LSDA COPY

# Shuttle-Mir Science Program
# Mir 18 and STS-71

# 30-Day Operational Accomplishment Report


National Aeronautics
and Space Administration

**Lyndon B. Johnson Space Center**
Houston, TX

**April 1996**

# Trace Chemical Contamination - 5.3
# (Water Quality)
# Postflight 30-Day Operational Report

## A. SCIENCE OPERATIONS

### Regenerated Hot Water Sampling

| Mission | Scheduled day | Actual day | Actual date | Actual Subjects | Samples/Parameters |
|---|---|---|---|---|---|
| Mir 18 | L-92 | L-92 | 28 Mar | Not Applicable | 965 ml of regenerated hot water<br>Split: 630 ml (US), 335 ml (Russia) |
| Mir 18 | L-8 | L-8 | 20 June | Not Applicable | 193 ml of regenerated hot water<br>Split: 145 ml (US), 48 ml (Russia) |
| STS-71 | FD7 | FD7 | 3 Jul | Not Applicable | 583 ml of regenerated hot water<br>Split: 395ml (US), 188 ml (Russia) |

### Regenerated Cold Water Sampling

| Mission | Scheduled day | Actual day | Actual date | Actual Subjects | Samples/Parameters |
|---|---|---|---|---|---|
| STS-71 | FD7 | did not occur | | | |

### Ground Supplied Rodnik Water Sampling

| Mission | Scheduled day | Actual day | Actual date | Actual Subjects | Samples/Parameters |
|---|---|---|---|---|---|
| STS-71 | FD7 | FD7 | 3 Jul | Not Applicable | 291 ml of Rodnik water<br>Split: 145 ml (US), 146 ml (Russia) |

## B. PARAMETER LIST

Parameters tested by US Lab
Alcohols, Amines, Formaldehyde, Nonvolatile organics, Carboxylates, Organic acids, Semivolatile organics, Total Organic Carbon, Volatile Organics

Parameters tested by Russian Lab
Anions, Cations, Conductivity, Metals, pH, Turbidity

## C. HARDWARE

This experiment did not include any preflight activity.

Major hardware used inflight

Water Sampling Kit :
- 1 Liter sample Bags, 500 ml sample bags
- Potable Water Samplers and galley port/Rodnik port adapters
- Waste Bags
- Storage Bags

Major hardware used postflight

HP 5890 Gas Chromatograph (GC) with HP5971A Mass Spectrometer (MS)
Waters Quanta 4000 Capillary Electrophoresis System
HP 5890 Gas Chromatograph (GC) with HP5971 Mass Spectrometer (MS)
OI 700 Carbon Analyzer
HP 7694 Headspace sampler with a HP 5890 GC and 5972 Mass Selective Detector
HP 5989 Mass Spectrometer (MS) with a 1090 Liquid Chromatograph with Particle beam & Thermospray interfaces

## D. DATA COLLECTION

### 1. Completeness of data

Data for this experiment is derived from analysis of water samples received. Sample analyses are in progress. One cold water sample was not collected inflight as planned. In addition, a humidity condensate sample expected was also not received. For these two samples, no data will be available.

### 2. Quality of data

Not Applicable to this experiment.

### 3. Anomalies

**Preflight Anomalies**

Not Applicable to this experiment.

**Inflight Anomalies**

Mir 18

None.

STS-71

We were unable to collect one sample of cold water because of time constraints on the last day of docking, FD7. 18-CR was to perform the sampling.

The humidity condensate sample, while reported to have been collected, could not be found for transfer to the Shuttle.

Misinterpretation of water collection flight procedures caused a sample of ground supplied Rodnik water to be taken at the wrong location. The sample was taken in the Kvant 2 module. The correct location should have been the Mir Core module.

Inflight hardware failed and leakage of water from the sample bags occurred.

Postflight Anomalies

All sample analyses planned could not be performed due to leakage of water sample bags.

**4. Additional data collections**

Once leakage of sample bags was detected on FD7, 18-CR was directed to keep the waste bag ( a purge bag to collect water before the actual sample is taken). This bag is usually thrown away. By keeping it and returning it on STS-71, we received additional sample volume to perform the analyses. Analyses performed on this waste bag included carboxylates, amines, volatiles, formaldehyde, and nonvolatiles.

## E. STATUS OF DATA ANALYSIS

Preliminary Sample Analysis Reports have been generated. These reports include results of Total Organic Carbon, alcohols, organic acids, semivolatiles, carboxylates, and nonvolatiles for each water sample collected.

Analyses for volatile organics, formaldehyde, amines, identification, confirmation and quantification of unknown semivolatiles, and the preparation of organic carbon balances still need to be completed. In addition, analysis of water that leaked into the overwrap bags has not been initiated yet.

## F. PRELIMINARY SCIENCE FINDINGS

Preliminary science findings show total organic carbon of the hot water ranged from 1298 ug/L to 6,723 ug/L. ISS Requirements are 500 ug/L (US) and 25,000 ug/L (RSA). Total Organic Carbon of the ground supplied Rodnik water was 6,562 ug/L.

The silver content of the hot water and ground supplied water ranged from 44.5 ug/L to 141.5 ug/L.

Organic Constituents found to date include acetophenone, benzothiazole, decamethylcyclopentasiloxane, dibutyl phthalate, 1.3-dichlorobenzene, diethyl phthalate, dioctyl phthalate, bis-2-ethylhexyl adipate, 2-methylthiobenzo-thiazole, and n-phenyl 2-naphthyamine. The levels of the compounds are probably not toxicologically significant.

**This Page Intentionally Left Blank**