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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

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

A. SCIENCE OPERATIONS

Air samples collected during the Mir 18 mission include 7 sorbent tube samples using the Solid Sorbent Air Sampler (SSAS), 12 grab samples using the Grab Sample Containers (GSC), and 9 formaldehyde monitors using the Formaldehyde Monitoring Kit (FMK). STS-71 air samples include 7 sorbent tube samples using the Solid Sorbent Air Sampler (2nd unit) and 6 grab samples using additional Grab Sample Containers. The inflight sample collection occurred as follows:

Air Sampling Using the Solid Sorbent Air Sampler

Mission	Sample	Scheduled Day	Actual day	Actual date	Subjects	Samples/Parameters
Mir 18	Tube 1	MD 5	MD 5	20 March	n/a	Integrated/GC-MS for VOC's
	Tube 2	MD 13	MD 14	29 March	n/a	Same
	Tube 3	MD 25	MD 25	9 April	n/a	Same
	Tube 4	MD 45	MD 45	29 April	n/a	Same
	Tube 5	MD 60	MD 60	14 May	n/a	Same
	Tube 6	MD 73	MD 73	28 May	n/a	Same
	Tube 7	MD 82	MD 80	3 June	n/a	Same
STS-71	Tube 1	FD 1	FD 1	27 June	n/a	Integrated/GC-MS for VOC's
	Tube 2	FD 2	FD 2	28 June	n/a	Same
	Tube 3	FD 4	FD 4	30 June	n/a	Same
	Tube 4	FD 5	FD 5	1 July	n/a	Same
	Tube 5	FD 6	FD 6	2 July	n/a	Same
	Tube 6	FD 7	FD 7	3 July	n/a	Same
	Tube 7	FD 8	FD 8	4 July	n/a	Same

Air Sampling Using Grab Sample Containers

Mir 18	1	MD 6	MD 6	21 March	n/a	Grab/GC-MS for VOC's
	2	MD 14	MD 14	29 March	n/a	Same
	3	MD 26	MD 26	10 April	n/a	Same
	4	MD 46	MD 46	30 April	n/a	Same
	5	MD 61	MD 61	15 May	n/a	Same
	6	MD 74	MD 74	29 May	n/a	Same
	7	MD 82	MD 81	4 June	n/a	Same
	8	MD 109	MD 89	12 June	n/a	Same
	9	MD 109	MD 89	12 June	n/a	Same
	10	MD 109	MD 89	12 June	n/a	Same
	11	MD 109	MD 89	12 June	n/a	Same
	12	MD 109	MD 106	29 June	n/a	Same
STS-71	1	FD 1	FD 1	27 June	n/a	Grab/GC-MS for VOC's
	2	FD 2	FD 2	28 June	n/a	Same
	3	FD 3	FD 3	29 June	n/a	Same
	4	FD 6	FD 6	2 July	n/a	Same
	5	FD 7	FD 7	3 July	n/a	Same
	6	FD 7	FD 7	3 July	n/a	Same

Air Sampling Using the Formaldehyde Monitors

Mission	Sample	Scheduled Day	Actual day	Actual date	Subjects	Samples/Parameters
Mir 18	1	MD 6	MD 6	22 March	18-CR	Formaldehyde
	2	MD 14	MD 14	29 March	18-CR	Same
	3	MD 26	MD 26	10 April	18-CR	Same
	4	MD 37	MD 37	21 April	18-CR	Same
	5	MD 46	MD 46	30 April	18-CR	Same
	6	MD 57	MD 56	10 May	18-CR	Same
	7	MD 68	MD 69	23 May	18-CR	Same
	8	MD 79	MD 89	12 June	18-CR	Same
	9	MD 97	MD 97	20 June	18-CR	Same

B. BIOMEDICAL PARAMETER LIST

Air samples collected using the SSAS and GSCs will be analyzed for volatile organic compounds (VOCs) including 80 target VOCs and additional nontarget VOCs. Additionally, the GSCs will be analyzed for methane, hydrogen, and carbon monoxide. The formaldehyde monitors will be analyzed for formaldehyde.

C. HARDWARE

Major hardware items used during the Mir 18 and STS-71 missions include the following:

Preflight	Inflight	Postflight
Hewlett-Packard GC/MS systems (2)	SSAS	Hewlett-Packard GC/MS systems (2)
Vacuum racks	GSCs	Vacuum racks
Training hardware	FMK	Various pumps
Various pumps		Valco Model 1000 HID Trace Gas Analyzer
Valco Model 1000 HID Trace Gas Analyzer		Varian 3700 Series GC
Varian 3700 Series GC		Shimadzu UV-Vis Spectrophotometer
Shimadzu UV-Vis Spectrophotometer		Thermal desorption system
Thermal desorption system		

D. DATA COLLECTION

1. Completeness of data

Mir 18 and STS-71 cabin pressure readings near the time of SSAS sampling are needed to complete the sample volume collection calculations. These values are needed to correct the collection volume to standard conditions.

2. Quality of data

Mir 18 sample collection and recording were carried out precisely as planned with only insignificant deviations.

For STS-71, 6 GSC's were manifested. Four grab samples were to be collected in the Spacelab module (SLM) and 1 end-of-mission sample collected in the

middeck. The last container is to be used in case of a contingency event. During the course of the mission, all 6 GSC's samples were collected in the SL.

3. Anomalies

Preflight Anomalies

None

Inflight Anomalies

Mir 18

A plan to collect grab samples from different modules was developed and implemented perfectly during the course of the mission.

STS-71

As previously mentioned, the middeck grab samples were not collected, however, this should not impact the STS-71 cabin air quality assessment.

Postflight Anomalies

None

4. Additional data collections

All samplers manifested were used during the course of the Mir 18 and STS-71 missions.

E. STATUS OF DATA ANALYSIS

Formaldehyde analyses and gas chromatography analyses for hydrogen, methane, and carbon monoxide are approximately 90% complete. GC/MS analyses and data reduction for VOCs are approximately 10% complete. A preliminary report for Mir 18 air sampling is targeted for the week of August 21.

F. PRELIMINARY SCIENCE FINDINGS

Statements on preliminary science findings are premature at this time.

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