                     | 5150                               | 23900                             |
| Silanols LCRI (Semi-Quantitative-NIST traceable standard not available)                                     |          |                   |                                               |                                                        |                            |                                    |                                   |
| Dimethylsilanediol (DMSD)                                                                                   | µg/L     | U.S.              | 35,000                                        | SWEG                                                   | < 1000                     | 2800                               | 6700                              |
| Carboxylates IC                                                                                             |          |                   |                                               |                                                        |                            |                                    |                                   |
| Acetate                                                                                                     | µg/L     | U.S.              |                                               |                                                        | < 500                      | < 500                              | 35200                             |
| Formate                                                                                                     | µg/L     | U.S.              | 2,500,000                                     | SWEG                                                   | < 500                      | 556                                | 1740                              |
| Propionate                                                                                                  | µg/L     | U.S.              |                                               |                                                        | < 500                      | < 500                              | 596                               |
| Aldehydes GCMS                                                                                              |          |                   |                                               |                                                        |                            |                                    |                                   |
| Formaldehyde (Methanal)                                                                                     | µg/L     | U.S.              | 12,000                                        | SWEG                                                   | < 10                       | 26                                 | 1040                              |
| Organic Carbon Recovery                                                                                     |          |                   |                                               |                                                        |                            |                                    |                                   |
|                                                                                                             | percent  | U.S.              |                                               |                                                        | 13.0                       | 26.5                               | 75.4                              |
| Unaccounted Organic Carbon                                                                                  |          |                   |                                               |                                                        |                            |                                    |                                   |
|                                                                                                             | mg/L     | U.S.              |                                               |                                                        | 0.320                      | 17.1                               | 24.8                              |

Comments: NR= Not Reported NA=Not Analyzed

Data Qualifiers: WQ240505&507: Valerate-Data Qualifier: Possible low bias (MS 74.9%)

1,2-Ethanediol (Ethylene Glycol)-Data Qualifier: Possible low bias (MS Rec. 66%)

Freon 12: Data Qualifier-Possible low bias (MS Rec. 58.1%)

Hexachlorobutadiene: Data Qualifier-Possible low bias (MS Rec. 63.9%)