NASA-TM-112400

BASELINED JMSWG

Final
12/13/96

NASA/MIR PROGRAM

INTEGRATED PAYLOAD REQUIREMENTS DOCUMENT (IPRD)

Mission Science Working Group

Res. Incr. 5

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ACRONYMS

a-VO2	Arterial-venous Oxygen
ABPM	Automatic Blood Pressure Measurement
ADV	Advanced Technology
AH	Acceleration Heads
ALB	Angular Liquid Bridge
APCF	Advanced Protein Crystalization Facility
BATS	Biosphere Atmosphere Transfer Scheme
BCAT	Binary Colloidal Alloy Test
BCR	Bar Code Reader
BDC	Baseline Data Collection
BMMD	Body Mass Measurement Device
BRIC	Biological Research in Canister
BTS	Biotechnology System
CART	Cartilage in Space
CCB	Configuration Control Board
CCD	Charged Coupled Device
CFM	Candle Flame in Microgravity
CGBA	Commercial Generic Bioprocessing Apparatus
CPD	Crew Passive Dosimeters
CTS	Circadian Timing System
DB	Distribution Box
DCAM	Ambient Diffusion Controlled Protein Crystal Growth
EDLS	Enhanced Dynamic Load Sensor
ELISA	Enzyme-Linked Immunosorbent Assay
EMA	Electrolysis Module Assembly
ES	Earth Sciences
ESM	Experiment Support Module
EVA	Extra-Vehicular Activity
FB	Fundamental Biology
FCA	Fluids Control Assembly
FD	Flight Day
FFFT	Forced Flow Flamespread Test
GAP	Group Activation Pack
GN2	Gaseous Nitrogen
HLS	Human Life Sciences
HSR	Hygiene, Sanitation, & Radiation
IBMP	Institute of Biomedical Problems
ICE	Interface Configuration Experiment
ID	Identifier
IMS	Inventory Management System
IPRD	Integrated Payload Requirements Document
ISS	International Space Station
JMSWG	Joint Mission Science Working Group (United States & Russia)
JSC	Johnson Space Center

LaRC	Langley Research Center
LBNP	Lower Body Negative Pressure
LCD	Liquid Crystal Display
LeRC	Lewis Research Center
LET	Linear Energy Transfer
LMD	Liquid Metal Diffusion Experiment
LPS	Liquid Phase Sintering
LSRM	Life Support Risk Mitigation
MAS	Microbial Air Sampler
MG	Microgravity
MGAS	Metabolic Gas Analyzer
MGBX	Microgravity Glovebox
MGM	Mechanics of Granular Materials
MIM	Microgravity Isolation Mount
MIPS	Mir Interface to Payload Systems
MiSDE	Mir Structural Dynamics Experiment
MMO	Mission Management Office
MO	Medical Operations
MOIWG	Mir Operations and Integration Working Group
MRI	Magnetic Resonance Imaging
MSCI	Mission Science Office
MSFC	Marshall Space Flight Center
MSRE	Mir Sample Return Experiment
MSWG	Mission Science Working Group (United States)
MVC	Maximal Voluntary Contraction
NASA	National Aeronautics and Space Administration
ND	Normative Data
NMSP	NASA/Mir Science Program
ODC	Orbital Debris Collector
OPM	Optical Properties Monitor
OR/F	Orbiter Refrigerator/Freezer
OTFE	Oscillatory Thermocapillary Flow Exp
PAH	Para-Amino-Hippuric Acid
PAS	Passive Accelerometer System
PCA	Pressure Control Assembly
PCBA	Portable Clinical Blood Analyzer
PCG	Protein Crystal Growth
PCGG	Protein Crystal Growth in Glovebox
PDA	Personal Data Assistant
PDC	Postflight Data Collection
PDE	Particle Dispersion Experiment
PGSC	Payload General Support Computer
PIE	Particle Impact Experiment
POSA	Passive Optical Sample Assembly
PPMD	Polish Plate Micrometeoroid Debris Collector
PRA	Plasma Renin Activity

PRCB	Phase 1 Requirements Control Board
PRD	Passive radiation dosimeters
PVP	Peripheral Venous Pressure
QUELD	Queen's University Experiment in Liquid Diffusion
R/IM	Refrigerator/Incubator Module
REM	Rapid Eye Movement
RSA	Russian Space Agency
SAMS	Space Acceleration Measurement System
SeaWiFS	Sea Wide Field Sensor
SFE	Static Feed Electrolysis
SL-J	Spacelab-Japan
SL-M	Spacelab-Mir
SMP	Space Medicine Program
SMS	Space Motion Sickness
SMSP	Shuttle-Mir Science Program
SS	Space Sciences
SSAS	Solid Sorbent Air Sampler
SSM/I	Special Sensor Microwave/Imager
SSMR	Scanning Multispectral Microwave Radiometer
SSP	Space Shuttle Program
STES	Single Locker Thermal Enclosure System
STS	Space Transportation System
TCA	Thermal Control Assembly
TCD	Trans-Cranial Doppler
TEM	Technical Evaluation of MIM
TEPC	Tissue Equivalent Proportional Counter
TLD	Thermoluminescent Dosimeter
TRMM	Tropical Rainfall Measuring Mission
TSH	Triaxial Sensor Head
US	United States
VCD	Vapor Compression Distillation
VO2	Volume of Oxygen (Maximum Oxygen Uptake)
VOA	Volatile Organic Analyzer
VOC	Volatile Organic Compound
VRA	Volatile Removal Assembly

1.0 INTRODUCTION

The purpose of the Integrated Payload Requirements Document (IPRD) is to define the science and technology payload content and resulting requirements for the long duration Mir missions and the Shuttle docking missions that are part of the National Aeronautics and Space Administration's (NASA) and the Russian Space Agency's (RSA) NASA/Mir Science Program (NMSP). The payload content is defined in terms of the investigations assigned to the mission, the goals and objectives expected to be accomplished, and the mission implementation requirements. An IPRD will be developed for each long-duration United States (U.S.) mission on the Mir space station. The document consists of four sections and five appendices.

Section 1.0 defines the scope, purpose, and management of the IPRD.

Section 2.0 provides an overview of and current planning scenarios for the NASA/Mir program, the missions associated with this particular research increment, and the goals and objectives of the planned science and technology demonstrations.

Section 3.0 consists of science summaries that define the individual investigations assigned to this research increment. The investigations are identified by title, investigator team, hypotheses, and/or science objectives.

Section 4.0 consists of session descriptions that define the implementation requirements of the payload during the pre-, in-, and postflight phases of each mission in this increment. The introduction provides instructions on how to read the sessions and describes the purpose and function of each component of the sessions.

Appendices A-E consist of tables summarizing the functional objectives (sessions) , associated crewtime, and planned schedules for the pre-, in-, and postflight phases of the specified increment.

Appendix A lists all of the inflight sessions and crewtime by flight day.

Appendix B consists of a bar-chart depicting how crewtime is spread-out per flight day.

Appendix C summarizes all of the preflight sessions, associated crewtime, and session contraints in 30-day increments.

Appendix D summarizes all of the inflight sessions, associated crewtime, and session contraints in 30-day increments.

Appendix E summarizes all of the postflight sessions, associated crewtime, and session contraints in 30-day increments.

1.1 Purpose and Scope

This document identifies the requirements for science investigations and technology demonstrations planned for the Mir 24/NASA 5 long duration mission and the STS 84 (SM-06) and STS 86 (SM-

07) supporting Shuttle missions. All requirements identified in this document are subject to final approval by both the RSA and NASA NMSP management. The basic units that define these requirements are the preflight, inflight, and postflight payload activities requiring crew involvement and participation as well as other resources necessary for program implementation. The preflight sessions define the scheduling and science requirements for training and preflight baseline data collection (BDC). The inflight sessions define times for discrete activities aboard the Mir and the Shuttle and will be used to develop the associated mission timelines that will guide the long duration and Shuttle crews through daily payload activities. The postflight sessions define postflight BDC requirements.

In order to account for the iterative process by which requirements are evaluated against the capability of the Mir station, the IPRD will continually identify requirements in two basic categories; 1) Prime - those activities whose implementation is required, and 2) Contingency - those activities whose implementation is desired, but which have lower priority. For discussion purposes, these two sets of activities will be known as "above" and "below" the line. As each iteration of the IPRD occurs, the total set of requirements under consideration will continue to be adjusted and contingency activities identified as those that:

1) may not be actually scheduled or timelined but which could be done should there be a failure in some aspect of a Prime activity and

2) which can be accomplished if the failure in the Prime activity relinquishes sufficient resources.

1.2 IPRD Management

As mission design and implementation documentation is developed, it is necessary to modify the requirements contained in the IPRD. The Phase 1 Program Documentation Plan, MP1P 60001, defines the requirements for documenting the baseline, and the changes thereto, of the IPRD requirements.

The U.S. science and technology payload requirements identified in this document were submitted by the U.S. Discipline Leads for the following disciplines: Advanced Technology, Earth Sciences, Fundamental Biology, Human Life Sciences, International Space Station (ISS) Risk Mitigation, Life Support Risk Mitigation, Microgravity, Space Medicine Program, and Space Science. The requirements were evaluated based upon available resources defined by the Joint Mission Science Working Group (JMSWG) and upon feasibility assessments submitted to the Mission Scientist by each of the Disciplines. Science requirements in the IPRD will be negotiated by the JMSWG.

The JMSWG is responsible for establishing the initial revision of each IPRD. This version is submitted to the JSC Mir Operation and Integration Working Group (MOIWG) Configuration Control Board (CCB) for baseline and control. Upon formal issuance of the IPRD by the MOIWG CCB, the MOIWG CCB shall control the content and resource requirements of the IPRD. The MOIWG CCB shall be conducted by the requirements defined in the Mission Management Office Configuration Management Plan, JSC 17844.

The Change Control Process

All Change Requests (CRs) against the content of the IPRD from either the U.S. or the Russian side shall be submitted through the respective Co-Chairs of the JMSWG, who will prioritize the CRs. The U.S. side will forward changes to the NASA/Mir Mission Scientist who will evaluate the CRs for science impact. The CRs will then be logged and distributed to the appropriate controlling organizations.

All CRs affecting mission resources will be forwarded to the JSC MOIWG CCB for evaluation and disposition. All CRs approved by the MOIWG CCB are implemented into the IPRD. All disapproved CRs are returned to the originating party who may resubmit the change with justifying rationale.

All CRs affecting programmatic Phase I requirements will also be sent to the Phase 1 Program Requirements Control Board (PRCB) for disposition. Once changes are approved by either the MOIWG CCB or the PRCB, new requirements affecting Mir resources (crewtime, power, stowage, etc...) will be negotiated with the Russians through the JMSWG. The Russian side will also have the capability to submit CRs against the IPRD when implementation considerations require such a change. The Russian side will be notified of all approved CRs.

Figure 1-1 depicts the change control process.

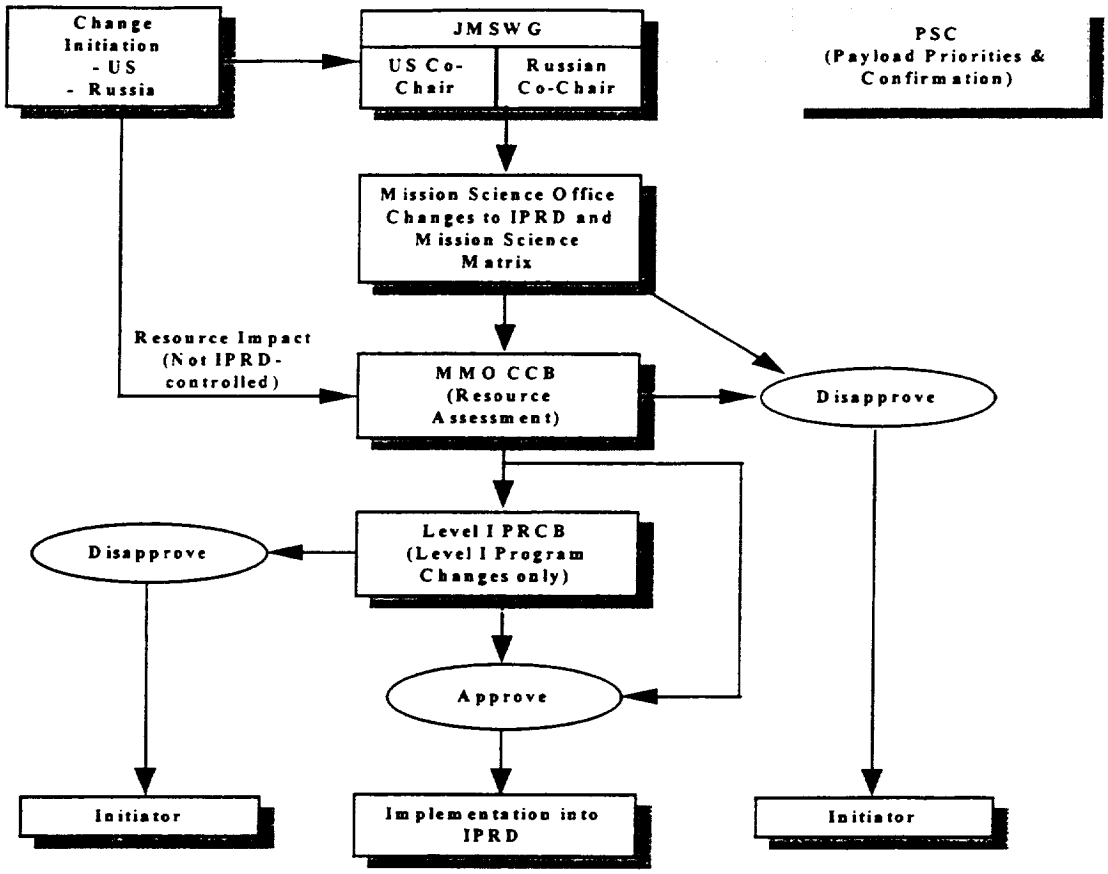

Figure 1-1, Change Control Process

2.0 NASA/MIR PROGRAM AND INCREMENT DESCRIPTION

The U.S.'s involvement in the ISS program begins with a series of collaborative missions between NASA and RSA. This series of missions has been designated Phase 1 ISS and will expand the current Spacelab program by providing a transition in capabilities, research, and operations from short-term Shuttle flights to long-duration missions on the Mir complex. The implementation of Phase 1 has taken place in two parts: 1A and 1B.

2.1 Phase 1A Overview

The Shuttle-Mir Program was the first such collaboration and was a non-reimbursable activity. It established the working relationship between NASA and RSA and provided the basis for an information and technology exchange upon which to build mission success. The Mir 18 mission began with the docking of a Soyuz manned module carrying the Mir 18 crew - an American astronaut and two Russian cosmonauts - for a 90-day mission on the Mir space station. During Mir 18, all three crew members participated in long-duration life sciences and microgravity experiments as well as other activities planned by NASA and RSA. Seven research areas or disciplines encompassing twenty-eight investigations comprised the Phase 1A science payload. The United States and the Russian Federation each supplied a lead scientist for every discipline and an investigator for every experiment.

The Mir 18 mission ended with the docking of the Shuttle Atlantis as part of the Spacelab-Mir (SL-M) mission. SL-M carried seven crew members into space: three orbiter crew members, two payload crew members, and two cosmonauts who will become the Mir 19 crew. The shuttle remained docked with Mir for five days. During that time, the crew members finished science operations, transfered equipment, data and samples, and performed station handover activities for the next Mir mission (Mir 19). Limited science activities continued after separation and prior to landing. The Mir 19 crewmembers performed some of the investigations that could not be accommodated on Mir 18 or SL-M. SL-M returned to Earth with eight crew members: three orbiter crew members, two payload crew members, and the three-member Mir 18 long duration crew.

Goals and Objectives of the Shuttle-Mir Program:

1) To obtain engineering and operational experience in conducting research on an orbital space station.

2) To conduct specific investigations in medical support, life sciences, fundamental biology, microgravity sciences, Earth observations, and life support technology.

3) To characterize the environment relative to microgravity and life sciences research on Mir to help understand past and future investigations.

2.2 Phase 1B Overview

The NASA/Mir program, Phase 1B, consists of four long-duration flights of U.S. astronauts aboard the space station Mir between early 1996 and late 1997. This series of missions will expand U.S.

research on Mir with additional facilities launched to the station primarily on the Shuttle and the new Priroda module. Also, the life of the Mir station will be extended to maximize the overall research opportunity. A U.S. astronaut will serve as a Mir crewmember for flight durations ranging from 127 to 158 days (~18 months total time on orbit). A minimum of six Shuttle Flights support the program, providing resupply materials for experiments to be performed aboard Mir as well as returning experimental samples and data to Earth. Limited research will also be conducted during the Shuttle missions. The U.S. long-duration astronauts will launch and land aboard the Shuttle, while Russian cosmonauts will use the traditional Soyuz vehicle for launch and landing.

The science investigations and technology demonstrations planned for Phase 1B are divided among nine disciplines: Advanced Technology (ADV), Earth Sciences (ES), Fundamental Biology (FB), Human Life Sciences (HLS), ISS Risk Mitigation (ISS), Life Support Risk Mitigation (LSRM), Microgravity (MG), Space Medicine Program (SMP), and Space Sciences (SS). The objectives of each of these disciplines will be accomplished utilizing existing research facilities aboard the Mir in its Core, Kvant 1, Kvant 2, and Krystall modules. Also, U.S. equipment will be delivered to Mir Station by Progress vehicles and the Spektr and Priroda modules. Additional hardware and consumables will be delivered by Shuttle missions which will also return hardware, data and samples. The U.S. astronaut will be primarily responsible for performing Phase 1B payload operations. However, prior to and during the astronauts' stays aboard the Mir, Russian cosmonauts will also participate in the U.S. research program, as subjects and operators for HLS investigations and as operators for the other investigations and demonstrations.

Goals and Objectives of the NASA-Mir Program:

1) To obtain engineering and operational experience conducting research on an orbital space station.

2) To characterize the Mir environment relative to microgravity and life science research on Mir as well as conduct demonstrations and peer-reviewed investigation in medical support, life sciences, microgravity sciences, Earth observations, and life support.

3) To identify and implement experiments demonstrating technologies and equipment selected to validate ISS design and operations.

4) To provide EVA demonstrations for Space Station hardware and tasks.

Specific discipline objectives for Phase 1B include:

Advanced Technology (ADV)

· Identify appropriate future technology needs through testing, demonstration, calibration, and prototyping
· Facilitate the timely development of key enabling technologies in support of other NASA and U.S. space programs
· Facilitate the application of completed technology developments to industrial needs

Earth Sciences (ES)

· Continue and expand existing cooperation between the U.S. and Russia in Earth observation through joint field experiments and research use of satellite data

Fundamental Biology (FB)

· Study the long-term effects of microgravity on the growth and development of organisms
· Determine the role gravity plays in molecular mechanisms at the cellular level and in regulatory and sensory mechanisms in an integrated system

Human Life Sciences (HLS)

· Identify changes in human physiology during long-duration space flight, specifically for the metabolic, neurological, musculoskeletal, and cardiopulmonary systems, and where feasible, identify mitigating procedures
· Determine the time course, extent, and underlying mechanisms of physiological changes
· Determine if and how these physiological changes as well as long-term exposure to microgravity affects crew behavior and performance
· Characterization of the Mir habitable environment and life support systems in support of science research

ISS Risk Mitigation (ISS)

· Use flight system investigations to provide test data that will reduce technical risks for ISS construction and operation

Life Support Risk Mitigation (LSRM)

· Assess life support systems on the Mir station with regard to regenerative systems, air and water quality, EVA monitoring, and medical restraint systems
· Evaluate and calibrate the internal Mir environment and establish the level of drift across systems over time for each long duration stay

Microgravity (MG)

· Determine protein crystal structures and their growth relationship under a microgravity controlled process environment
· Measure and analyze the microgravity acceleration environment on board the Mir in support of microgravity science research
· Use microgravity to study how physical, chemical, and biological processes are affected outside the influence of sedimentation and buoyancy caused by Earth's gravity
· Use the microgravity environment to study the underlying principles necessary to predict the

relationships of synthesis and materials processing to their resulting structures and properties
· Use the microgravity environment to study combustion phenomena such as soot formation and flame structures

Space Medicine Program (SMP)

· Determine a minimal and standardized set of biomedical monitoring procedures and protocols to ensure crew health and safety, based upon integrating existing Russian and U.S. approaches, including use of Russian and U.S. medical hardware and systems, countermeasures, health monitoring, and protocols
· Observe and understand Russian policies and procedures related to biomedical monitoring and countermeasures

Space Sciences (SS)

· Use the Mir platform for sampling interstellar and interplanetary materials, namely cosmic dust particles.

2.3 Mir 24/NASA 5 Increment Overview

Mir 24/NASA 5 is the fourth mission in the Phase 1B program. Its payload consists of several experiments in eight of the nine major research and technology areas. The investigations cover a diverse array of subjects that will optimally utilize the Mir station facilities.

ES discipline investigations continue Earth observation, remote sensing, and satellite data analysis research. Hand-held and large format photography will be used to generate detailed land cover assessments over various test sites. Remote sensing equipment on the Priroda module will be used to study seasonal changes over several oceanic and land-based test sites and to analyze biosphere and atmospheric changes. Ground-base activities are also planned for the joint US/Russian program of data exchange and compatible data format development.

The FB discipline continues the study of circadian changes induced by microgravity. The simple circadian timing system of the beetle is exposed to varying light levels to gage the phase-shifting sensitivity of the system under the extreme environment of the microgravity. The FB discipline also escalates it's developmental studies with a tri-generational plant experiment using the Brassica Rapa seed. In contrast to wheat, the sensitivity of this seed to its environment should lead to a structure whose form and configuration directly reflect the Mir and microg-g environments.

Investigations under the HLS discipline continue to evaluate physiological adaptation and changes to the musculoskeletal, immunological, and neurological systems. Also, any affects of long-duration microgravity exposure on human behavior and performance will be determined.

For the ISS Risk Mitigation discipline, several technology demonstrations associated with human factors and maintaining crew health and safety aboard the ISS will be conducted. Dynamic Loads data will be collected for normal force impacts and movements exerted by Mir station crews and for the Mir in general, especially during the Shuttle docked phase. The microbiological content of

potable water will be evaluated along with the planned ISS hardware used to sample it. Lastly, 4 passive payloads deployed during the Mir 21/NASA 2 mission are retrieved by the STS 86 crew during a scheduled joint EVA.

Technology demonstrations planned for the LSRM discipline will test the design and effectiveness of advanced air, water and environmental quality monitoring instruments developed for use aboard the ISS. These tests will be conducted mostly during the docked phases of STS 84 and STS 86.

Facilities aboard the Priroda module continue to support MG experiments and technology demonstrations. The Microgravity Globebox (MGBX) will be used to conduct fluid physics, combustion, and materials processing experiments. The Microgravity Isolation Mount (MIM) will be used to isolate materials experiments from vibrational frequencies on Mir. The Biotechnology System (BTS) will be used for protein crystal growth and cell culture research. A passive protein crystal growth experiment using liquid-liquid diffusion will also be conducted.

As on previous missions, the SMP discipline will be soley concerned with maintaining crew health and monitoring environmental operations. The information gained from the planned activities will be used to develop countermeasures against the effects of space flight and to perfect procedures associated with human factors. The planned activities support a joint program of monitoring and countermeasures established between the U.S. and Russia to identify appropriate on-board medical monitoring, diagnostic, and treatment capabilities that will need to be instituted for the ISS program.

Figure 2-2 lists the experiments planned for the Mir 24/NASA 5 mission.

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Cat.	Invest. ID	Exp. ID	Russian ID	Investigation Title	US Investigator
ADV	600006	CGBA-01	CGBA	Commercial Generic Bioprocessing Apparatus (CGBA)	Stodieck, Louis
ES	700004	EO3	Color	Regional & Temporal Variability of Primary Productivity in Ocean Shelf Waters	Muller-Karger, F. E.
ES	700005	EO7	IKAR	Calibration & Validation of Priroda Microwave Sensors	Shiue, James C.
ES	700006	EO4	Sailwet	Watershed Hydrologic Studies	Jackson, Thomas J.
ES	700007	EO2	Prairies	Validation of Biosphere-Atmosphere Interchange Model for Northern Prairies	England, A.W.
ES	700008	EO8	Chemistry	Comparison of Atmospheric Chemistry Sensors on Priroda & American Satellites	Kaye, Jack A.
ES	700010	EO6	Rain	Validation of Priroda Rain Observations	Thiele, Otto W.
ES	700011	EO5	Test	Test Site Monitoring	Evans, Cynthia; Lulla, Kamlesh
ES	810525	EO9	Obs	Visual Earth Observations	Evans, Cynthia; Lulla, Kamlesh
ES	890615	E11	VObs	Visual Observations	Lulla, Kamlesh; Saganti, Premkumar
FB	110047	698	Beetle	Effects of Gravity on Insect Circadian Rhythmicity	Hoban-Higgins, Tana M.
FB	890268	Greenhouse	Greenhouse -	Developmental Analysis of Seeds Grown on Mir	Musgrave, Mary E.
HLS	9	598	Bone	Bone Mineral Loss and Recovery after Shuttle/Mir Flights	Shackelford, Linda C.
HLS	110019	639	Sleep	Sleep Investigations (639/663/710)	Monk, Timothy, Ph.D
HLS	110028	701	Orientation	Frames of Reference for Sensori-motor Transformations	Berthoz, Alain
HLS	110034	586	MRI	Magnetic Resonance Imaging (MRI) After Exposure to Microgravity	LeBlanc, Adrian L.
HLS	110037	628	Interactions	Crewmember and Crew-Ground Interactions During NASA-Mir	Kanas, Nick A.
HLS	890091	GASMAP	GASMAP Fac	GASMAP Facility Operations	Booker, Floyd
ISS	650006	Mir (E18)	EDLS	Enhanced Dynamic Load Sensors (EDLS) on Mir	Beck, Sherwin
ISS	650007	RME 1307	OPM	Optical Properties Monitor (OPM)	Wilkes, Don
ISS	650008	Mir (CHeCS	WMM	Water Microbiological Monitoring (WMM)	Pierson, Duane
ISS	650009	Mir (E10)	MEFC	Mir Electric Field Characterization (MEFC)	Chavez, Mark
ISS	650011	Mir (E6)	MEEP	Mir Environmental Effects Payload (MEEP)	Gay, Buck
ISS	650013	MiSDE	MiSDE	Mir Structural Dynamics Experiment (MiSDE)	Kim, Hyoung-Man
ISS	890601	RME 1320	RME	Radiation Monitoring Equipment - III	Golightly, Mike; Afinidad, Francis
ISS	890621		CREAM	Cosmic Radiation and Effects Activation Monitor (CREAM)	Truscott, Peter
LSR	650015	Mir (CHeCS	WQM	Water Quality Monitor (WQM)	Sauer, Richard
LSR	890036	LIFSUP-VR	VRA	Volatile Removal Assembly (VRA)	Holder, Donald
MG	750029	MIM	MIM Facility	Microgravity Isolation Mount (MIM) Facility Operations	Trygvasson, Bjarni
MG	750030	MGBX	Glovebox Faci	Microgravity Glovebox (MGBX) Facility Operations	Reiss, Don
MG	750031	BTS	BTS Facility	Biotechnology System (BTS) Facility Operations	Gonda, Steve
MG	750032	APCF	APCF	Advanced Protein Crystalization Facility (APCF)	TBD
MG	750033	PCG-GN2	PCG-Dewar	Protein Crystal Growth (PCG) GN2 Dewar	McPherson, Alex
MG	890034	MGM	MGM	Mechanics of Granular Materials (MGM)	Sture, Stein
MG	890043	QUELD	QUELD	QUELD Furnace Experiment - MIM	Smith, Reginald
MG	890079	SAMS	SAMS	Space Acceleration Measurement System (SAMS) Operations	DeLombard, R.
MG	890093	BIO3D	BIO3D	Biochemistry of 3-D Tissue Engineering - BTS	Lelkes/Hammond
MG	890252	CAPE	CAPE	Canadian Protein Crystallization Experiment - MIM	Sygusch, Jurgen
MG	890255	DCAM	DCAM	Ambient Diffusion Controlled Protein Crystal Growth	Carter, D.
MG	890265	CGEL	CGEL	Colloidal Gelation	Weitz, D.
OPS	890271	Photo		Photo/TV Operations	G. Robbins
OPS	890437	SVD	SVD	Mir Inventory	N/A
OPS	890606	Facility	Facility	Facility Operations	N/A
SMP	890096	MO	SMP-US	Space Medicine Program - US Medical Operations	WG-8
SMP	890597	MSD042		Return to Duty Sensorimotor Neurological Assessment	WG-8

SMP	890605	MSD002		Monitoring Orthostatic Function During Entry, Landing, & Egress	John Charles, Ph.D.
SMP	890607	MSD053	Water	Analysis of Mir Archival Water Samples	WG-8
SMP	890608	MSD021	Crew	Crew Microbiological Assessment	WG-8
SMP	890609	MSD022	Micro	Mir Microbiological Assessment	WG-8
SMP	890610	MSD007	SSAS/GSC	Toxicological Assessment of Airborne Volatile Organic Compounds	WG-8
SMP	890613	Defib	Defib	Mir Defibrillator and Crew Medical Restraint System (CMRS)	Flight Surgeon

2.4 Mir 24/NASA 5 Increment Goals and Objectives

Specific goals and objectives for the Mir 24/NASA 5 investigations include:

Earth Sciences (ES)

· Extensive photography to map changes to specific geographical sites
· Calibrate Mir Earth observation sensors and compare the data with observations coordinated using U.S. satellites
· Maintain and input information into a joint Earth observation database established between the U.S. and Russia consisting of data and images

Fundamental Biology (FB)

· Study the complex growth and development of a plant system over several generations during extended duration in microgravity
· Demonstrate plant growth and habitat facilities in a space station environment
· Study the effect of microgravity on circadian rhythmicity in a simple organism

Human Life Sciences (HLS)

· Evaluate the overall structural, behavioral, and cardiological response to extended microgravity exposure
· Begin the process of supporting medical operations, countermeasures, and crew health care procedures consistent with operational considerations associated with plans for ISS

ISS Risk Mitigation (ISS)

· Evaluate structural and dynamic data associated with space station occupation and general operations
· Perform EVAs that test procedures associated with ISS construction

Microgravity (MG)

· Process materials and analyze microgravity's effect on their fundamental properties
· Demonstrate biotechnology apparatuses in microgravity and analyze the environmental effect on manufactured biological systems
· Characterize the microacceleration environment on the Mir space station
· Examine combustion phenomena in the microgravity environment

Space Medicine Program (SMP)

· Ensure that individual crewmembers have adapted to the space environment and are capable of performing the tasks required to operate under a unique set of circumstances

3.0 Mir 24/NASA 5 SCIENCE SUMMARIES

3.1 Advanced Technology (ADV)

Invest. ID: 600006 **Exp. ID:** CGBA-01 **Russian ID:** CGBA

US PI: Stodieck, Louis **Russian PI:** TBD

Commercial Generic Bioprocessing Apparatus (CGBA)

The CGBA is a generic, versatile research tool which supports a wide variety of life sciences research. Using simple hardware, experiments can be supported in biochemistry, biophysics, microbiology, cellular biology, developmental biology and physiology. In previous missions, up to 30 investigators with more 400 individual samples have been accommodated. The main payload components include a generic, temperature controlled containment (TGBA) compatible with MIR Standard Interface Drawer (SID). For our proposed mission, it would contain up to 8 group activation packets (GAPs) in support of life sciences research. However, any other experiment requiring a highly controlled and documented temperature environment around typical ambient temperatures could be accommodated. The containment is easily accommodated on Mir and easily moved from one system to other.

The CGBA payload consists of two Isothermal Control Modules (ICM) each containing 8 GAP that each contain 8 fluid processing apparatus (FPA). Therefore, a total of 128 FPA containing protein crystal growth and biological cellular experiments will be flown on this mission. A 3.5" floppy disk is stowed in the sleeve of each ICM insulation. These can be used in a contingency situation for program upload to the ICM.

3.2 Earth Sciences (ES)

Invest. ID: 700004 **Exp. ID:** EO3 **Russian ID:** Color

US PI: Muller-Karger, F. E. **Russian PI:** Kopelevich, O.

Regional & Temporal Variability of Primary Productivity in Ocean Shelf Waters

This investigation is part of NASA's Mission to Planet Earth. Ocean shelf (coastal) waters will be monitored to study the possible overestimation of primary coastal productivity occurring through conventional satellite techniques. Test sites may be imaged throughout the diurnal cycle, thereby permitting the investigation of short period phenomena. The investigation utilizes the unique capabilities of Moz-Obzur, a remote sensing, ocean color instrument aboard the Priroda module. Moz-Obzur, combined with the U.S.'s Sea Wide Field Sensor (SeaWiFS), will yield critical insights on role of aerosols and dissolved solids in shelf and river plumes.

Invest. ID: 700005 **Exp. ID:** EO7 **Russian ID:** IKAR

US PI: Shiue, James C. **Russian PI:** Armand, Neon A.

Calibration & Validation of Priroda Microwave Sensors

This investigation is part of NASA's Mission to Planet Earth. The calibration and stability of Priroda microwave sensors will be documented and parameter retrievals will be validated by comparisons with other satellite and airborne sensors. The investigation utilizes the IKAR, a suite of Priroda microwave sensors that study atmospheric moisture and land and ocean surface properties. The main goal of the project is to cross calibrate the IKAR with U.S. sensors so that a variety of scientific projects can be undertaken using time series data from multiple sources. U.S. sensors include the operational Special Sensor Microwave/Imager (SSM/I) and previously flown sensors such as the Scanning Multispectral Microwave Radiometer (SMMR).

Invest. ID: 700006 **Exp. ID:** EO4 **Russian ID:** Sailwet

US PI: Jackson, Thomas J. **Russian PI:** Shutko, Anatoly M.

Watershed Hydrologic Studies

This investigation is part of NASA's Mission to Planet Earth and will study large watershed hydrology in various climatic regimes. Microwave remote sensing (using the Priroda module's IKAR sensor suite) will be evaluated as a source of information on large watershed hydrology. The primary test site is the American southwest. Data from this investigation will be used to support the International GEWEX Programme of the World Climate Research Programme.

Invest. ID: 700007 **Exp. ID:** EO2 **Russian ID:** Prairies

US PI: England, A.W. **Russian PI:** Shutko, A. M.

Validation of Biosphere-Atmosphere Interchange Model for Northern Prairies

This investigation is part of NASA's Mission to Planet Earth and seeks to validate a model of land atmosphere interactions. The Biosphere Atmosphere Transfer Scheme (BATS) focuses on the diurnal and seasonal time scales and is driven by passive microwave measurements. The validation program will utilize NASA ground truth radar on the northern prairie of North America and Priroda microwave sensor observations.

Invest. ID: 700008 **Exp. ID:** EO8 **Russian ID:** Chemistry

US PI: Kaye, Jack A. **Russian PI:** TBD

Comparison of Atmospheric Chemistry Sensors on Priroda & American Satellites

This project is part of NASA's Mission to Planet Earth and seeks to establish the relationships among measurements obtained by various satellite sensors designed for studies of atmospheric chemistry. The Ozone-Mir, Istok-1, & MOZ-Obzur on Priroda will be compared with TOMS, SBUV/2, SSBUV, SAGE II, POAM II & various sensors on UARS to determine how to best use their complementary capabilities in long term studies. Understanding of these relationships will permit the conduct of other studies using a combination of these sensors to extend time series or to provide complementary information.

Invest. ID: 700010 **Exp. ID:** EO6 **Russian ID:** Rain

US PI: Thiele, Otto W. **Russian PI:** TBD

Validation of Priroda Rain Observations

This investigaiton is part of NASA's Mission to Planet Earth. The goal of this project is to validate the Priroda determination of precipitation rates over the ocean using NASA ground based resources developed for the Tropical Rainfall Measuring Mission (TRMM). A secondary goal is to utilize Russian ground truth radar to validate precipitation rates over the ocean from the joint NASA-Japanese TRMM.

Invest. ID: 700011 **Exp. ID:** EO5 **Russian ID:** Test

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

Test Site Monitoring

This experiment involves environmental monitoring by way of coupled data collection (visual and film-based observations and data from Priroda sensors) over four test sites. We propose to routinely collect data over: the Aral Sea, Galveston Bay, TX, South Florida and the Bahamas, and the Panama Canal Zone. The data will include observations and imagery by astronauts and cosmonauts, as well as imagery collected by mounted sensors such as the KFA-1000 camera, and the MSU-SK and MSU-E sensors on the Priroda module. These data, collected at least seasonally, will allow us to monitor these rapidly changing regions which are explemplary of several interdisciplinary processes. The data will also allow us to extrapolate observations from our historical database and ground-based studies to produce a more comprehensive assessment of the nature and rate of the changes. Each site has a significant historical archive which will serve as a baseline for the observations collected onboard Mir.

Opportunities for data collection, which will occur at least monthly for each site, will be planned based on orbit trajectory, attitude and weather constraints.

Invest. ID: 810525 **Exp. ID:** EO9 **Russian ID:** Obs

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

Visual Earth Observations

This experiment is designed for routine monitoring of the Earth from space using astronaut and cosmonaut observations and photography. Earth photography will be time-tagged with camera databacks and logged on an Earth observations electronic file. The continuous presence in low-Earth orbit will allow for continual observations of jointly selected sites to document geologic structures using variable sun angles, seasonal events like biomass burning, longer-term changes like the rise and fall of lake levels, gradual changes in land-use patterns, dyamic patterns in the ocean surface waters and globally-distributed episodic events like tropical storms, floods, forest fires, volcanic eruptions and dust storms. Sites selection will be based on longer-term planning of known regions of interest, and near term replanning of targets based on current events, weather patterns and trajectory and attitude information.

Communication with the crew about new sites will occur weekly, but special events will be requested in real-time. The film-based data will be exchanged with Russian counterparts, and screened and archived by both sides.

Invest. ID: 890615 **Exp. ID:** E11 **Russian ID:** VObs

US PI: Lulla, Kamlesh; Saganti, Premkumar **Russian PI:** Savchenko, Stanislav; Firsov, Ivan

Visual Observations

Window Survey of the Mir Complex

3.3 Fundamental Biology (FB)

Invest. ID: 110047 **Exp. ID:** 698 **Russian ID:** Beetle

US PI: Hoban-Higgins, Tana M. **Russian PI:** Alpatov, Alexei M.

Effects of Gravity on Insect Circadian Rhythmicity

The following hypotheses will be evaluated:

1. Exposure to microgravity alters the beetle Circadian Timing System (CTS). There will be an immediate change in period, amplitude and mean, followed by an adaptation to new steady-state levels.

2. Exposure to hyperdynamic fields via centrifugation alters the beetle CTS. There will be an immediate change in period, amplitude and mean, followed by an adaptation to new steady-state levels.

3. Exposure to microgravity will alter the relationship between endogenous CTS period and light intensity.

4. Exposure to hyperdynamic fields will alter the relationship between the endogenous CTS period and light intensity.

5. Exposure to microgravity changes the sensitivity of the beetle CTS to the phase shifting effects of light.

6. Exposure to hyperdynamic fields changes the sensitivity of the beetle CTS to the phase-shifting effect of light.

7. At Earth's gravity, exposure to acute pulses of 2G via centrifugation can phase shift the insect CTS.

Invest. ID: 890268 **Exp. ID:** Greenhouse - 3 **Russian ID:** Greenhouse - 3

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

Developmental Analysis of Seeds Grown on Mir

The experiment outlined will address the problem of seed-to-seed cycling in microgravity. Developmental information on reproductive events in microgravity will be gathered using Brassica rapa grown for three generations in the Svet Greenhouse hardware on Mir. While the overall goal is to understand the nature of disruption of reproductive events by microgravity, the experiment focus will be on the hypothesis that the microgravity environment causes a reduction in the storage reserves available to support reproductive events. In addition to the activities conducted on-orbit, preflight experiment verification and postflight ground control experiments will be conducted duplicating IPRD in-flight sessions.

3.4 Human Life Sciences (HLS)

Invest. ID: 9 **Exp. ID:** 598 **Russian ID:** Bone

US PI: Shackelford, Linda C. **Russian PI:** Oganov, Viktor; Koslovskaya, Inessa; M

Bone Mineral Loss and Recovery after Shuttle/Mir Flights

Our research group has participated in a joint Soviet/American research project to determine the bone mineral loss of cosmonauts after long duration space flight lasting from 4 to 12 months. This program was the first to study bone loss in weightlessness in a comprehensive manner and included measurements of the spine, hip, tibia, whole body and subregions of the whole body. To date 13 cosmonauts have been studied. While this study is extremely valuable, there is however only limited data on the very important issue of recovery of bone after return to 1-g. This proposal will measure the space flight-induced bone loss of the crewmembers of the Shuttle/Mir flights and follow the recovery with bone mineral measurements every six to twelve months for up to three years or until full recovery has occurred. In order to gain information on the role of muscular fitness with respect to bone loss and recovery, muscle strength testing will be performed at the same time points as bone mineral measurements. Muscular fitness will be used as an indicator of a crewmember's level of load-bearing physical activity throughout the study. Knowledge of the rate and degree of bone recovery is important not only for NASA, but for clinical investigators interested in reversing the effects of osteoporosis.

The effects of space flight on bone metabolism (e.g. changes in bone resorption and/or formation) can be assessed indirectly by measuring the serum and urinary levels of several markers of bone turnover. This information will compliment the densitometry data and may shed light on the mechanisms of altered bone metabolism during spaceflight. During the Phase 1B missions (NASA 7 and Mir 26), the study will be expanded by testing an inflight pharmaceutical countermeasure to bone loss. We will test the biophosphate alendronate, which acts by inhibiting bone resorption and which may therefore decrease or even prevent spaceflight induced bone loss.

Invest. ID: 110019 **Exp. ID:** 639 **Russian ID:** Sleep

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

Sleep Investigations (639/663/710)

Hypotheses:
Vestibular adaptation both provokes and is enhanced by REM sleep under both ground-based and space conditions. Immune Function is altered during sleep in microgravity. Circadian physiology is altered in microgravity. Postflight, sleep, circadian rhythm, and immune function will return to baseline levels and be indistinguishable within 3 months.

Invest. ID: 110028 **Exp. ID:** 701 **Russian ID:** Orientation

US PI: Berthoz, Alain **Russian PI:** Gurfinkel, Viktor

Frames of Reference for Sensori-motor Transformations

The scientific goals will be pursued of a series psychophysical experiments conducted in microgravity. Subjects will be asked to perceive differences in stimuli either visually or haptically. These sensory modalities will be studied both independently and in coordination. The independent analysis will serve to identify the intrinsic reference frames associated with each sense. Making comparisons with the independent tasks of 2 modalities will test whether exposures to microgravity invokes global changes in sensory perception or whether modifications are restricted to a particular sensory system. Finally by performing tasks which require a simultaneous effort with the 2 sensory modalities, we will test for a role of gravity facilitating visuo-motor transformations.

Invest. ID: 110034 **Exp. ID:** 586 **Russian ID:** MRI

US PI: LeBlanc, Adrian L. **Russian PI:** Kozlovskaya, Inessa

Magnetic Resonance Imaging (MRI) After Exposure to Microgravity

Measurements on the crew of Spacelab-Japan (SL-J) demonstrated significant muscle-specific atrophy after only 8 days in weightlessness. Published bed-rest studies by the investigator have documented the degree of expected atrophy after 4 months of disuse. This investigation proposes to repeat these muscle measurements on long-duration mission crewmembers. Previous bed-rest studies by the investigator have shown that when normal subjects are put in bed rest, partially unloading the spinal column, significant intervertebral disc expansion occurs. This expansion reverts to normal shortly after reambulation following bed rest lasting days to a few weeks. Longer duration bed rest (17 weeks) however, results in some residual expansion that remains for some time following reambulation. Results from SL-J revealed that 8 days of weightlessness does not result in residual expansion 24 hours after landing. It is speculated that disc expansion during flight may be causally related to the back pain reported to occur during flight and that longer duration space flight will result in residual disc expansion that may pose some risk of disc damage during the landing and early post-flight period. This disc expansion with back muscle atrophy may be causally related to the back pain experienced after long duration space flight. Several space experiments have documented altered hematopoietic activity which may be related to cellularity changes in the bone marow. This investigation will measure the intervertebral disc cross-sectional area, muscle volumes and spinal bone marrow cellularity of the crewmembers before and after the NASA/Mir flights to test the following hypotheses:

1. Significant intervertebral disc expansion occurs during space flight which will remain for some period of time after return to earth's gravity.

2. Muscle specific atrophy occurs during weightlessness. As a result of the inflight exercise countermeasure regime, the degree of atrophy will be less than the atrophy that occurs during bed rest of similar duration without exercise, but similar to that anticipated for bed rest with resistive exercise.

3. Spinal bone marrow cellularity decreases (increased percentage of fat) during space flight and is correlated with bone loss in the spine to be measured in a separate protocol.

Invest. ID: 110037 **Exp. ID:** 628 **Russian ID:** Interactions

US PI: Kanas, Nick A. **Russian PI:** Salnitskiy, Vyacheslav

Crewmember and Crew-Ground Interactions During NASA-Mir

During future space missions involving a space station or a trip to Mars, international crews will be engaged in complicated activities over long periods of time. A number of interpersonal issues likely to impact on these missions must be addressed in order to ensure healthy crew member interactions and optimal performance. A review of the literature of space analog studies on Earth, anecdotal reports from previous space missions, and the principal investigator's own work involving astronauts and cosmonauts have isolated crew tension, cohesion, and leadership as important interpersonal issues.

The aim of this study is to evaluate the following hypotheses:

1. The crewmembers' perception of intra-crew tension will be much higher halfway into the mission than before. This general effect will be measurable even though specific stressful events that serendipitously occur may transiently raise the level of intra-crew tension.
2. Intra-crew tension will be displaced to the ground personnel as indicated by a negative correlation between crew member perception of this tension and support from ground personnel.
3. Tension in the ground personnel will be displaced to the RSA and NASA management as indicated by a negative correlation between ground personnel perception of intra-group tension and support from management.
4. The crew members will perceive themselves as less cohesive halfway into the mission than before; cohesion scores will transiently rise the last 2 weeks as the crew prepares for the return to Earth.
5. The crewmembers will perceive their leader and ground monitors as less supportive halfway into the mission than before.
6. The ground personnel will perceive their leader and mangement as less supportive halfway into the mission than before.

These hypotheses will be tested by having both the crewmembers and personnel in ground control complete subscales from three standard mood and interpersonal group climate questionnaires: Profile of Mood States, Group Environment Scale, and Work Environment Scale. Along with a critical incident log and an experiences questionnaire, these measures will be completed pre-, in-, and postlfight. By using the interrupted time-series analysis and a number of predicted correlations, a test of the six hypotheses will be made and discussed.

Invest. ID: 890091 **Exp. ID:** GASMAP **Russian ID:** GASMAP Facility

US PI: Booker, Floyd **Russian PI:**

GASMAP Facility Operations

3.5 ISS Risk Mitigation (ISS)

Invest. ID: 650006 **Exp. ID:** Mir (E18) **Russian ID:** EDLS

US PI: Beck, Sherwin **Russian PI:** Kharitonov, W.

Enhanced Dynamic Load Sensors (EDLS) on Mir

The purpose of the Enhanced Dynamic Load Sensor (EDLS) experiment is to measure the normal common forces and moments exerted by space station crews during their regular routine activities on board Mir. The experiment hardware is comprised of sensor hardware that includes a handhold, touch pad, and two foot restraints designed to function as normal motion restraint devices. These sensors measure forces and torques and are connected to an Experiment Support Module (ESM). The ESM contains electronics, a computer, data storage device, power supply, and filters to control signal conditioning and data stowage.

Invest. ID: 650007 **Exp. ID:** RME 1307 **Russian ID:** OPM

US PI: Wilkes, Don **Russian PI:** S. Naumov

Optical Properties Monitor (OPM)

The OPM will expose materials to the external Mir low earth orbital environment and measure the effects of this exposure in-situ with on-board optical instruments. Environmental monitors will also meaure test sample exposure to atomic oxygen, solar/earth irradiance and molecular contamination. The OPM will collect data for about 9 months and then be retireved. Collected data from the OPM will be stored on floppy disks by the Mir crew. These disks should be returned to the ground along with the OPM.

Invest. ID: 650008 **Exp. ID:** Mir (CHeCS 4) **Russian ID:** WMM

US PI: Pierson, Duane **Russian PI:** TBD

Water Microbiological Monitoring (WMM)

This experiment will demonstrate the zero-gravity operation of water sampling hardware proposed for the microbiological monitoring of the ISS potable water supply. The collection and in-flight microbiological analysis of Mir potable water is necessary to evaluate the operation of hardware and the growth of microorganisms in a zero-gravity environment.

Invest. ID: 650009 **Exp. ID:** Mir (E10) **Russian ID:** MEFC

US PI: Chavez, Mark **Russian PI:** Frolov, Igor

Mir Electric Field Characterization (MEFC)

Measures interior and exterior radio frequency interference at various frequency bands through the use of antennas. The data will be analyzed to determine whether interference mitigation techniques will be necessary for ISS equipment.

Invest. ID: 650011 **Exp. ID:** Mir (E6) **Russian ID:** MEEP

US PI: Gay, Buck **Russian PI:** Naumov, S.

Mir Environmental Effects Pavload (MEEP)

This experiment consists of four identical passive experiment carriers each containing one experiment. The four experiments are (1) Orbital Debris Collector (ODC), (2) Passive Optical Sample Assembly #1, (3) Polish Plate Micrometeoroid Debris Collector, and (4) Passive Optical Sample Assembly #2. The MEEP expriments will be transported to orbit by the Shuttle. An EVA by the U.S. astronauts will be performed to mount the MEEP experiments on the Mir Docking Module after the Shuttle has docked to the Mir space station. The MEEP experiments are to remain on the docking module for greater than one year. The MEEP experiments are to be removed from the docking module during an EVA conducted by the U.S. astronauts. The astronauts will remove the MEEP experiments, transport them to the Shuttle for return to the ground.

Invest. ID: 650013 **Exp. ID:** MiSDE **Russian ID:** MiSDE

US PI: Kim, Hyoung-Man **Russian PI:** Mezhin, Vyacheslav

Mir Structural Dynamics Experiment (MiSDE)

The MiSDE experiment will measure structural dynamic response data on the Mir and Mir/Shuttle in a mated configuration during normal operational events using existing Mir space station instrumentation and new experiment unique instrumentation. The MiSDE experiment will utilize the SAMS and EDLS, if they are available. The MiSDE hardware, defined as Mir Auxiliary Sensor Unit (MASU), consists of an Experiment Support Module (ESM), a distribution box (DB), Accelerometer Heads (AHs), and associated cables. Five triaxial and four uni-axial AHs are connected through the DB to the ESM which provides signal conditioning, data processing, and data stowage.

Invest. ID: 890601 **Exp. ID:** RME 1320 **Russian ID:** RME

US PI: Golightly, Mike; Afinidad, Francis **Russian PI:** Petrov, Vladislav

Radiation Monitoring Equipment - III

Two Radiation Monitoring Equipment - III units will be flown and operated simultaneously onboard Mir. This will allow for a first time measurement of the "East-West Effect" radiation influence. The ability to study the East-West Effect will provide much needed information on the magnitude of the east-west radiation ratio. Knowing this, empirical corrections can be made to the dose projection for crew and the equipment inside the International Space Station (ISS). Current dose projections are based on "isotropic" models which assume that the flux of particles is the same regardless of the arrival direction. However, from previous Shuttle missions it has been discovered that the dose difference between the local will allow researchers to quantify how much reduction in radiation exposure will be experienced by astronauts by having them spend more time (like sleep periods) on the local east side of the ISS compared to the local west side.

Invest. ID: 890621 **Exp. ID:** **Russian ID:** CREAM

US PI: Truscott, Peter **Russian PI:** Petrov, Vladislav

Cosmic Radiation and Effects Activation Monitor (CREAM)

The Mir modules, and later the International Space Station, represent opportunities to explore new radiation environments in order to obtain data on different shielding levels and the effects of radiation on larger spacecraft. The Cosmic Radiation and Effects Activation Monitor (CREAM) measures the Linear Energy Transfer (LET) effects within silicon and provides information relevant to single event upsets on avionics equipment.

3.6 Life Support Risk Mitigation (LSR)

Invest. ID: 650015 **Exp. ID:** Mir (CHeCS 5) **Russian ID:** WQM

US PI: Sauer, Richard **Russian PI:** Sinyak, Y. and Protasov, N.

Water Quality Monitor (WQM)

The Water Quality Monitor (WQM) consists of one instrument with associated supplies which measures total organic, total inorganic, and total carbons, conductivity and pH of samples. The WQM will fly up/down on STS-81 for testing on Shuttle. The WQM will be launched on STS-84 and transferred to Mir, then left on board Mir for NASA 5 and NASA 6. Archived water samples will be returned to earth for confirmation of on-orbit analysis results.

Invest. ID: 890036 **Exp. ID:** LIFSUP-VRA **Russian ID:** VRA

US PI: Holder, Donald **Russian PI:** N/A

Volatile Removal Assembly (VRA)

The VRA flight experiment is an International Space Station risk mitigation experiment. The VRA is a catalytic oxidation-based water treatment process to be used for the recovery of water from wastewater aboard the U.S. segment of the ISS. Central to the VRA is a catalytic oxidation reactor in which trace organic contaminants are reacted with oxygen in the presence of a cold catalyst. The oxidation reaction takes place at approximately 275 degrees F. Heat exchangers provide energy recovery between the reactor's influent and effluent streams. A membrane-based phase separator removes excess oxygen and by-product carbon dioxide from the reactor effluent. Ionic by-products are removed by an ion exchange polishing bed. Oxygen is delivered to the reactor from an oxygen storage tank provided with the experiment. The VRA flight experiment includes a full-scale VRA reactor interfaced to flight support accessories such as tanks, pumps, valves, and plumbing required for its stand-alone operation. A controller, with a Payload General Support Computer (PGSC) interface, is also included.

3.7 Microgravity (MG)

Invest. ID: 750029 **Exp. ID:** MIM **Russian ID:** MIM Facility

US PI: Trygvasson, Bjarni **Russian PI:** N/A

Microgravity Isolation Mount (MIM) Facility Operations

This operation includes the sessions necessary to set up the MIM facility, prepare it for experiment operations, and deactivate it after experiment ops are complete.

Invest. ID: 750030 **Exp. ID:** MGBX **Russian ID:** Glovebox Facility

US PI: Reiss, Don **Russian PI:** N/A

Microgravity Glovebox (MGBX) Facility Operations

The MGBX facility provides a clean and sealed work cabinet for the preparation and performance of experiments within the laboratory environment of the Priroda module. Experiments are inserted into the unit and manipulated by gloved crewmembers. The MGBX will be used to prevent experiment materials from entering the module atmosphere and to provide basic services to experiments that will be provided by independent investigators. The basic services supplied by the MGBX Facility to the experimenters are: electrical power, lighting, data recording, viewing (by crew), video recording, cooling, small item(s) stowage, airlock passthrough, air circulation, filtering, and gas sensing. The MGBX provides the capability to perform a variety of experiments including but not limited to fluid experiments, material experiments, and other experiments and demonstrations.

The MGBX is capable of keeping the MGBX work area at a negative pressure with reference to the ambient atmosphere. The air flowing through the work area will be suitably filtered before it is returned to the crew work environment. Additionally, the MGBX provides suitable internal instrumentation to monitor temperature, pressure, humidity and gases as appropriate.

Invest. ID: 750031 **Exp. ID:** BTS **Russian ID:** BTS Facility

US PI: Gonda, Steve **Russian PI:** N/A

Biotechnology System (BTS) Facility Operations

These operations are the activities required to set up, activate, verify functionality, and maintain the Biotechnology System facility.

Invest. ID: 750032 **Exp. ID:** APCF **Russian ID:** APCF

US PI: TBD **Russian PI:** N/A

Advanced Protein Crystalization Facility (APCF)

These activities are required to install, activate, check out, deactivate, or otherwise provide for the operation of the Advanced Protein Crystallization Facility.

Invest. ID: 750033 **Exp. ID:** PCG-GN2 **Russian ID:** PCG-Dewar

US PI: McPherson, Alex **Russian PI:** TBD

Protein Crystal Growth (PCG) GN2 Dewar

The purpose of this investigation is to grow protein crystals by using the flash frozen batch and liquid-liquid method. Proteins can be rapidly mixed with all other chemical components necessary and flash frozen, well before any crystal nuclei can be expected to form. This can be done months in advance of the mission so long as the samples are maintained frozen. The GN2 freezer/dewar is needed to maintain the samples frozen from the time of space vehicle loading to achievement of orbit. Activation depends solely on the samples defrosting. Frozen samples are transported to the Mir station by STS and allowed to thaw naturally at which time the diffusion and crystal growth begin passively. A comparison of different growth methods and equilibration times will be studied by varying the aspect ratio of the tubes and capillaries.

These experiments are particularly ideal for the long duration Mir mission. They are entirely passive and require virtually no crew attention. Launch preparation is minimal because the samples are prepared well ahead of time. Experiments will be carried out in sealed volumes of liquid that will cushion and protect crystals on return, and can be flown in large numbers. This experiment will also allow screening of a greater variety of macromolecules and viruses, and to optimize the results by expanding the number of trials for each.

Invest. ID: 890034 **Exp. ID:** MGM **Russian ID:** MGM

US PI: Sture, Stein **Russian PI:** N/A

Mechanics of Granular Materials (MGM)

The MGM investigation entails a test series on granular materials in dry and fully saturated states.

Invest. ID: 890043 **Exp. ID:** QUELD **Russian ID:** QUELD

US PI: Smith, Reginald **Russian PI:** TBD

QUELD Furnace Experiment - MIM

The QUELD unit is a fixed furnace facility that provides an experimental method of measuring the diffusion coefficients (D) in some metallic binary systems under conditions of microgravity. Accurate diffusion coefficients are of considerable importance in modelling the diffusion process on Earth, since even in systems having other mass transport, there are always boundary layers in which diffusion is dominant. During the course of this experiment, diffusian couples of selected systems will be place in graphite crucibles, each contained in a separate stainless steel tube (called a "capsule"). The capsule is rapidly heated to a constant temperature and held there for a given period of time. At the end of this period, the capsule is ejected into an aluminum chill block and quenched to room temperature. Upon return to Earth, the sample will be analyzed by the appropriate techniques to determine the solute concentration profile, thus allowing the caluclation of D. The QUELD unit will be operated in conjunction with the Microgravity Isolation Mount (MIM). It is hoped that the MIM will isolate the QUELD from acceleration and vibration forces that may disturb the fluid phases of its liquid specimens.

Invest. ID: 890079 **Exp. ID:** SAMS **Russian ID:** SAMS

US PI: DeLombard, R. **Russian PI:** Kundik, Ye; Simakov, S.

Space Acceleration Measurement System (SAMS) Operations

Disturbances to the on-orbit microgravity environment, typically 10-6 g to 10-2 g in magnitude and 10-4 Hz to 102 Hz in frequency, affect various types of microgravity science experiments. Additional benefits can be achieved by comparing measured data with mathematical models of the microgravity environment aboard spacecraft.

The Space Acceleration Measurement System (SAMS) is an acceleration measurement and data acquisition instrument, not a classical microgravity research experiment. The SAMS consists of a main unit and up to three remotely positioned triaxial sensor heads (TSH). Each TSH contains orthogonally positioned accelerometers, with a threshold sensitivity of 10-6 g. The main unit contains analog and digital signal processing circuitry and two optical disk drives for storage.

SAMS equipment measures acceleration disturbances in four ranges automatically selected by a stored software algorithm. The ranges are ±500 mg, ±50 mg, ±5 mg, and ±500 ug full scale. It is possible to select a specific range and inhibit the automatic range selection. This requires a serial computer connection to SAMS to interact with an internal menu driven program.

Each TSH and associated analog filter card in the main unit can be pre-selected to measure acceleration in one of six bandwidths. For the Mir Mission, bandwidths of 10 Hz and 100 Hz have been selected, pending approval by the Russian counterpart. Sample rates for the acceleration data are 50 and 500 samples per second, respectively. The data obtained at these sample rates will be approximately 400 megabytes (one double-sided optical disk full) per day.

The MIPS shall provide the time signal requested by SAMS. The MIPS time signal is synchronized to the Mir timing signal. This signal is used to time stamp data.

Invest. ID: 890093 **Exp. ID:** BIO3D **Russian ID:** BIO3D

US PI: Lelkes/Hammond **Russian PI:** N/A

Biochemistry of 3-D Tissue Engineering - BTS

This investigation will investigate basic cell to cell interactions in a quiescent cell culture environment and their role in the formation of functional cell aggregates.

Invest. ID: 890252 **Exp. ID:** CAPE **Russian ID:** CAPE

US PI: Sygusch, Jurgen **Russian PI:** N/A

Canadian Protein Crystallization Experiment - MIM

The investigation will utilize the liquid-liquid diffusion technique to grow protein crystals. The proteins will be grown in two separate crystallization units, one mounted in the MIM and the other on the MIM wall.

Invest. ID: 890255 **Exp. ID:** DCAM **Russian ID:** DCAM

US PI: Carter, D. **Russian PI:** N/A

Ambient Diffusion Controlled Protein Crystal Growth

The primary objective of the DCAM experiment is to produce large, high-quality crystals of selected proteins under controlled conditions in microgravity. Crystals of sufficient size and suitable quality are essential for protein crystallographic analysis of molecular structures via x-ray diffraction and computer modeling.
All proteins are pre-loaded into the DCAM prior to the STS ferry flight. Once integrated into Priroda/Mir, and the crystals will grow for the remainder of the flight. Monthly photography sessions will be required throughout the flight. Data recording required will be the maintenance of a temperature log which will be updated during photography sessions and status checks.

The success of the DCAM has been proven on many STS flights; however, the success of these longer duration flights will be determined by the size and quality of the crystals "grown" aboard Mir.

Invest. ID: 890265 **Exp. ID:** CGEL **Russian ID:** CGEL

US PI: Weitz, D. **Russian PI:** N/A

Colloidal Gelation

The goal of CGEL is to investigate a series of critical problems in colloid science that can not be investigated on Earth due to limitations imposed by sedimentation or convection. The results obtained in CGEL will not only significantly further our understanding of the fundamental physics of colloidal suspensions, but will also facilitate our goal of fabricating novel materials using colloidal precursors. In particular, CGEL will allow us to use static and dynamic light scattering to monitor the behavior of the colloidal samples.

3.8 Space Medicine Program (SMP)

Invest. ID: 890096 **Exp. ID:** MO **Russian ID:** SMP-US
US PI: WG-8 **Russian PI:** TBD

Space Medicine Program - US Medical Operations

TBD

Invest. ID: 890597 **Exp. ID:** MSD042 **Russian ID:**
US PI: WG-8 **Russian PI:**

Return to Duty Sensorimotor Neurological Assessment

Invest. ID: 890605 **Exp. ID:** MSD002 **Russian ID:**
US PI: John Charles, Ph.D. **Russian PI:**

Monitoring Orthostatic Function During Entry, Landing, & Egress

Invest. ID: 890607 **Exp. ID:** MSD053 **Russian ID:** Water
US PI: WG-8 **Russian PI:**

Analysis of Mir Archival Water Samples

Detailed analysis of source and finished waters will confirm that the design of the Mir purification system is adequate to maintain the concentrations of potentially harmful contaminants at acceptably safe levels. The information gathered by this analysis will support the development and evaluation of water purification units, water quality standards and inflight water sampling hardware for the International Space Station.

Invest. ID: 890608 **Exp. ID:** MSD021 **Russian ID:** Crew
US PI: WG-8 **Russian PI:**

Crew Microbiological Assessment

Human microbiota will undergo quantitative and qualitative changes during long (3 to 6 month) space missions. This monitoring activity is expected to provide information about the incidence and mechanisms of microbial transmission between crewmembers. A better understanding of microbial transfer during space flight will allow us to predict which areas or situations allow microbial transfer, and to direct contamination-control efforts accordingly. Information gained from this monitoring activity will be helpful in developing monitoring requirements that will minimize the risks of microbial cross-contamination and infectious disease.

Invest. ID: 890609 **Exp. ID:** MSD022 **Russian ID:** Micro
US PI: WG-8 **Russian PI:**

Mir Microbiological Assessment

The microbial ecology of the Mir station will undergo quantitative and qualitative changes during long (3 to 6 month) space missions. This monitoring activity is expected to provide information about the incidence and mechanisms of microbial transmission in the environment. A better understanding of microbial transfer during space flight will allow us to predict which areas or situations allow microbial transfer, and to direct contamination-control efforts accordingly. Information gained from this monitoring activity will be helpful in designing future spacecraft and in developing monitoring requirements that will minimize the risks of microbial cross-contamination and infectious disease.

Invest. ID: 890610 **Exp. ID:** MSD007 **Russian ID:** SSAS/GSC

US PI: WG-8 **Russian PI:**

Toxicological Assessment of Airborne Volatile Organic Compounds

We propose to characterize the volatile organic compounds (VOCs) in air samples collected on the Mir during the NASA/Mir program and to perform a toxicological assessment of the Mir air quality. Additionally, samples will be collected onto cartridges using the U.S. Solid Sorbent Air Sampler (SSAS). Alternately grab samples will be collected using U.S. Grab Sample Containers. The results of the analyses will include detailed information on the types and concentrations of VOCs in the Mir environment and a toxicolgical evalution of the Mir air.

Invest. ID: 890613 **Exp. ID:** Defib **Russian ID:** Defib

US PI: Flight Surgeon **Russian PI:** Flight Surgeon

Mir Defibrillator and Crew Medical Restraint System (CMRS)

3.9 Space Sciences (SS)

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4.0 DETAILED INVESTIGATION DESCRIPTIONS

The following section consists of integrated preflight, inflight, and postflight investigation sessions for the Mir 24/NASA 5 mission. The section has been sorted so that all of the sessions for a particular investigation are grouped together. The full sorting scheme is as follows:

* Discipline
* Investigation ID #
* Investigation Summary
* Preflight Sessions
    - Mir 24
    - NASA 5
* Up Item Sessions
    - STS 84
* Inflight Sessions
    - Mir 24
    - NASA 5
    - STS 84
    - STS 86
* Down Item Sessions
    - STS 86
* Postflight Sessions
    - Mir 24
    - NASA 5

Each session is classified by a session identifier (ID). Sessions are further described with a session title; a schedule of pre-, in-, or postflight dates on which to perform the session; total crew time needed for the session; a session scenario describing the activities that will be performed during the session; and session constraints and/or restrictions for operators, subjects, and/or the BDC environment.

Schedules:

Session schedules are assigned accordingly:

* Preflight sessions use Launch minus days (L-)
* Postflight sessions use Return (landing) plus days (R+)
* Inflight sessions use the Flight Day (FD) designation

The first and last FD for each mission corresponds to the launch and landing days of each mission's crew vehicle. NASA 5 is the exception, with its last FD equaling the total number of days between STS-84's launch and STS-86's landing. Therefore, FD1 of Mir 24 is the day of Soyuz launch and FD(last) is the day Soyuz lands. FD1 of NASA 5 is the day of STS-84 launch and FD(last) equals the total days after STS-84's launch up to and including the day STS-86 lands. The durations of the resupply STS missions are consistent with conventional Shuttle FDs.

Session IDs:

The session ID is composed of four parts: a category, subcategory, mission phase abbreviation, and a unique number (e.g. HLS:MET:B:1).

Category: A letter or letters designating the science or technology discipline associated with the session.

ADV= Advanced Technology
ES= Earth Science
FB= Fundamental Biology
HLS= Human life Sciences
ISS= ISSA Risk Mitigation
MG= Microgravity
SMP= Medical Operations
SS= Space Sciences

SubCategory: A letter or letters designating the type of functional objective being performed in the session.

ADV

BT= Biotechnology
ENV= Environment
LOG= Logistics
MTS= Material Science

ES

AC= Atmospheric Chemistry
EO= Earth Observation
HYD= Hydrology
LAI= Land/Atmosphere Interaction
LOG= Logistics
MT= Meterology
OB= Ocean Biosphere

FB

HSR= Hygiene, Sanitation, Radiation
DEV= Developmental
LOG= Logistics

HLS

BP= Behavior and Performance
CP= Cardiovascular/ Pulmonary
FAC= Facilities Operations
HSR= Hygiene, Sanitation, Radiation
LOG= Logistics
LS= Life Support
MS= Musculoskeletal
NEU= Neuroscience
MET= Metabolism

ISS

CHS = Crew Health Systems
DYN= Dynamics
ENV= Environment
EVA= Extra-vehicular Activity
LOG= Logistics
OP = Operations

LSRM

CHS = Crew Health Systems
LOG = Logisitics
TD = Technology Demonstration

MG

BT= Biotechnology
CS= Combustion Science
ENV= Environment
FAC= Facilities Operations
FP= Fluid Physics
LOG= Logistics
MTS= Materials Science

OPS

SHR = Shared

SMP

CH = Crew Health

ENV= Environment
LOG = Logisitics
MIC = Microbiological
MON = Orthostatic Monitoring
MO = U.S. Medical Operations
NOR = Normative Data
NEU = Return to Duty Sensorimotor Neurological Assessment

SS

ENV= Environment
EVA= Extra-vehicular Activity
LOG= Logistics

Phase: A letter designating the phase of the mission in which the session is conducted.

Preflight= P
Inflight= I
Postflight= R (for Return)
Up Item= I (occurs Inflight)
Down Item= I (occurs Inflight)

Number: A sequential number to confer uniqueness on the session.

ISS:DYN:I:10
ISS:DYN:I:11
ISS:DYN:I:12
etc...

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Advanced Technology (ADV)

Inv ID#	Rus ID	Investigation Title	Pg.
600006	CGBA-01	Commercial Generic Bioprocessing Apparatus	39

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Investigation ID: 600006 **Experiment ID:** CGBA-01 **Russian ID:** CGBA

Investigation Title: Commercial Generic Bioprocessing Apparatus (CGBA)

US Investigators: Stodieck, Louis

Russian Investigators: TBD

Other Investigators: TBD

Payload Category: ADV **Sub-Cat.:** BT **Subjects Requested:**

Description: The CGBA is a generic, versatile research tool which supports a wide variety of life sciences research. Using simple hardware, experiments can be supported in biochemistry, biophysics, microbiology, cellular biology, developmental biology and physiology. In previous missions, up to 30 investigators with more 400 individual samples have been accommodated. The main payload components include a generic, temperature controlled containment (TGBA) compatible with MIR Standard Interface Drawer (SID). For our proposed mission, it would contain up to 8 group activation packets (GAPs) in support of life sciences research. However, any other experiment requiring a highly controlled and documented temperature environment around typical ambient temperatures could be accommodated. The containment is easily accommodated on Mir and easily moved from one system to other.

The CGBA payload consists of two Isothermal Control Modules (ICM) each containing 8 GAP that each contain 8 fluid processing apparatus (FPA). Therefore, a total of 128 FPA containing protein crystal growth and biological cellular experiments will be flown on this mission. A 3.5" floppy disk is stowed in the sleeve of each ICM insulation. These can be used in a contingency situation for program upload to the ICM.

Science Objectives:
1. Synthesize biomedical materials
2. Analyze cell receptor sites and channels
3. Investigate new symbiotic relations between plants and nitrogen fixing bacteria

Functional Objectives:
1. Activate and monitor GAPs

Sample Transfer Rqd: No **Hardware Transfer Rqd:** Yes

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
3	Mir 22	8/17/96	☒	☒
3	NASA 3	9/16/96	☒	☒
3	STS 79 (SM-04)	9/16/96	☒	☒
4	STS 81 (SM-05)	1/16/97	☒	☒
5	NASA 5	5/15/97	☒	☒
6	Mir 25	12/12/97	☒	☒
6	NASA 6	9/18/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒
7	STS 89 (SM-08)	1/15/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
ADV		Flight	852183	Isothermal Control Module (ICM)
ADV		Flight	852184	Group Activation Pack (GAP)
OPS	SHR	Flight	854863	PUP Power Cable
ADV	BT	Flight	854870	Fluid Processing Apparatus (FPA)
OPS	SHR	Flight	854871	Priroda IFM Tool Kit
OPS	SHR	Flight	854872	Perforated ECS Panel

Mission: NASA 5 **Invest. ID:** 600006 **Exp. ID:** CGBA-01 **Russian ID:** CGBA

Invest. Title: Commercial Generic Bioprocessing Apparatus (CGBA)

Prime ☒
Contingent ☐

US PI: Stodieck, Louis **Russian PI:** TBD

1. Session ID: ADV:BT:P:11

Session Type: Training

2. Session: CGBA ICM Locker Preparation

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 90

4. Session Scenario:

Session will instruct crewmember how to reconfigure Priroda locker from stowage configuration to accept powered payload.

5. Session Constraints:

1. None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
853503	Priroda Locker Mockup	1
854863	PUP Power Cable	1
854871	Priroda IFM Tool Kit	1
854872	Perforated ECS Panel	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	1	0	Locker preparation training

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 600006 **Exp. ID:** CGBA-01 **Russian ID:** CGBA

Invest. Title: Commercial Generic Bioprocessing Apparatus (CGBA)

Prime ☑
Contingent ☐

US PI: Stodieck, Louis **Russian PI:** TBD

1. Session ID: ADV:OPS:I:1

Session Type: Inflight

2. Session: Locker Preparation for CGBA-ICM-001 Prior to Shuttle Docking

3. Session Timeline: **Crewtime Usage (mins):** 46 **Session Time (mins):** 46

Scheduled Days: FD 120

4. Session Scenario:
Mir locker must be prepared prior to docking to allow transfer of CGBA units.

5. Session Constraints:
1. Session must occur prior to STS-86 Shuttle docking.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854863	PUP Power Cable	1
854871	Priroda IFM Tool Kit	1
854872	Perforated ECS Panel	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	1	0	Retrieve materials/tools from stowage
3	3	1	1	0	Remove stowed items from locker and temp stow
15	15	1	1	0	Remove solid panel and replace with perforated ECS panel
3	3	1	1	0	Replace stowed items into locker
10	10	1	1	0	Stow tools (unless session for CGBA-002 locker preparation will be performed immediately) and removed panel

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 600006 **Exp. ID:** CGBA-01 **Russian ID:** CGBA

Invest. Title: Commercial Generic Bioprocessing Apparatus (CGBA)

Prime ☑
Contingent ☐

US PI: Stodieck, Louis **Russian PI:** TBD

1. Session ID: ADV:OPS:I:2

2. Session: Locker Preparation for CGBA-ICM-002 Prior to Shuttle Docking

Session Type: Inflight

3. Session Timeline: **Crewtime Usage (mins):** 46 **Session Time (mins):** 46

Scheduled Days: FD 120

4. Session Scenario:

Mir locker must be prepared prior to docking to allow transfer of CGBA units.

5. Session Constraints:

1. Session must occur prior to STS-86 Shuttle docking.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854863	PUP Power Cable	1
854871	Priroda IFM Tool Kit	1
854872	Perforated ECS Panel	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	1	0	Retrieve materials/tools from stowage
3	3	1	1	0	Remove stowed items from locker and temp stow
15	15	1	1	0	Remove solid panel and replace with perforated ECS panel
3	3	1	1	0	Replace stowed items into locker
10	10	1	1	0	Stow tools (unless session for CGBA-001 has not been done) and removed panel

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

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Earth Sciences (ES)

Inv ID#	Rus ID	Investigation Title	Pg.
700004	Color	Regional & Temporal Variability of Primary Productivity in Ocean Shelf Waters	43
700005	IKAR	Calibration & Validation of Priroda Microwave Sensors	46
700006	Sailwet	Watershed Hydrologic Studies	49
700007	Prairies	Validation of Biosphere-Atmosphere Interchange Model for Northern Prairies	52
700008	Chemistry	Comparison of Atmosphere Chemistry Sensors on Priroda & American Satellites	56
700010	Rain	Validation of Priroda Rain Observations	59
700011	Test	Test Site Monitoring	66
810525	Obs	Visual Earth Observations	99

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Investigation ID: 700004 **Experiment ID:** EO3 **Russian ID:** Color

Investigation Title: Regional & Temporal Variability of Primary Productivity in Ocean Shelf Waters

US Investigators: Muller-Karger, F. E.

Russian Investigators: Kopelevich, O.

Other Investigators: Various

Payload Category: ES **Sub-Cat.:** OB **Subjects Requested:**

Description: This investigation is part of NASA's Mission to Planet Earth. Ocean shelf (coastal) waters will be monitored to study the possible overestimation of primary coastal productivity occurring through conventional satellite techniques. Test sites may be imaged throughout the diurnal cycle, thereby permitting the investigation of short period phenomena. The investigation utilizes the unique capabilities of Moz-Obzur, a remote sensing, ocean color instrument aboard the Priroda module. Moz-Obzur, combined with the U.S.'s Sea Wide Field Sensor (SeaWiFS), will yield critical insights on role of aerosols and dissolved solids in shelf and river plumes.

Science Objectives:
1. Quantify role of continental margins in global BGC.
2. Investigate physical & chemical factors controlling production.
3. Investigate trajectory of materials supplied by upwelling & river discharge.
4. Compare MOZ-Obzur & SeaWiFS data.
5. Investigate use of MOZ-Obzur to correct SeaWiFS Data for aerosol distribution.
6. Assure data compatibility between Priroda & SeaWiFS.

Functional Objectives: Comparison of MOZ-Obzur and other satellite data together with sea truth.

Sample Transfer Rqd: No **Hardware Transfer Rqd:** No

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
2	Mir 21	2/21/96	☒	☒
3	NASA 3	9/16/96	☒	☒
4	NASA 4	1/16/97	☒	☒
5	NASA 5	5/15/97	☒	☒
6	NASA 6	9/18/97	☒	☒
7	NASA 7	1/15/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
ES		Flight	820341	Priroda Earth Observation Sensors

Mission: NASA 5 **Invest. ID:** 700004 **Exp. ID:** EO3 **Russian ID:** Color

Invest. Title: Regional & Temporal Variability of Primary Productivity in Ocean Shelf Waters **Prime** ☒ **Contingent** ☐

US PI: Muller-Karger, F. E. **Russian PI:** Kopelevich, O.

1. Session ID: ES:OB:I:1

Session Type: Inflight

2. Session: EO3 - Regional & Temporal Variability of Primary Productivity in Ocean Shelf Waters: Priroda Data Acquisition
Minimal number of measurements for each site: TBD

3. Session Timeline: **Crewtime Usage (mins):** 0 **Session Time (mins):** 0

Scheduled Days: FD 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130

4. Session Scenario:

Priroda Earth observation sensors are activated and data recorded. The investigation utilizes the unique capabilities of Moz-Obzur, a remote sensing, ocean color instrument aboard the Priroda module. Moz-Obzur, combined with the U.S.'s Sea Wide Field Sensor (SeaWiFS), will yield critical insights on role of aerosols and disolved solids in shelf and river plumes.

Specific instruments used in priority order: MOS-A/B, MSU-SK, MSU-E, SAR-Travers and ISTOK-1 (nadir)

Specific site locations required:

1. 1S-7N, 35W-60W	Amazon plume dispersal region
2. 7N-19N, 60W-68W	Caribbean Sea
3. 9N-13N, 71W-72W	Maracaibo Lake
4. 18N-31N, 80W-99W	Gulf of Mexico, emphasis on
24N-31N, 81W-88W	West Florida
28N-31N, 88W-97W	Mississippi Delta
5. 35N-39N, 75W-77W	Chesapeake & Delaware Bay
6. 32N-33N, 64.5W-65.5W	Bermuda (JGOFS Station)
7. 23N-32N, 106W-115W	Gulf of California
8. 20.5N-21N, 156.7W-157.5W	Lanai, Hawaii (SEAWIFS site)
	Thyrennic Sea (Gulf of Naples)
	Northern Adriatic
	Baltic Sea (Bight of Gdansk)
9. 2S-7N, 85W-150W	Equatorial Pacific Ocean
10. 23N-50N, 70W-77W	US East Coast

5. Session Constraints:

1. This is a scheduling session only. All activities will be done via ground-based data commanding.
2. The actual times of data acquisition will be determined when location (with respect to Earth) and station orientation are known, and when phenomena of interest are determined on a real-time basis.
3. Data from all Priroda sensors (especially MOS & MSU) should be collected concurrently if possible.
4. Enough data should be collected to bracket each target area by 100km along the track of observation.
5. High priority targets should be imaged whenever possible (Lanai, Bermuda, Gulf of California) under appropriate viewing conditions (local time between 9am and 3 pm)
6. A representative set of seasonal data are required. Actual day of collection is not critical unless aircraft

underflight is scheduled.
7. Data are most useful when collected between 9am & 3pm local time (preferably local Noon), though some daylight data collected earlier or later might also be of use.
8. Photographic documentation and crew observations of the surface conditions including sun-glint photography, during Priroda data collection may be useful.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820341	Priroda Earth Observation Sensors	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
0	0	1	0	0	No crewtime charged. Ground-based commanding & recording only

8. Data Processing:

1. Data downlink/commanding is required from Priroda sensors.
2. Priroda sensors must be activated via ground-based commanding.
3. Sensor data to be recorded using ground-based media.
4. Duration of observation should be long enough to span the test sites by 100km.

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Investigation ID: 700005 **Experiment ID:** EO7 **Russian ID:** IKAR

Investigation Title: Calibration & Validation of Priroda Microwave Sensors

US Investigators: Shiue, James C.

Russian Investigators: Armand, Neon A.

Other Investigators: Njoku, Eni G.; Wilson, William

Payload Category: ES **Sub-Cat.:** HYD **Subjects Requested:**

Description: This investigation is part of NASA's Mission to Planet Earth. The calibration and stability of Priroda microwave sensors will be documented and parameter retrievals will be validated by comparisons with other satellite and airborne sensors. The investigation utilizes the IKAR, a suite of Priroda microwave sensors that study atmospheric moisture and land and ocean surface properties. The main goal of the project is to cross calibrate the IKAR with U.S. sensors so that a variety of scientific projects can be undertaken using time series data from multiple sources. U.S. sensors include the operational Special Sensor Microwave/Imager (SSM/I) and previously flown sensors such as the Scanning Multispectral Microwave Radiometer (SMMR).

Science Objectives:
1. Document sensor characteristics.
2. Validate sensor retrieval algorithms.

Functional Objectives:
1. Compare IKAR-D & other sensor data to SSM/I observations taken in near simultanity.
2. Verify geolocation thru identification of specific features.
3. Use flights of opportunity to compare IKAR-D & other data to airborne sensor observations & ground truth.

Sample Transfer Rqd: No **Hardware Transfer Rqd:** No

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
2	Mir 21	2/21/96	☒	☒
3	NASA 3	9/16/96	☒	☒
4	NASA 4	1/16/97	☒	☒
5	NASA 5	5/15/97	☒	☒
6	NASA 6	9/18/97	☒	☒
7	NASA 7	1/15/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
ES		Flight	820341	Priroda Earth Observation Sensors

Mission: NASA 5 **Invest. ID:** 700005 **Exp. ID:** EO7 **Russian ID:** IKAR

Invest. Title: Calibration & Validation of Priroda Microwave Sensors **Prime** ☒ **Contingent** ☐

US PI: Shiue, James C. **Russian PI:** Armand, Neon A.

1. Session ID: ES:HYD:I:1

2. Session: EO7-Calibration & Validation of Priroda Microwave Sensors: Priroda Data Acquisition **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 0 **Session Time (mins):** 0

Scheduled Days: FD 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130

4. Session Scenario:

Priroda Earth observation sensors are activated via ground-based commanding and data recorded. The investigation utilizes the IKAR, a suite of Priroda microwave sensors that study atmospheric moisture and land and ocean surface properties. IKAR data will be cross calibrated with U.S. sensors so that a variety of scientific projects can be undertaken using time series data from multiple sources. U.S. sensors include the operational Special Sensor Microwave/Imager (SSM/I) and previously flown sensors such as the Scanning Multispectral Microwave Radiometer (SMMR).

Specific instruments required: IKAR-N, D, & P

Though no specific site locations are required, a representative collection of Earth locations (oceans, desert tropical forest, sea ice) is needed.

5. Session Constraints:

1. This is a scheduling session only. All activities will be done via ground-based data commanding.
2. The actual times of data acquisition will be determined when location (with respect to Earth) and station orientation are known, and when phenomena of interest are determined on a real-time basis.
3. Data from all the IKAR sensors should be collected concurrently if possible, though that is not a strict requirement.
4. One orbit of coincident IKAR - N, D, & P data are required at least once per week.
5. Photographic documentation and crew observations of the surface conditions during IKAR data collection is desired.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820341	Priroda Earth Observation Sensors	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
0	0	1	0	0	No crewtime charged. Ground-based commanding & recording only

8. Data Processing:

1. Data downlink/commanding is required from Priroda sensors.
2. Priroda sensors must be activated via ground-based commanding.
3. Sensor data to be recorded using ground-based media.
4. An entire orbit of observation is requried, though shorter segments can be useful as well. Longer segments of

several days are desired to monitor instrument stability.

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Investigation ID: 700006 **Experiment ID:** EO4 **Russian ID:** Sailwet

Investigation Title: Watershed Hydrologic Studies

US Investigators: Jackson, Thomas J.

Russian Investigators: Shutko, Anatoly M.

Other Investigators: Engman, Edwin T. & Others

Payload Category: ES **Sub-Cat.:** HYD **Subjects Requested:**

Description: This investigation is part of NASA's Mission to Planet Earth and will study large watershed hydrology in various climatic regimes. Microwave remote sensing (using the Priroda module's IKAR sensor suite) will be evaluated as a source of information on large watershed hydrology. The primary test site is the American southwest. Data from this investigation will be used to support the International GEWEX Programme of the World Climate Research Programme.

Science Objectives:
1. Develop & validate algorithms to retrieve hydrologic properties & fluxes in various climatic regimes.
2. Assess value of specific frequencies.
3. Assess value of long term observation series.

Functional Objectives:
1. Collect mutifrequency observations with IKAR-P & IKAR-N for long time series over instrumented test sites.
2. Use ground truth radar, other satellite observations & airborne observations to validate paramter retrievals.
3. Use R-400, TRAVERS SAR, ISTOK-1, MOS-A, MOS-B and MSU-SK for ancillary data.

Sample Transfer Rqd: No **Hardware Transfer Rqd:** No

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
2	Mir 21	2/21/96	☒	☒
3	NASA 3	9/16/96	☒	☒
4	NASA 4	1/16/97	☒	☒
5	NASA 5	5/15/97	☒	☒
6	NASA 6	9/18/97	☒	☒
7	NASA 7	1/15/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
ES		Flight	820341	Priroda Earth Observation Sensors

Mission: NASA 5 **Invest. ID:** 700006 **Exp. ID:** EO4 **Russian ID:** Sailwet

Invest. Title: Watershed Hydrologic Studies **Prime** ☒ **Contingent** ☐

US PI: Jackson, Thomas J. **Russian PI:** Shutko, Anatoly M.

1. Session ID: ES:HYD:I:2

Session Type: Inflight

2. Session: EO4 - Watershed Hydrologic Studies: Priroda Data Acquisition
Minimal number of measurements for each site: TBD

3. Session Timeline: **Crewtime Usage (mins):** 0 **Session Time (mins):** 0

Scheduled Days: FD 10, 120

4. Session Scenario:

Priroda Earth observation sensors are activated and data recorded. Microwave remote sensing data will be collected using the Priroda module's IKAR sensor suite.

Specific Priroda sensors needed in order of priority:
1. IKAR-P & N
2. IKAR-D & R-400
3. SAR-TRAVERS
4. ISTOK-1, Thermal Data
5. MOS-A/B
6. MSU-SK

Specific site locations:
1. 34.5N-37N, 97.5W-98.5W Little Washita River, OK
2. 31.5N-33N, 109.5W-111W Walnut Gulch, AZ
3. 30N-46N, 80W-105W GCIP Mississippi Basin

5. Session Constraints:

1. This is a scheduling session only. All activities will be done via ground-based data commanding.
2. The actual times of data acquisition will be determined when location (with respect to Earth) and station orientation are known, and when phenomena of interest are determined on a real-time basis.
3. Passive microwave data should be collected concurrently when possible though not strictly required.
4. Microwave data is required for the North American target areas several times per day if possible, as often as possible.
5. A uniform sampling of data throughout the year is required.
6. Photographic documentation and crew observations of the surface conditions at the experiment sites is desired.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820341	Priroda Earth Observation Sensors	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
0	0	1	0	0	No crewtime charged. Ground-based commanding & recording only.

8. Data Processing:

1. Data downlink/commanding is required from Priroda sensors.
2. Priroda sensors are activated via ground-based commanding.
3. Sensor data recorded using ground-based media.

4. The duraiton of observations should be the length of time required to transit the study sites and the surrounding 100km.

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Investigation ID: 700007 **Experiment ID:** EO2 **Russian ID:** Prairies

Investigation Title: Validation of Biosphere-Atmosphere Interchange Model for Northern Prairies

US Investigators: England, A.W.

Russian Investigators: Shutko, A. M.

Other Investigators: TBD

Payload Category: ES **Sub-Cat.:** LAI **Subjects Requested:**

Description: This investigation is part of NASA's Mission to Planet Earth and seeks to validate a model of land atmosphere interactions. The Biosphere Atmosphere Transfer Scheme (BATS) focuses on the diurnal and seasonal time scales and is driven by passive microwave measurements. The validation program will utilize NASA ground truth radar on the northern prairie of North America and Priroda microwave sensor observations.

Science Objectives: 1. Validate Biosphere-Atmosphere Interchange Model of Northern Prairies

Functional Objectives:
1. Acquire IKAR-D covering the diurnal cycle on a seasonal basis.
2. Acquire contemporaneous SSM/I data.
3. Validate biospher-atmosphere model using satellite data & antecedant weather data.

Sample Transfer Rqd: No **Hardware Transfer Rqd:** No

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
2	Mir 21	2/21/96	☒	☒
3	NASA 3	9/16/96	☒	☒
4	NASA 4	1/16/97	☒	☒
5	NASA 5	5/15/97	☒	☒
6	NASA 6	9/18/97	☒	☒
7	NASA 7	1/15/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
ES		Flight	820341	Priroda Earth Observation Sensors

Mission: NASA 5 **Invest. ID:** 700007 **Exp. ID:** EO2 **Russian ID:** Prairies

Invest. Title: Validation of Biosphere-Atmosphere Interchange Model for Northern Prairies

Prime ☒
Contingent ☐

US PI: England, A.W. **Russian PI:** Shutko, A. M.

1. Session ID: ES:LAI:I:1

Session Type: Inflight

2. Session: EO2-Validation of Biosphere-Atmosphere Interchange Model for Northern Prairies: Priroda Data Acquisition
Minimal number of measurements for each site: TBD

3. Session Timeline: **Crewtime Usage (mins):** 0 **Session Time (mins):** 0

Scheduled Days: FD 10, 24, 38, 52, 66, 80, 94, 108, 122

4. Session Scenario:

Priroda Earth observation sensors are activated amnd data recorded. IKAR microwave sensors will be utilized for this session. Coordinates to be provided in separate fax.

5. Session Constraints:

1. Observations will be taken before, during, and after seasonal shifts.
2. This is a scheduling session only. All activities will be done via ground-based data commanding.
3. The actual times of data acquisition will be determined when location (with respect to Earth) and station orientation are known, and when phenomena of interest are determined on a real-time basis.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820341	Priroda Earth Observation Sensors	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
0	0	1	0	0	No crewtime charged. Ground-based commanding & recording only.

8. Data Processing:

1. Data donwlink/commanding is required.
2. Priroda sensors are activated via ground-based commanding.
3. Sensor data recorded using ground-based media.

Investigation ID: 700008 **Experiment ID:** EO8 **Russian ID:** Chemistry

Investigation Title: Comparison of Atmospheric Chemistry Sensors on Priroda & American Satellites

US Investigators: Kaye, Jack A.

Russian Investigators: TBD

Other Investigators: TBD

Payload Category: ES **Sub-Cat.:** AC **Subjects Requested:**

Description: This project is part of NASA's Mission to Planet Earth and seeks to establish the relationships among measurements obtained by various satellite sensors designed for studies of atmospheric chemistry. The Ozone-Mir, Istok-1, & MOZ-Obzur on Priroda will be compared with TOMS, SBUV/2, SSBUV, SAGE II, POAM II & various sensors on UARS to determine how to best use their complementary capabilities in long term studies. Understanding of these relationships will permit the conduct of other studies using a combination of these sensors to extend time series or to provide complementary information.

Science Objectives: 1. Comparison of contemporaneous data from multiple sensors.

Functional Objectives: 1. Acquire near simultaneous data over selected regions.
2. Exchange data.

Sample Transfer Rqd: No **Hardware Transfer Rqd:** No

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
2	Mir 21	2/21/96	☒	☒
3	NASA 3	9/16/96	☒	☒
4	NASA 4	1/16/97	☒	☒
5	NASA 5	5/15/97	☒	☒
6	NASA 6	9/18/97	☒	☒
7	NASA 7	1/15/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
ES		Flight	820341	Priroda Earth Observation Sensors

Mission: NASA 5 **Invest. ID:** 700008 **Exp. ID:** EO8 **Russian ID:** Chemistr

Invest. Title: Comparison of Atmospheric Chemistry Sensors on Priroda & American Satellites

Prime ☒
Contingent ☐

US PI: Kaye, Jack A. **Russian PI:** TBD

1. Session ID: ES:AC:I:1

Session Type: Inflight

2. Session: EO8 - Comparison of Atmospheric Chemistry Sensors on Priroda and American Satellites: Priroda Data Acquisition

3. Session Timeline: **Crewtime Usage (mins):** 0 **Session Time (mins):** 0

Scheduled Days: FD 10, 24, 38, 52, 66, 80, 94, 108, 122

4. Session Scenario:

Priroda Earth observation sensors are activated and data recorded. Data from the Ozone-Mir, Istok-1, & MOZ-Obzur on Priroda will be compared with data from the U.S. sensors TOMS, SBUV/2, SSBUV, SAGE II, POAM II & various sensors on UARS to determine how to best use their complementary capabilities in long term studies.

Specific sensors required in order of priority:
1. OZON-M
2. ISTOK
3. MOS-OBZUR

Priroda sensors will collect data globally (no specific site locations).

5. Session Constraints:

1. This is a scheduling session only. All activities will be done via ground-based data commanding.
2. The actual times of data acquisition will be determined when location (with respect to Earth) and station orientation are known, and when phenomena of interest are determined on a real-time basis.
3. Data from OZON-M, ISTOK, & MOZ-OBZUR should be collected concurrently if possible though that is not a strict requirement.
4. Data should be globally collected as often as possible and during every orbit if possible.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820341	Priroda Earth Observation Sensors	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
0	0	1	0	0	No crewtime charged. Ground-based commanding & recording only.

8. Data Processing:

1. Data downlink/commanding is required from Priroda sensors.
2. Priroda sensors must be activated via ground-based commanding.
3. Sensor data to be recorded using ground-based media.
4. Observation duration is requried for complete sunlit orbit segments.

Investigation ID: 700010 **Experiment ID:** EO6 **Russian ID:** Rain

Investigation Title: Validation of Priroda Rain Observations

US Investigators: Thiele, Otto W.

Russian Investigators: TBD

Other Investigators: Han, Daesoo

Payload Category: ES **Sub-Cat.:** MT **Subjects Requested:**

Description: This investigaiton is part of NASA's Mission to Planet Earth. The goal of this project is to validate the Priroda determination of precipitation rates over the ocean using NASA ground based resources developed for the Tropical Rainfall Measuring Mission (TRMM) . A secondary goal is to utilize Russian ground truth radar to validate precipitation rates over the ocean from the joint NASA-Japanese TRMM.

Science Objectives: 1. Validate rain rate estimations from Priroda sensors.

Functional Objectives: 1. Acquire Priroda data over US test site in Melborne, FL.
2. Compare to rain radar data.

Sample Transfer Rqd: No **Hardware Transfer Rqd:** No

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
2	Mir 21	2/21/96	☒	☒
3	NASA 3	9/16/96	☒	☒
4	NASA 4	1/16/97	☒	☒
5	NASA 5	5/15/97	☒	☒
6	NASA 6	9/18/97	☒	☒
7	NASA 7	1/15/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
ES		Flight	820341	Priroda Earth Observation Sensors

Mission: NASA 5 **Invest. ID:** 700010 **Exp. ID:** EO6 **Russian ID:** Rain

Invest. Title: Validation of Priroda Rain Observations **Prime** ☒ **Contingent** ☐

US PI: Thiele, Otto W. **Russian PI:** TBD

1. Session ID: ES:MT:I:1

2. Session: EO6 - Validation of Priroda Rain Observations: Priroda Data Acquisition for Investigations EO2, EO3, EO4, EO6, EO7, & EO8
Minimal number of measurements for each site: TBD

Session Type: Inflight

3. Session Timeline: **Crewtime Usage (mins):** 0 **Session Time (mins):** 0

Scheduled Days: FD 10, 24, 38, 52, 66, 80, 94, 108, 122

4. Session Scenario:

Priroda Earth observation sensors are activated and data recorded. Data will be collected using the Moz-Obur sensors.

Specific instruments required in order of priority:
1. IKAR-N, D, & P
2. MSU-SK & MSU-E
3. SAR

Specific site locations:
1. Central Florida, around Melbourne (78-83W, 26-30N)

5. Session Constraints:

1. The actual times of data acquisition will be determined when location (with respect to Earth) and station orientation are known, and when phenomena of interest are determined on a real-time basis.
2. Data from all the IKAR sensors, MSU, and SAR should be collected concurrently if possible, though that is not a strict requirement.
3. Frequency of data collection should be whenever it rains in central Florida and at least twice per day during observing periods.
4. A representative set of seasonal data are required. Actual day of collection is not critical unless an aircraft underflight is scheduled.
5. Photographic documentaiton and crew observations of the surface conditions during Priroda data collection is desired.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820341	Priroda Earth Observation Sensors	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
0	0	1	0	0	No crewtime charged. Ground-based commanding & recording only.

8. Data Processing:

1. Data downlink/commanding is required from Priroda sensors.
2. Priroda sensors are activated via ground-based commanding.
3. Sensor data recorded using ground-based media.
4. Data must be collected from the IKAR, MSU, SAR, & GREBEN for 3-5 minutes or the amount of time it takes to span the Melbourne test site.

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Investigation ID: 700011 **Experiment ID:** EO5 **Russian ID:** Test

Investigation Title: Test Site Monitoring

US Investigators: Evans, Cynthia; Lulla, Kamlesh

Russian Investigators: Desinov, Lev

Other Investigators: TBD

Payload Category: ES **Sub-Cat.:** EO **Subjects Requested:**

Description: This experiment involves environmental monitoring by way of coupled data collection (visual and film-based observations and data from Priroda sensors) over four test sites. We propose to routinely collect data over: the Aral Sea, Galveston Bay, TX, South Florida and the Bahamas, and the Panama Canal Zone. The data will include observations and imagery by astronauts and cosmonauts, as well as imagery collected by mounted sensors such as the KFA-1000 camera, and the MSU-SK and MSU-E sensors on the Priroda module. These data, collected at least seasonally, will allow us to monitor these rapidly changing regions which are explemplary of several interdisciplinary processes. The data will also allow us to extrapolate observations from our historical database and ground-based studies to produce a more comprehensive assessment of the nature and rate of the changes. Each site has a significant historical archive which will serve as a baseline for the observations collected onboard Mir.

Opportunities for data collection, which will occur at least monthly for each site, will be planned based on orbit trajectory, attitude and weather constraints.

Science Objectives: 1. Monitor changes in land cover and condition, lake levels, etc., at selected test sites in support of the US EOS Program and global change research.

Functional Objectives:
1. Acquire data from long & medium focal length film cameras & multispectral scanners.
2. Provide copies to EOS Test Site Program.
3. Describe environmental changes using these & other EOS Test Site data.

Sample Transfer Rqd: No **Hardware Transfer Rqd:** Yes

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
2	Mir 21	2/21/96	☒	☒
2	NASA 2	3/22/96	☒	☒
3	Mir 22	8/17/96	☒	☒
3	NASA 3	9/16/96	☒	☒
4	Mir 23	2/2/97	☒	☒
4	NASA 4	1/16/97	☒	☒
5	Mir 24	6/24/97	☒	☒
5	NASA 5	5/15/97	☒	☒
6	Mir 25	12/12/97	☒	☒
6	NASA 6	9/18/97	☒	☒
7	Mir 26	5/30/98	☒	☒
7	NASA 7	1/15/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
OPS	SHR	Flight	390071	Diskettes
OPS	SHR	Flight	410037	MIR Interface to Payload Systems-2 (MIPS-2)
OPS	SHR	Flight	810233	Hasselblad 70-mm Camera System (NASA)
ES		Flight	820339	KFA 1000
ES		Flight	820341	Priroda Earth Observation Sensors
ES	EO	Flight	847723	70 mm film

Mission: Mir 24 **Invest. ID:** 700011 **Exp. ID:** EO5 **Russian ID:** Test

Invest. Title: Test Site Monitoring

Prime ☑
Contingent ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:EO:P:21

2. Session: Test Sites Familiarization

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 360 **Session Time (mins):** 180

Scheduled Days: L- 90

4. Session Scenario:

Geographic recognition of sites, discussion of frequency, techniques, and data recording.

5. Session Constraints:

1. Access to projecting equipment.
2. Scheduling should occur as close to Earth Observation Sites - 1 and Earth Observation Sites - 2 as possible (L-8 to L-3 months).
3. Session training for 1 cosmonaut and 1 astronaut.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
180	180	1	2	0	Review geography and processes important to chosen test sites.

8. Data Processing:

N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 700011 **Exp. ID:** EO5 **Russian ID:** Test

Invest. Title: Test Site Monitoring

Prime ☒
Contingent ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:EO:P:21

Session Type: Training

2. Session: Test Sites Familiarization

3. Session Timeline: **Crewtime Usage (mins):** 360 **Session Time (mins):** 180

Scheduled Days: L- 120

4. Session Scenario:
Geographic recognition of sites, discussion of frequency, techniques, and data recording.

5. Session Constraints:
1. Access to projecting equipment.
2. Scheduling should occur as close to Earth Observation Sites - 1 and Earth Observation Sites - 2 as possible (L-8 to L-3 months).
3. Session training for 1 cosmonaut and 1 astronaut.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
180	180	1	2	0	Review geography and processes important to chosen test sites.

8. Data Processing:
N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 700011 **Exp. ID:** EO5 **Russian ID:** Test

Invest. Title: Test Site Monitoring **Prime** ☒ **Contingent** ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:EO:I:10

2. Session: Global Test Site Monitoring **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 10, 11, 38, 39, 66, 67, 90, 91, 122, 123, 134, 149

4. Session Scenario:

Hand held photography is collected simultaneously with Priroda sensors. Crew member photographs Earth scene with hand-held imagery. Photography information (date, time, location, camera, camera settings, film) will be recorded on ES diskette containing ES files. Images from the KFA-1000 is collected. Crew member activates the KFA-1000.

Priroda sensors are activated from ground and data are recorded. Data will be collected using the MOMS, MSU-SK, and MSU-E sensors.

Site goals follow:

Texas-Louisiana Gulf Coast
Goals: landuse, features in inland and costal waters (e.g. sediment plumes, turbidity, oil seeps)

S. Florida-N. Bahamas
Goals: landuse, coastal features (algae growth, turbidity, whitings)

Panama Canal Zone
Goals: changing forest cover, lake levels and lake sediment

Aral Sea
Goals: water levels, dust, agriculture

Site list (please see table):

Priority	Target Coordinates Lat/Long	Target Description	Acceptable Parallax	Sun/Moon Lighting Constraints	Season Impact
High	31/-97, 31/-89, 28/-89, 25/-99	Texas-Louisiana Gulf Coast	Sensors: Nadir; Photography: Nadir views preferred, but low obliques are acceptable. Wide views for sediment plumes in Gulf of Mexico.	Less than 30% cloud cover. Greater than 20 deg sun angle.	Sensors: seasonal data required. Photography: More frequent observations may be requested during winter storm season, or during and after summer tropical storms.
High	28/-84, 28/-77, 23/-75, 23/-83	S. Florida - N. Bahamas	Sensors: Nadir; Photography: Low oblique acceptable	Less than 30% cloud cover. Greater than 20 degree sun angle.	Sensors: seasonal data required. Phtotgraphy: More frequent observations desired.

10/-82, 10/-77, 7/-77, 7/-82	Panama Canal Zone	Sensors: Nadir; Photography: Low oblique acceptable.	Cloud cover is always a problem - constraints are loosened to obtain data. Less than 40% cloud cover. Greater than 20 deg sun angle.	Sensors: seasonal data requied. Photography: More frequent observations desired.
47/57, 47/64, 43/64, 43/57	Aral Sea	Sensors: Nadir; Photography: Low ablique acceptable.	Less than 30 % cloud cover. Greater than 20 degree sun angle.	Sensors: seasonal data required. Photography: More frequent observations desired.

5. Session Constraints:

1. Session must be performed in conjunction with "Global Test Site Monitoring/Priroda Data Acquisition". Coordination with ground controllers is necessary.
2. Session performed once every 4 weeks.
3. Imagery acquisition must be coordinated with astronaut photography so as to occur simultaneously.
4. Sessions are time placeholders. Actual date, time and length of session to be determined real-time with station orientation information and Earth orbits known.
5. Observation constraints include: time of year, lighting, cloudiness, and viewing angle.
6. The following data will be verified 15 days, 4 days, and 24 hours (final) prior to observations and data takes.
   - Required attitude of station (distance and angles)
   - Cloudiness constraints
   - Equipment to be used
   - Number of crewmembers participating in observations
7. Sessions can be cancelled 24 hours prior to observations, based on weather or other constraints.
8. Requires Earth-viewing attitude for windows and sensors.
9. When conditions allow (nadir viewing, <10% cloud cover), request imagery from KFA-1000 camera.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390071	Diskettes	1
410037	MIR Interface to Payload Systems-2 (MIPS-2)	1
810233	Hasselblad 70-mm Camera System (NASA)	1
820339	KFA 1000	1
847723	70 mm film	0.25

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow cameras, go to Priroda
5	5	1	1	0	Equipment check; lens, filter, batteries, databack-on. film, window conditions
5	5	1	1	0	Activate KFA-1000 and image selected Earth sites
8	8	1	1	0	Go to window, note GMT, location, check information, and photograph Earth
5	5	1	1	0	Record data acquisition and downlink data/info
2	2	1	1	0	Restow cameras

8. Data Processing:

1. Data downlink from Priroda sensors required.
2. Possible beta camcorder downlink after data takes, to be decided on a case by case basis.
3. Communication with crew prior to data takes to plan earth view weather opportunities.
4. Ground data processing (both digital data and film) required.
5. Air-to-Ground voice communications may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 700011 **Exp. ID:** EO5 **Russian ID:** Test

Invest. Title: Test Site Monitoring

Prime ☒
Contingent ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:EO:I:12

Session Type: Inflight

2. Session: NASA - Global Test Site Monitoring/Priroda Data Acquisition

3. Session Timeline: **Crewtime Usage (mins):** 0 **Session Time (mins):** 0

Scheduled Days: FD 10, 11, 38, 39, 66, 67, 90, 91, 122, 123

4. Session Scenario:

Priroda sensors (MOMS, MSU-SK, MSU-E) are activated and data recorded.

Sites are (please see table):

Priority	Target Coordinates Lat/Long	Target Description	Acceptable Parallax	Sun/Moon Lighting Constraints	Season Impact
High	31/-97, 31/-89, 28/-89, 25/-99	Texas-Louisiana Gulf Coast	Sensors: Nadir	Less than 30% cloud cover. Greater than 20 degree sun angle.	Sensors: seasonal data required.
High	28/-84, 28/-77, 23/-75, 23/-83	S. Florida - N. Bahamas	Sensors: Nadir	Less than 30% cloud cover. Greater than 20 degree sun angle.	Sesnors: seasonal data required.
High	10/-82, 10/-77, 7/-77, 7/-82	Panama Canal Zone	Sensors: Nadir	Less than 40% cloud cover. Greater than 20 degree sun angle.	Sensors: seasonal data required.
High	47/57, 47/64, 43/64, 43/57	Aral Sea	Sensors:Nadir	Less than 30% cloud cover. Greater than 20 degree sun angle.	Sensors: seasonal data required.

5. Session Constraints:

1. Session must be performed in conjunction with "NASA - Global Test Site Monitoring/Priroda Data Acquisition". Coordination with ground controllers is necessary.
2. Session performed once every 4 weeks for each site.
3. Imagery acquisition must be coordinated with astronaut photography so as to occur simultaneously.
4. Sessions are time placeholders. Actual date, time and length of session to be determined real-time with station orientation information and Earth orbits known.
5. Since 4 sites are scattered, successive days are used as placeholders for each clump.
6. <= 30% cloud cover, >20 degrees sun angle required.
7. Earth viewing attitude required for sensors.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820341	Priroda Earth Observation Sensors	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
0	0	1	0	0	No crewtime charged. Ground-based commanding of sensors only.

8. Data Processing:

1. Data downlink/commanding from Priroda sensors required.
2. Ground data processing (both digital data and film) required.
3. Requires Earth viewing atitude for sensors and windows.
4. Sensor data recorded using ground-based media.

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Investigation ID: 810525 **Experiment ID:** EO9 **Russian ID:** Obs

Investigation Title: Visual Earth Observations

US Investigators: Evans, Cynthia; Lulla, Kamlesh

Russian Investigators: Desinov, Lev

Other Investigators: TBD

Payload Category: ES **Sub-Cat.:** EO **Subjects Requested:**

Description: This experiment is designed for routine monitoring of the Earth from space using astronaut and cosmonaut observations and photography. Earth photography will be time-tagged with camera databacks and logged on an Earth observations electronic file. The continuous presence in low-Earth orbit will allow for continual observations of jointly selected sites to document geologic structures using variable sun angles, seasonal events like biomass burning, longer-term changes like the rise and fall of lake levels, gradual changes in land-use patterns, dyamic patterns in the ocean surface waters and globally-distributed episodic events like tropical storms, floods, forest fires, volcanic eruptions and dust storms. Sites selection will be based on longer-term planning of known regions of interest, and near term replanning of targets based on current events, weather patterns and trajectory and attitude information.

Communication with the crew about new sites will occur weekly, but special events will be requested in real-time. The film-based data will be exchanged with Russian counterparts, and screened and archived by both sides.

Science Objectives: 1. Monitor changes observable on Earth's surface, and image ephemeral events (hurricanes, plankton blooms, volcanic eruptions) to complement 30+ year databse of human observations.

Functional Objectives: 1. Astronauts & cosmonauts use onboard camera and imaging systems to document global events and changes.

Sample Transfer Rqd: No **Hardware Transfer Rqd:** Yes

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
2	Mir 21	2/21/96	☒	☒
2	NASA 2	3/22/96	☒	☒
2	STS 74 (SM-02)	11/12/95	☒	☒
2	STS 76 (SM-03)	3/22/96	☒	☒
3	Mir 22	8/17/96	☒	☒
3	NASA 3	9/16/96	☒	☒
3	STS 79 (SM-04)	9/16/96	☒	☒
4	Mir 23	2/2/97	☒	☒
4	NASA 4	1/16/97	☒	☒
4	STS 81 (SM-05)	1/16/97	☒	☒
5	Mir 24	6/24/97	☒	☒
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	Mir 25	12/12/97	☒	☒
6	NASA 6	9/18/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒
7	Mir 26	5/30/98	☒	☒
7	NASA 7	1/15/98	☒	☒
7	STS 89 (SM-08)	1/15/98	☒	☒
7	STS 91 (SM-09)	5/29/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
OPS	SHR	Flight	390043	Camcorder System (NASA)
OPS	SHR	Flight	390071	Diskettes
OPS	SHR	Flight	410037	MIR Interface to Payload Systems-2 (MIPS-2)
OPS	SHR	Flight	510010	35mm film w/container
OPS	SHR	Flight	810233	Hasselblad 70-mm Camera System (NASA)
ES	SHR	Flight	810236	Nikon F3 Camera System
SHR9	SHR	Flight	820431	MIPS-2L Laptop
ES	EO	Flight	840379	Payload General Support Computer (PGSC)

SHR	EO	Flight	840408	70 mm Camera Bag
ES	EO	Flight	847723	70 mm film
SHR	SHR	Flight	848745	Magneto Optical Cartridge (MIPS)
ES	SHR	Flight	852162	Nikon F4 Camera (STS)
ES	SHR	Flight	852163	Camcorder (STS)
ES	SHR	Flight	852164	Hasselblad 70-mm Camera System (STS)
ES	SHR	Flight	852165	Betacam (Russian)
ES	SHR	Flight	852172	Nikon F4 Camera (ESA)
ES	EO	Flight	854842	Earth Observation Floppy
ES	EO	Flight	854843	Film Test Package

Mission: Mir 24 **Invest. ID:** 810525 **Exp. ID:** EO9 **Russian ID:** Obs

Invest. Title: Visual Earth Observations

Prime ☑
Contingent ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:EO:P:14

Session Type: Training

2. Session: 70mm EQ (Hasselblad Training)

3. Session Timeline: **Crewtime Usage (mins):** 360 **Session Time (mins):** 180

Scheduled Days: L- 180

4. Session Scenario:
Crew is introduced to basic workings of the photographic hardware (Hasselblad) and differences between Russian & NASA cameras. Film reloading and data module programming included.

5. Session Constraints:
1. Classroom with projection equipment.
2. Training session is not specific to Earth observation.
3. Scheduled day can be anytime from L- 10 to L-4 months.
4. Training for cosmonaut (receives all camera hardware training) + US astronaut.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
810233	Hasselblad 70-mm Camera System (NASA)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	60	1	2	0	Introduction to Hasselblad
60	60	1	2	0	Databacks, film change, spotmeter
60	60	1	2	0	Hands-on training

8. Data Processing:
1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 810525 **Exp. ID:** EO9 **Russian ID:** Obs

Invest. Title: Visual Earth Observations

Prime ☑
Contingent ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:EO:P:18

2. Session: Earth Observations Photo Techniques-2

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 120

Scheduled Days: L- 90

4. Session Scenario:

Crew review photo techniques for documenting various Earth features. This session includes spot meter operations and exposure adjustments.

5. Session Constraints:

1. Classroom with projection facilities.
2. Training for cosmonaut on all camera hardware and US astronaut.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
410037	MIR Interface to Payload Systems-2 (MIPS-2)	1
810233	Hasselblad 70-mm Camera System (NASA)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	120	1	2	0	Review techniques specific for imaging Earth

8. Data Processing:

1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 810525 **Exp. ID:** EO9 **Russian ID:** Obs

Invest. Title: Visual Earth Observations

Prime ☑
Contingent ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:EO:P:19

Session Type: Training

2. Session: Earth Observation Sites - 1

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 120

Scheduled Days: L- 90

4. Session Scenario:
Geographic recognition of sites, primer on recognition of important Earth processes, discussion of frequency, techniques and data recording.

5. Session Constraints:
1. Access to projecting equipment.
2. Session can be scheduled anytime from L- 8 to L-3 months.
3. Training for cosmonaut and astronaut receiving camera training.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	120	1	2	0	Review geography of northern hemisphere, focus on sites of interest and general phenomena they represent.

8. Data Processing:
1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 810525 **Exp. ID:** EO9 **Russian ID:** Obs

Invest. Title: Visual Earth Observations

Prime ☒
Contingent ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:EO:P:20

Session Type: Training

2. Session: Earth Observation Sites - 2

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 120

Scheduled Days: L- 90

4. Session Scenario:
Geographic recognition of sites, primer on recognition of important Earth processes, discussion of frequency, techniques and data recording, review of real-time communications.

5. Session Constraints:
1. Access to projecting equipment.
2. Scheduling should occur as close to Earth Observation Sites - 1 as possible (L-8 to L-3 months).
3. Training for cosmonaut & astronaut receiving camera hardware training.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	120	1	2	0	Review geography of southern hemisphere, study regions and processes at chosen target sites.

8. Data Processing:
1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 810525 **Exp. ID:** EO9 **Russian ID:** Obs

Invest. Title: Visual Earth Observations

Prime ☒
Contingent ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:EO:P:22

Session Type: Training

2. Session: Photo Skills-2

3. Session Timeline: **Crewtime Usage (mins):** 360 **Session Time (mins):** 180

Scheduled Days: L- 90

4. Session Scenario:
Crew members practice photo skills, including film reloading and databack programming.

5. Session Constraints:
1. Session to be scheduled mid-day for outdoor photography.
2. Training session is not specific to Earth observations.
3. Session should occur between L-4 and L-2 months.
4. Training for cosmonaut receiving training and US astronaut.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
410037	MIR Interface to Payload Systems-2 (MIPS-2)	1
810233	Hasselblad 70-mm Camera System (NASA)	1
810236	Nikon F3 Camera System	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	60	1	1	0	Reload film and data module programme
120	120	1	2	0	Photography session

8. Data Processing:
1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 810525 **Exp. ID:** EO9 **Russian ID:** Obs

Invest. Title: Visual Earth Observations

Prime ☒
Contingent ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:EO:P:23

2. Session: Earth Science Software

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 270

4. Session Scenario:

Crew members review and practice on orbit software (Win SPOC) and data recording.

5. Session Constraints:

1. Session is not time dependent, but should occur with set of Earth Science training sessions.
2. Training for astronaut.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
410037	MIR Interface to Payload Systems-2 (MIPS-2)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	60	1	1	0	Review software

8. Data Processing:

1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 810525 **Exp. ID:** EO9 **Russian ID:** Obs

Invest. Title: Visual Earth Observations

Prime ☒
Contingent ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:EO:P:24

Session Type: Training

2. Session: 35 mm EQ review

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 120

Scheduled Days: L- 90

4. Session Scenario:
Crew members review 35 mm equipment and equipment interface

5. Session Constraints:
1. Mir station mock-up to demonstrate interfaces.
2. Training session is not specific to Earth observations.
3. Session should occur between L-4 and L-2 months.
4. Training for astronaut and cosmonaut.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
810236	Nikon F3 Camera System	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	120	1	2	0	Review interfaces to Mir station

8. Data Processing:
1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 810525 **Exp. ID:** EO9 **Russian ID:** Obs

Invest. Title: Visual Earth Observations

Prime ☒
Contingent ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:EO:P:25

Session Type: Training

2. Session: 70 mm EQ review

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 120

Scheduled Days: L- 90

4. Session Scenario:
Crew members review 70 mm equipment, film reloading, data recording and data module programming.

5. Session Constraints:
1. Session should occur between L-4 and L-2 months.
2. Training for astronaut and cosmonaut.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
410037	MIR Interface to Payload Systems-2 (MIPS-2)	1
810233	Hasselblad 70-mm Camera System (NASA)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	120	1	2	0	Review 70 mm equipment

8. Data Processing:
1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 810525 **Exp. ID:** EO9 **Russian ID:** Obs

Invest. Title: Visual Earth Observations

Prime ☒
Contingent ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:EO:P:26

2. Session: Camcorder Review

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 120

Scheduled Days: L- 90

4. Session Scenario:
Crew members review camcorder ops.

5. Session Constraints:
1 Training session is not specific to Earth observations.
2. Session should occur between L-4 and L-2 months.
3. Training for astronaut and cosmonaut.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	120	1	2	0	Review camcorder Ops

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 810525 **Exp. ID:** EO9 **Russian ID:** Obs

Invest. Title: Visual Earth Observations

Prime ☒
Contingent ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:EO:P:14

Session Type: Training

2. Session: 70mm EQ (Hasselblad Training)

3. Session Timeline: **Crewtime Usage (mins):** 360 **Session Time (mins):** 180

Scheduled Days: L- 210

4. Session Scenario:
Crew is introduced to basic workings of the photographic hardware (Hasselblad) and differences between Russian & NASA cameras. Film reloading and data module programming included.

5. Session Constraints:
1. Classroom with projection equipment.
2. Training session is not specific to Earth observation.
3. Scheduled day can be anytime from L- 10 to L-4 months.
4. Training for cosmonaut (receives all camera hardware training) + US astronaut.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
810233	Hasselblad 70-mm Camera System (NASA)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	60	1	2	0	Introduction to Hasselblad
60	60	1	2	0	Databacks, film change, spotmeter
60	60	1	2	0	Hands-on training

8. Data Processing:
1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 810525 **Exp. ID:** EO9 **Russian ID:** Obs

Invest. Title: Visual Earth Observations

Prime ☒
Contingent ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:EO:P:18

Session Type: Training

2. Session: Earth Observations Photo Techniques-2

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 120

Scheduled Days: L- 120

4. Session Scenario:
Crew review photo techniques for documenting various Earth features. This session includes spot meter operations and exposure adjustments.

5. Session Constraints:
1. Classroom with projection facilities.
2. Training for cosmonaut on all camera hardware and US astronaut.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
410037	MIR Interface to Payload Systems-2 (MIPS-2)	1
810233	Hasselblad 70-mm Camera System (NASA)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	120	1	2	0	Review techniques specific for imaging Earth

8. Data Processing:
1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 810525 **Exp. ID:** EO9 **Russian ID:** Obs

Invest. Title: Visual Earth Observations

Prime ☑
Contingent ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:EO:P:19

Session Type: Training

2. Session: Earth Observation Sites - 1

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 120

Scheduled Days: L- 120

4. Session Scenario:

Geographic recognition of sites, primer on recognition of important Earth processes, discussion of frequency, techniques and data recording.

5. Session Constraints:

1. Access to projecting equipment.
2. Session can be scheduled anytime from L- 8 to L-3 months.
3. Training for cosmonaut and astronaut receiving camera training.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	120	1	2	0	Review geography of northern hemisphere, focus on sites of interest and general phenomena they represent.

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 810525 **Exp. ID:** EO9 **Russian ID:** Obs

Invest. Title: Visual Earth Observations

Prime ☑
Contingent ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:EO:P:20

Session Type: Training

2. Session: Earth Observation Sites - 2

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 120

Scheduled Days: L- 120

4. Session Scenario:
Geographic recognition of sites, primer on recognition of important Earth processes, discussion of frequency, techniques and data recording, review of real-time communications.

5. Session Constraints:
1. Access to projecting equipment.
2. Scheduling should occur as close to Earth Observation Sites - 1 as possible (L-8 to L-3 months).
3. Training for cosmonaut & astronaut receiving camera hardware training.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	120	1	2	0	Review geography of southern hemisphere, study regions and processes at chosen target sites.

8. Data Processing:
1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 810525 **Exp. ID:** EO9 **Russian ID:** Obs

Invest. Title: Visual Earth Observations

Prime ☒
Contingent ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:EO:P:22

2. Session: Photo Skills-2

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 360 **Session Time (mins):** 180

Scheduled Days: L- 120

4. Session Scenario:

Crew members practice photo skills, including film reloading and databack programming.

5. Session Constraints:

1. Session to be scheduled mid-day for outdoor photography.
2. Training session is not specific to Earth observations.
3. Session should occur between L-4 and L-2 months.
4. Training for cosmonaut receiving training and US astronaut.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
410037	MIR Interface to Payload Systems-2 (MIPS-2)	1
810233	Hasselblad 70-mm Camera System (NASA)	1
810236	Nikon F3 Camera System	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	60	1	1	0	Reload film and data module programme
120	120	1	2	0	Photography session

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 810525 **Exp. ID:** EO9 **Russian ID:** Obs

Invest. Title: Visual Earth Observations

Prime ☒
Contingent ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:EO:P:23

Session Type: Training

2. Session: Earth Science Software

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 300

4. Session Scenario:
Crew members review and practice on orbit software (Win SPOC) and data recording.

5. Session Constraints:
1. Session is not time dependent, but should occur with set of Earth Science training sessions.
2. Training for astronaut.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
410037	MIR Interface to Payload Systems-2 (MIPS-2)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	60	1	1	0	Review software

8. Data Processing:
1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 810525 **Exp. ID:** EO9 **Russian ID:** Obs

Invest. Title: Visual Earth Observations

Prime ☒
Contingent ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:EO:P:24

2. Session: 35 mm EQ review

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 120

Scheduled Days: L- 120

4. Session Scenario:
Crew members review 35 mm equipment and equipment interface

5. Session Constraints:
1. Mir station mock-up to demonstrate interfaces.
2. Training session is not specific to Earth observations.
3. Session should occur between L-4 and L-2 months.
4. Training for astronaut and cosmonaut.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
810236	Nikon F3 Camera System	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	120	1	2	0	Review interfaces to Mir station

8. Data Processing:
1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 810525 **Exp. ID:** EO9 **Russian ID:** Obs

Invest. Title: Visual Earth Observations

Prime ☒
Contingent ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:EO:P:25

Session Type: Training

2. Session: 70 mm EQ review

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 120

Scheduled Days: L- 120

4. Session Scenario:
Crew members review 70 mm equipment, film reloading, data recording and data module programming.

5. Session Constraints:
1. Session should occur between L-4 and L-2 months.
2. Training for astronaut and cosmonaut.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
410037	MIR Interface to Payload Systems-2 (MIPS-2)	1
810233	Hasselblad 70-mm Camera System (NASA)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	120	1	2	0	Review 70 mm equipment

8. Data Processing:
1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 810525 **Exp. ID:** EO9 **Russian ID:** Obs

Invest. Title: Visual Earth Observations

Prime ☑
Contingent ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:EO:P:26

Session Type: Training

2. Session: Camcorder Review

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 120

Scheduled Days: L- 120

4. Session Scenario:
Crew members review camcorder ops.

5. Session Constraints:
1 Training session is not specific to Earth observations.
2. Session should occur between L-4 and L-2 months.
3. Training for astronaut and cosmonaut.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	120	1	2	0	Review camcorder Ops

8. Data Processing:
1. N/A for preflight sessions.

Mission: STS 84 (SM-06) **Invest. ID:** 810525 **Exp. ID:** EO9 **Russian ID:** Obs

Invest. Title: Visual Earth Observations

Prime ☒
Contingent ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:LOG:I:2

Session Type: Up Item

2. Session: Earth Sciences Logistics Transfer - Visual Earth Observations & Test Site Monitoring

3. Session Timeline: **Crewtime Usage (mins):** 27 **Session Time (mins):** 27

Scheduled Days: FD 7

4. Session Scenario:
Film, data tapes/disks and hardware are transferred from Shuttle to Mir and stowed.

5. Session Constraints:
1. New ES equipment (film, etc) will be in camera bags.
2. Session accounts for resupply items for both Visual Earth Obs and Test Site Monitoring.
3. To maximize crew time, this session should be performed in conjunction with Earth Sciences Logisitcs Transfer, Down Item or other Down Item sessions.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840408	70 mm Camera Bag	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
2	2	1	1	0	Unstow 70 mm camera bag for transfer to Mir
10	10	1	1	0	Go to TBD Mir module
5	5	1	1	0	Stow ES 70 mm camera bag in Mir locker
10	10	1	1	0	Return to Shuttle

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 810525 **Exp. ID:** EO9 **Russian ID:** Obs

Invest. Title: Visual Earth Observations **Prime** ☒ **Contingent** ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:EO:I:37

2. Session: Earth Observations for Visual Earth Observations & Test Site Monitoring **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60, 64, 68, 72, 76, 80, 84, 88, 92, 96, 100, 104, 108, 112, 116, 120, 124, 128, 132

4. Session Scenario:

Specific Earth features or phenomena are observed and photographed. Data (date,time,camera, camera settings, film) are recorded on ES diskette containing ES files.

Texas-Louisiana Gulf Coast
Goals: landuse, features in inland and coastal waters (e.g.sediment plumes, turbidity, oil seeps)

S. Florida-N.Bahamas
Goals: Landuse, coastal features (algae growth, turbidity, whitings)

Panama Canal Zone
Goals: Changing forest cover, lake levels and lake sediment

Aral Sea
Goals: Water levels, dust, agriculture

Pinatubo, Philippines
Goals: Mudflows

S. Luzon, Philippines
Goals: Volcanoes, landuse

Rabaul New Britain
Goals: Volcano, floating pumice

New Zealand
Goals: Volcanoes, landuse, snowfields, faults

Kamchatka
Goals: Volcanoes

Lake Baikal
Goals: Forest cover, landuse, water features, ice cover

Sea of Azov
Goals: Sediment/pollution plumes, water color, coastal landuse

Kiev, Chernobyl, Dniepr
Goals: radiation, industrial impact on environment

Russian/Ukraine Agriculture

Goals: Environmental impact

Caspian Sea
Goals: Water levels, flooded region

S. Urals
Goals: Industrial cities, environmental impact

Siberia
Goals: Environmental impacts, forest health

Pamirs
Goals: Snow levels, structures

Tian Shan
Goals: Snow levels, structures

Lower Nile
Goals: Water levels, shoreline changes, dust

Fourth Cataract, Nile
Goals: Water levels, shoreline changes, dust

Upper Nile
Goals: Water levels, shoreline changes, dust

Lake Chad
Goals: Water level, dust

Cascade Mountains
Goals: Volcanoes (Mt St. Helens, Ranier), landuse, logging

Great Salt Lake
Goals: Water level, snow pack

NE U.S. Urban Region
Goals: Urban regions, smog

Great Lakes
Goals: Landuse, urban areas, lake features

S. Amazon Basin
Goals: Landuse, forest conversion, fires and smoke

Central Andes
Goals: Volcanic activity, lake levels, dust

S. Andes
Goals: Snow levels, volcanoes

Gulf Stream
Goals: Water color, current boundary, eddies

Pacific Ocean equatorial fronts
Goals: Equatorial fronts (water boundaries)

Arabian Sea
Goals: Plankton blooms, currents, boundaries, ship traffic

Karakoram Mountains
Goals: snow pack, glacier movement

Altai
Goals: landuse, structures

Voronezh
Goals: landuse, environment monitoring

Niger River – Inland Delta
Goals: vegetation cover, water levels

Okavango swamp, NS Botswana
Goals: vegetation cover, landuse, fires

Sudd Swamp, Sudan
Goals: water levels, irrigation line, monitor agriculture and landuse

Central Namibian Coast
Goals: dust plumes, fog banks, coastal changes, offshore plankton blooms

Betsiboka River Delta, Madagascar
Goals: Erosion, sediment plumes, delta progradation

Omo Delta, Kenya
Goals: Delta growth, vegetation cover, water levels

Southern Great Plains (Oklahoma and Texas)
Goals: Drought conditions, agriculture, storm systems

S. African Industrial Core
Goals: landuse changes, smog palls

Mexico City
Goals: smog, volcanic activity, archeological sites

Belize
Goals: archeological sites, coastal processes

Leyte Gulf, Philippines
Goals: ocean structures like internal waves, suloys

Kuroshio/Oyashio Currents
Goals: ocean structures like current boundaries, frontal systems, plankton blooms

Falkland Current
Goals: ocean structures like current boundaries, frontal systems, plankton blooms

Gulf of Venizia
Goals: ocean structures like internal waves, eddies

Altai Mountains
Goals: landuse, forest health, fires

Danube Delta
Goals: Delta vegetation, landuse and development, coastal features

Yellow R, Delta/Beijing region
Goals: shoreline changes, landuse, smog

Sichuan Basin, China
Goals: landuse, smog palls
Additional site information (please see table):

Priority	Target Coordinates Lat/Long	Target Description	Acceptable Parallax	Sun/Moon Lighting Constraints	Season Impact
	54/83, 51/95, 45/95, 50/79	Altai		Less than 30% cloud cover. Greater than 20 degree sun angle.	Seasonal
	49.0/87.0	Altai Mountains	Nadir-low oblique	Less than 30% cloud cover. Greater than 20 degree sun angle.	
	20/60, 20/67, 17/70, 17/55	Arabian Sea	Near nadir low oblique	Less than 30% cloud cover. Greater than 20 deg sun angle. May require sunglint.	Seasonal
	47/57, 47/64, 43/64, 43/57	Aral Sea	Nadir-Low oblique. Detailed views of the shorelines, as well as landuse in the river valleys. Dynamic events like dust storms may require more oblique viewing angles	Less than 30% cloud cover. Greater than 20 deg sun angle	Sensors: seasonal data required. Photography: More frequent observations desired
	17.5/-88.75	Belize	Nadir-low oblique	Less than 30% cloud cover. Greater than 20 degree sun angle.	
	-16.0/46.5	Betsiboka R. Delta, Madagascar	Nadir-low oblique	Less than 30% cloud cover. Greater than 20 degree sun angle.	
	50/-124, 50/-120, 41/-120, 41/-124	Cascade Mountains	Near nadir	Less than 30% cloud cover. Greater than 20 deg sun angle	Seasonal
	47/46, 47.5/54, 36/54, 36/48	Caspian Sea	Near nadir-low oblique	Less than 30% cloud cover. Greater than 20 degree sun angle.	Seasonal. CIR in summer/high sun
	-18/-72. -18/-57, 28/-57, -28/-72	Central Andes	Near nadir low oblique	Less than 30% cloud cover. Greater than 20 deg sun angle	Seasonal. More frequent observations for volcanic activity
	-25.0/16.0	Central Namibian Coast	Nadir-low oblique	Less than 30% cloud cover. Greater than 20 degree sun angle.	
	45.0/29.0	Danube Delta	Nadir-low oblique	Less than 30% cloud cover. Greater than 20 degree sun angle.	
	-46.0/-60.0\	Falkland current	Nadir-low oblique	Less than 30% cloud cover. Greater than 20 degree sun angle.	
	17.5N/31E, 18.5N/31E, 19.5N/33E, 18.5N/33E	Fourth Cataract, Nile	Nadir	Sun angle>20 deg. less than 30% cloud cover.	Seasonal. May request more frequent observations for dust storms, smoke. etc.

49/-93, 47/-75, 42/-75, 41/-80, 41/-90	Great Lakes	Near nadir low oblique	Less than 30% cloud cover. Greater than 20 deg sun angle	Seasonal.
43/-114, 43/-111, 40/-111, 40/114	Great Salt Lake	Near nadir low oblique	Less than 30% cloud cover. Greater than 20 deg sun angle.	Seasonal.
45.25/13.0	Gulf of Venizia, Mediterranean	Nadir-low oblique	Less than 30% cloud cover. Greater than 20 degree sun angle	
37/-75, 37/-71, 33/-75, 33/-79	Gulf Stream	Near nadir low oblique	Less than 30% cloud cover. Greater than 20 deg sun angle. May require sunglint.	Seasonal.
N/A	Informal window survey		When Earth view not available: dark and light suns.	
57/155, 57/164, 50/157, 50/155	Kamchatka	Near nadir oblique	Less than 30% cloud cover. Greater than 20 deg sun. May request more frequent observations if volcanic activity occurs. A variety of sun angles will highlight structures.	Seasonal.
38/74, 34/80, 33/80, 33/74	Karakoran Mountains	Near nadir low oblique	Less than 30% cloud cover. Greater than 20 deg sun angle	Seasonal.
51/30, 50/34, 48/32	Kiev, Chernobyl, Dniepr	Near nadir	Less than 30% cloud cover. Greater than 20 deg sun angle	Seasonal. CIR with high sun in summer
41.0/152.5	Kuroshio/Oyashi Currents	Nadir-low oblique	Less than 30% cloud cover. Greater than 20 degree sun angle.	
57/107, 57/110, 51/106, 51/103	Lake Baikal	Near nadir. Nadir-low oblique	Less than 30% cloud cover. Greater than 20 deg sun angle	Seasonal. CIR only in Summer, with high sun.
15/12, 15/16, 12/16, 12/12	Lake Chad	Near nadir	Less than 30% cloud cover. Greater than 20 degree sun angle	Seasonal. May request more frequent observations for dust, unusual rainfall events.
10.5/126.0	Leyte Gulf, Philippines	Nadir-low oblique	Less than 30% cloud cover. Greater than 20 degree sun angle	
32/30, 32/33, 20/33, 20/30	Lower Nile	Nadir	Sun angle >20 deg. less than 30% cloud cover	Seasonal. May request more frequent observations for duststorms, smoke, etc.
19.5/-98.8	Mexico City	Nadir-low oblique	Less than 30% cloud cover. Greater than 20 degree sun angle.	
43/-78, 43/-70, 37/-76, 37/-84	NE U.S. urban region	Near nadir low oblique	Less than 30% cloud cover. Greater than 20 deg sun angle.	Seasonal. Oblique views of regional features (smog palls, etc.)
-34/172, -37/179, -47/164, -46/170	New Zealand	Near nadir-low oblique	Less than 30% cloud cover. Greater than 20 deg sun angle.	Use 250 mm(detailed) and 100mm(wide) seasonal coverage
16.0/3.25	Niger River Inland Delta	Nadir-low oblique	Less than 30% cloud cover. Greater than 20 degree sun angle	
4.5/36.0	Omo Delta, Kenya, Okvango Swamp	Nadir-low oblique	Less than 30% cloud cover. Greater than 20 degree sun angle.	

10/-160, 10/-130, -5/-130, -5/-160	Pacific Ocean equatorial fronts	Near nadir low oblique	Less than 30% cloud cover. Greater than 20 deg sun angle. May require sunglint.	Seasonal.
40/68, 40/75, 35/75, 35/65	Pamirs	Near nadir low oblique	Less than 30% cloud cover. Greater than 20 deg sun angle.	Seasonal. Focus on ends of glaciers. Use variable sun to highlight structure.
10/-82, 10/-77, 7/-77, 7/-82	Panama Canal Zone	Nadir-Low oblique	Cloud cover is always a problem, so constraints are loosened to obtain data. Less than 40% cloud cover. Greater than 20 deg sun angle	Sensors: seasonal data required, Photography: More frequent observations desired.
16/120.5, 16/119.0, 14/119.0, 14/120.5	Pinatubo, Philippines	Nadir-Low oblique. Images during any clear pass when viewing angle less than 30 degrees.	Less than 30% cloud cover. Greater than 20 deg sun angle. Both wide views and detailed views are important to document changes. CIR views if cloud cover <15%.	Baseline photos during dry season (Jan-April), and as frequent as weather allows during rainy season (June-Oct).
-4.3/152	Rabaul New Britain	Near nadir	Less than 30% cloud cover. Greater than 20 deg sun angle	As frequently as weather and flight parameters allow.
52/35, 52/46, 47/40, 47/35	Russian/Ukraine agriculture	Near nadir.	Less than 30% cloud cover. Greater than 20 deg sun angle	Seasonal. CIR in summer, specific regions of focus to be defined.
-27.5/28.0	S. African Industrial Core	Nadir-low oblique	Less than 30% cloud cover. Greater than 20 degree sun angle.	
-5/-73, -2/-55, -15/-55, -15/-68	S. Amazon Basin	Near nadir low oblique	More frequent observations if unusually clear or to obtain images of smoke.	
-40/-75, -40/-69, -55/-65, -55/-76	S. Andes	Near nadir low oblique	Less than 30% cloud cover. Greater than 20 deg sun angle	Seasonal. More frequent observations for volcanic activity.
28/-84, 28/-77, 23/-75, 23/-83	S. Florida-N. Bahamas	Nadir-Low oblique	Less than 30% cloud cover. Greater than 20 deg sun angle.	More frequent observations may be requested if special weather or ground shift occurrences warrant study. Sensors: seasonal data required. Photography: More frequent observations desired.
35.0/-95.5	S. Great Plains, OK and TX	Nadir-low oblique	Less than 30% cloud cover. Greater than 20 degree sun angle.	
14.5/122, 14.5/125, 12/125, 12/122	S. Luzon, Philippines	Nadir-Low oblique	Less than 30% cloud cover. Greater than 20 degree sun angle. Because this site encompasses regions of landuse change, CIR is more important	
54/55, 54/60, 51/60, 51/55	S. Urals	Near nadir	Less than 30% cloud cover. Greater than 20 deg sun angle.	Seasonal. CIR in summer/high sun.

47/34, 48/40, 45/40, 44/34	Sea of Azov	Near nadir.	Less than 30% cloud cover. Greater than 20 deg sun angle.	Seasonal.
55/60, 55/80, 50/80, 50/60	Siberia	Near nadir low oblique	Less than 30% cloud cover. Greater than 20 deg sun angle	Seasonal.
30.0/104.0	Sichuan Basin	Low to high oblique	Less than 30% cloud cover. Greater than 10 degree sun angle.	
8.0/31.6	Sudd Swamp	Nadir-low oblique	Less than 30% cloud cover. Greater than 20 degree sun angle.	
31/-97, 31/-89, 28/-89, 25/-99	Texas-Louisiana Gulf Coast	Nadir views preferred, but low obliques are acceptable. Wide views for sediment plumes in Gulf of Mexico.	Less than 30% cloud cover. Greater than 20 deg sun angle.	Sensors: seasonal data required. Photography: More frequent observations may be requested during winter storm season, or during and after summer tropical storms.
46/81, 41/81, 40/75, 40/69	Tian Shan	Near nadir low oblique	Less than 30% cloud cover. Greater than 20 deg sun angle.	Seasonal. Focus on ends of glaciers. Use variable sun to highlight structure.
14/32, 14/34, 19/32, 19/34	Upper Nile	Near nadir	Less than 30% cloud cover. Greater than 20 deg sun angle.	Seasonal. May request more frequent observations for dust storms, smoke, etc.
51/38.5, 52/38.5, 54/40, 51/40	Voronezh	Near nadir low oblique	Less than 30% cloud cover. Greater than 20 deg sun angle	Seasonal.
39.0/117.0	Yellow R. Delta Beijing	Nadir-low oblique	Less than 30% cloud cover. Greater than 20 degree sun angle.	
-19.5/23.0	Okavango Swamp	Nadir-low oblique	Less than 30% cloud cover. Greater that 20 degree sun angle.	

5. Session Constraints:

1. Session performed on the average of once a week throughout mission.
2. The specified times are only placeholders. The flight days and times of data acquisition will be determined when location (with respect to Earth) and station orientation are known, and when phenomena of interest are determined on a more real-time basis.
3. The times per session or sessions per day will change based upon real-time planning.
4. The observations constraints include: time of year, lighting, cloudiness, viewing angle
5. The following data will be verified 15 days, 4 days, and 24 hours (final) prior to data take:
   - Region & coordinates
   - Required attitude of station (distance & angles)
   - Cloudiness constraints
   - Equipment to be used
   - Number of crewmembers participating in observations
6. Sessions can be cancelled 24 hours prior to observations, based upon weather or other constraints.
7. Earth-viewing window required.
8. In the event of a catostrophic phenomena on the Earth, crewmembers, in real-time, will receive information by coordinates only, without accompanying descriptions.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1

390071	Diskettes	0.25
410037	MIR Interface to Payload Systems-2 (MIPS-2)	1
510010	35mm film w/container	0.5
810233	Hasselblad 70-mm Camera System (NASA)	1
810236	Nikon F3 Camera System	1
847723	70 mm film	0.5
852165	Betacam (Russian)	1
852172	Nikon F4 Camera (ESA)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
3	3	1	1	0	Unstow cameras
5	5	1	1	0	Equipment check: lens,filter, battery, data back on, window conditions
5	5	1	1	0	Check film (change if necessary)
3	3	1	1	0	Note GMT & location, check information
8	8	1	1	0	Photograph the Earth
2	2	1	1	0	Restow cameras
4	4	1	1	0	Record data on MIPS-2

8. Data Processing:

1. Possible camcorder downlink decided on a case by case basis.
2. Weekly downlink of photo log on PC.
3. Weekly communication with crew regarding upcoming sites, weather patterns, and ephemeral events.
4. Possible real-time communication for special events like volcanic eruptions.
5. Ground processing of film required.
6. Earth viewing attitude for window is mandatory.

Mission: NASA 5 **Invest. ID:** 810525 **Exp. ID:** EO9 **Russian ID:** Obs

Invest. Title: Visual Earth Observations

Prime ☒
Contingent ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:EO:I:38

Session Type: Inflight

2. Session: Data Transfer for Visual Observations

3. Session Timeline: **Crewtime Usage (mins):** 15 **Session Time (mins):** 15

Scheduled Days: FD 10, 17, 24, 31, 38, 45, 52, 59, 66, 73, 80, 87, 94, 101, 108, 115, 122, 129, 136, 143

4. Session Scenario:
Crew member downloads data to MIPS optical drive. Floppy is provided, if necessary.

5. Session Constraints:
1. Session timeline is a placeholder. Exact date of transfer is flexible. The desire is for this to occur roughly once per week.
2. These data are required upon landing for post-flight data analysis.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820431	MIPS-2L Laptop	1
848745	Magneto Optical Cartridge (MIPS)	1
854842	Earth Observation Floppy	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	1	0	Transfer electronic log text file to optical drive

8. Data Processing:
1. Text file, no data processing required.

Mission: STS 84 (SM-06) **Invest. ID:** 810525 **Exp. ID:** EO9 **Russian ID:** Obs

Invest. Title: Visual Earth Observations

Prime ☒
Contingent ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:EO:I:39

Session Type: Inflight

2. Session: Earth Observations On-Board Shuttle for Visual Earth Observations & Test Site Monitoring

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 1, 2, 3, 8, 9

4. Session Scenario:
Specific Earth features or phenomena are observed and photographed from Shuttle. Film and imaging devices are tested. Data (date, time, camera, camera settings, film) are recorded.

5. Session Constraints:
1. The sessions and specified times are only placeholders. The actual times of data acquisition will be determined when location (with respect to Earth) and station orientation are known, and when phenomena of interest are determined on a real-time basis.
2. The times per session or sessions per day will change based on real-time planning.
3. Session should be performed before Shuttle docking & after Shuttle undocking.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840379	Payload General Support Computer (PGSC)	1
852162	Nikon F4 Camera (STS)	1
852163	Camcorder (STS)	1
852164	Hasselblad 70-mm Camera System (STS)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
3	3	1	1	0	Unstow cameras/ film
2	2	1	1	0	Turn on databack, check film, filter, lens
15	15	1	1	0	Photograph and image Earth
5	5	1	1	0	Restow cameras
5	5	1	1	0	Record imaging data (location, conditions, camera settings)

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.
3. Ground processing of film required.

Mission: STS 86 (SM-07) **Invest. ID:** 810525 **Exp. ID:** EO9 **Russian ID:** Obs

Invest. Title: Visual Earth Observations

Prime ☒
Contingent ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:EO:I:39

Session Type: Inflight

2. Session: Earth Observations On-Board Shuttle for Visual Earth Observations & Test Site Monitoring

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 1, 2, 3, 8, 9

4. Session Scenario:
Specific Earth features or phenomena are observed and photographed from Shuttle. Film and imaging devices are tested. Data (date, time, camera, camera settings, film) are recorded.

5. Session Constraints:
1. The sessions and specified times are only placeholders. The actual times of data acquisition will be determined when location (with respect to Earth) and station orientation are known, and when phenomena of interest are determined on a real-time basis.
2. The times per session or sessions per day will change based on real-time planning.
3. Session should be performed before Shuttle docking & after Shuttle undocking.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840379	Payload General Support Computer (PGSC)	1
852162	Nikon F4 Camera (STS)	1
852163	Camcorder (STS)	1
852164	Hasselblad 70-mm Camera System (STS)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
3	3	1	1	0	Unstow cameras/ film
2	2	1	1	0	Turn on databack, check film, filter, lens
15	15	1	1	0	Photograph and image Earth
5	5	1	1	0	Restow cameras
5	5	1	1	0	Record imaging data (location, conditions, camera settings)

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.
3. Ground processing of film required.

Mission: STS 86 (SM-07) **Invest. ID:** 810525 **Exp. ID:** EO9 **Russian ID:** Obs

Invest. Title: Visual Earth Observations

Prime ☒
Contingent ☐

US PI: Evans, Cynthia; Lulla, Kamlesh **Russian PI:** Desinov, Lev

1. Session ID: ES:LOG:I:3

Session Type: Down Item

2. Session: Earth Sciences Logistics Transfer - Visual Earth Obs & Test Site Monitoring

3. Session Timeline: **Crewtime Usage (mins):** 35 **Session Time (mins):** 35

Scheduled Days: FD 5

4. Session Scenario:
Exposed film and data tapes/disks and hardware to be returned to Earth are transferred from the Mir to the Shuttle and stowed.

5. Session Constraints:
1. Exposed film and hardware to be returned will be in 70 mm camera bag.
2. Session accounts for return of down items for both Visual Earth Obs and Test Site Monitoring.
3. To maximize crew time, this session may be performed in conjunction with other Down Item sessions.
4. Film, once in Shuttle, should be stowed with exposed film for early return to Houston.
5. Camera system on Mir to be swapped with STS camera systems. No net change in weight/volume.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
810233	Hasselblad 70-mm Camera System (NASA)	1
840408	70 mm Camera Bag	3
854842	Earth Observation Floppy	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Go to Mir
10	10	1	1	0	Retrieve ES return items
10	10	1	1	0	Return to Shuttle
5	5	1	1	0	Stow ES return items

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

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Investigation ID: 890615 **Experiment ID:** E11 **Russian ID:** VObs

Investigation Title: Visual Observations

US Investigators: Lulla, Kamlesh; Saganti, Premkumar

Russian Investigators: Savchenko, Stanislav; Firsov, Ivan

Other Investigators:

Payload Category: ES **Sub-Cat.:** EO **Subjects Requested:**

Description: Window Survey of the Mir Complex

Science Objectives:

Functional Objectives:

Sample Transfer Rqd: No **Hardware Transfer Rqd:** No

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
5	Mir 24	6/24/97	☒	☒
5	NASA 5	5/15/97	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
OPS	SHR	Flight	510010	35mm film w/container
ES	SHR	Flight	810236	Nikon F3 Camera System

Mission: Mir 24 **Invest. ID:** 890615 **Exp. ID:** E11 **Russian ID:** VObs

Invest. Title: Visual Observations

Prime ☒
Contingent ☐

US PI: Lulla, Kamlesh; Saganti, Premkumar **Russian PI:** Savchenko, Stanislav; Firsov, Ivan

1. Session ID: ES:EO:P:31

Session Type: Preflight

2. Session: Training for the Investigation of the Optical Quality Degradation of the Russian Mir Complex Windows

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 120

4. Session Scenario:
Review of photographic acquisition procedures, lighting constraints, view angles, primers on aperture priority bracketing and camera usage.

5. Session Constraints:
none

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
810236	Nikon F3 Camera System	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	1	0	Review cue cards for acquisition procedure

8. Data Processing:

N/A

Mission: NASA 5 **Invest. ID:** 890615 **Exp. ID:** E11 **Russian ID:** VObs

Invest. Title: Visual Observations

Prime ☒
Contingent ☐

US PI: Lulla, Kamlesh; Saganti, Premkumar **Russian PI:** Savchenko, Stanislav; Firsov, Ivan

1. Session ID: ES:EO:P:31

Session Type: Preflight

2. Session: Training for the Investigation of the Optical Quality Degradation of the Russian Mir Complex Windows

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 120

4. Session Scenario:
Review of photographic acquisition procedures, lighting constraints, view angles, primers on aperture priority bracketing and camera usage.

5. Session Constraints:
none

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
810236	Nikon F3 Camera System	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	1	0	Review cue cards for acquisition procedure

8. Data Processing:

N/A

Mission: Mir 24 **Invest. ID:** 890615 **Exp. ID:** E11 **Russian ID:** VObs

Invest. Title: Visual Observations **Prime** ☒ **Contingent** ☐

US PI: Lulla, Kamlesh; Saganti, Premkumar **Russian PI:** Savchenko, Stanislav; Firsov, Ivan

1. Session ID: ES:EO:I:40

2. Session: Investigation of the Optical Quality Degradation of the Russian Mir Complex Windows **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 35 **Session Time (mins):** 35

Scheduled Days: FD 50, 60, 70, 80, 90

4. Session Scenario:

Hand held photography of specified window surfaces in the Kvant-2, Base block and Spektr modules is acquired using a Nikon F3 camera equipped with a 55 mm lens. During the daylight phase of the orbit, the outer pane of the window surface will be illuminated and photographed. Similarly, during the dark phase of the orbit, the inner pane of the window surface will be photographed with interior illumination. Each window will be photographed from 3 different view angles on both the dark and daylight phases. All photographs shall be bracketed at +/- 1 full stop.

Camera: Nikon F3
Lens: 55 mm
Film: 100 ASA color positive
Windows*: Kvant-2V, Base block #2, Base block #7, Base block #12, Spektr #1

* in order of priority

5. Session Constraints:

Access to specified windows
Access to control interior lighting
Scheduling should occur when specified window points away from earth for exterior lighting control.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
510010	35mm film w/container	5
810236	Nikon F3 Camera System	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
35	35	1	1	0	Review cue cards for acquisition procedure

8. Data Processing:

N/A

Mission: NASA 5 **Invest. ID:** 890615 **Exp. ID:** E11 **Russian ID:** VObs

Invest. Title: Visual Observations

Prime ☒
Contingent ☐

US PI: Lulla, Kamlesh; Saganti, Premkumar **Russian PI:** Savchenko, Stanislav; Firsov, Ivan

1. Session ID: ES:EO:I:40

Session Type: Inflight

2. Session: Investigation of the Optical Quality Degradation of the Russian Mir Complex Windows

3. Session Timeline: **Crewtime Usage (mins):** 35 **Session Time (mins):** 35

Scheduled Days: FD 50, 60, 70, 80, 90

4. Session Scenario:

Hand held photography of specified window surfaces in the Kvant-2, Base block and Spektr modules is acquired using a Nikon F3 camera equipped with a 55 mm lens. During the daylight phase of the orbit, the outer pane of the window surface will be illuminated and photographed. Similarly, during the dark phase of the orbit, the inner pane of the window surface will be photographed with interior illumination. Each window will be photographed from 3 different view angles on both the dark and daylight phases. All photographs shall be bracketed at +/- 1 full stop.

Camera: Nikon F3
Lens: 55 mm
Film: 100 ASA color positive
Windows*: Kvant-2V, Base block #2, Base block #7, Base block #12, Spektr #1

* in order of priority

5. Session Constraints:

Access to specified windows
Access to control interior lighting
Scheduling should occur when specified window points away from earth for exterior lighting control.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
510010	35mm film w/container	5
810236	Nikon F3 Camera System	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
35	35	1	1	0	Review cue cards for acquisition procedure

8. Data Processing:

N/A

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Fundamental Biology (FB)

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Detailed Investigation Descriptions - for: Res. Incr. 5

PIPS

9/6/96

Integrated Payload Requirements Document Res. Incr. 5

Investigation ID: 110047 **Experiment ID:** 698 **Russian ID:** Beetle

Investigation Title: Effects of Gravity on Insect Circadian Rhythmicity

US Investigators: Hoban-Higgins, Tana M.

Russian Investigators: Alpatov, Alexei M.

Other Investigators: Fuller, Charles A., Wassmer, Gary T., Rietveld, W.J.

Payload Category: FB **Sub-Cat.:** DEV **Subjects Requested:** 128

Description: The following hypotheses will be evaluated:

1. Exposure to microgravity alters the beetle Circadian Timing System (CTS). There will be an immediate change in period, amplitude and mean, followed by an adaptation to new steady-state levels.

2. Exposure to hyperdynamic fields via centrifugation alters the beetle CTS. There will be an immediate change in period, amplitude and mean, followed by an adaptation to new steady-state levels.

3. Exposure to microgravity will alter the relationship between endogenous CTS period and light intensity.

4. Exposure to hyperdynamic fields will alter the relationship between the endogenous CTS period and light intensity.

5. Exposure to microgravity changes the sensitivity of the beetle CTS to the phase shifting effects of light.

6. Exposure to hyperdynamic fields changes the sensitivity of the beetle CTS to the phase-shifting effect of light.

7. At Earth's gravity, exposure to acute pulses of 2G via centrifugation can phase shift the insect CTS.

Science Objectives:

Functional Objectives: 1. Beetle Kit Monitoring and Maintenance
a) may need to maintain the proper functioning of the beetle kit
b) need to verify Beetle kit power status every 7 days
c) need to ventilate Beetle kit every 7 days.

Sample Transfer Rqd: Yes **Hardware Transfer Rqd:** Yes

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
5	Mir 24	6/24/97	☒	☒
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
OPS	SHR	Flight	390043	Camcorder System (NASA)
SHR	SHR	Flight	840255	8mm Video Tape
OPS	SHR	Flight	854871	Priroda IFM Tool Kit
FB	DEV	Flight	855679	Beetle kit #1 (Includes Air Pump)
FB	DEV	Flight	855680	Beetle kit #2 (Includes Air Pump)
FB	DEV	Flight	855681	Beetle Experiment Logbook #1
FB	DEV	Flight	855682	Beetle Experiment Logbook #2
FB	DEV	Flight	855683	Beetle kit power cable

Mission: Mir 24 **Invest. ID:** 110047 **Exp. ID:** 698 **Russian ID:** Beetle

Invest. Title: Effects of Gravity on Insect Circadian Rhythmicity

Prime ☑
Contingent ☐

US PI: Hoban-Higgins, Tana M. **Russian PI:** Alpatov, Alexei M.

1. Session ID: FB:DEV:P:54

Session Type: Training

2. Session: Orientation: Effects of Gravity on Insect Circadian Rhythmicity (Mir Crew)

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 60

Scheduled Days: L- 180

4. Session Scenario:
This session will provide the crewmember with an overview of the scientific theory, design, and objectives of the Insect Circadian Rhythmicity experiment.

5. Session Constraints:
1. Session can be performed in conjunction with "Hardware Familiarization"

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	2	0	Classroom instruction

8. Data Processing:
1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 110047 **Exp. ID:** 698 **Russian ID:** Beetle

Invest. Title: Effects of Gravity on Insect Circadian Rhythmicity

Prime ☒
Contingent ☐

US PI: Hoban-Higgins, Tana M. **Russian PI:** Alpatov, Alexei M.

1. Session ID: FB:DEV:P:56

Session Type: Training

2. Session: Hardware Familiarization: Effects of Gravity on Insect Circadian Rhythmicity (Mir Crew)

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 60

Scheduled Days: L- 180

4. Session Scenario:
This session will provide crewmembers with an overview of the engineering, theory, design, and operation of the experiment equipment associated with the Insect Circadian Rhythmicity

5. Session Constraints:
1. Session can be performed in conjunction with "Orientation".

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
110114	Beetle Kit	1
855681	Beetle Experiment Logbook #1	1
855683	Beetle kit power cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	2	0	Classroom instructions and hands-on activities

8. Data Processing:
1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 110047 **Exp. ID:** 698 **Russian ID:** Beetle

Invest. Title: Effects of Gravity on Insect Circadian Rhythmicity **Prime** ☒ **Contingent** ☐

US PI: Hoban-Higgins, Tana M. **Russian PI:** Alpatov, Alexei M.

1. Session ID: FB:DEV:P:60

2. Session: Beetle Experiment FO: Activiation (Mir Crew) **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 60

Scheduled Days: L- 60, 120

4. Session Scenario:

This session will provide the crewmembers with an overview of the procedures associated with activating the equipment.

5. Session Constraints:

1. None.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
110114	Beetle Kit	1
855681	Beetle Experiment Logbook #1	1
855683	Beetle kit power cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	2	0	Perform procedures

8. Data Processing:

1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 110047 **Exp. ID:** 698 **Russian ID:** Beetle

Invest. Title: Effects of Gravity on Insect Circadian Rhythmicity

Prime ☒
Contingent ☐

US PI: Hoban-Higgins, Tana M. **Russian PI:** Alpatov, Alexei M.

1. Session ID: FB:DEV:P:66

Session Type: Training

2. Session: Beetle Experiment FO: Deactivation (Mir Crew)

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 30

Scheduled Days: L- 60, 120

4. Session Scenario:
This session will provide the crewmembers with an overview of the procedures associated with deactivating the equipment.

5. Session Constraints:
1. None.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
110114	Beetle Kit	1
855681	Beetle Experiment Logbook #1	1
855683	Beetle kit power cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	0	0	2	0	Perform procedures

8. Data Processing:
1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 110047 **Exp. ID:** 698 **Russian ID:** Beetle

Invest. Title: Effects of Gravity on Insect Circadian Rhythmicity

Prime ☒
Contingent ☐

US PI: Hoban-Higgins, Tana M. **Russian PI:** Alpatov, Alexei M.

1. Session ID: FB:DEV:P:68

Session Type: Training

2. Session: Malfunction (Mir Crew)

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 30

Scheduled Days: L- 60, 120

4. Session Scenario:

This session will provide the crewmembers with an overview of the malfunction procedures associated with the Insect Circadian Rhythmicity experiment.

5. Session Constraints:

1. None.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
110114	Beetle Kit	1
855681	Beetle Experiment Logbook #1	1
855683	Beetle kit power cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	0	0	2	0	Perform malfunction procedures

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 110047 **Exp. ID:** 698 **Russian ID:** Beetle

Invest. Title: Effects of Gravity on Insect Circadian Rhythmicity

Prime ☒
Contingent ☐

US PI: Hoban-Higgins, Tana M. **Russian PI:** Alpatov, Alexei M.

1. Session ID: FB:DEV:P:55

Session Type: Training

2. Session: Orientation: Effects of Gravity on Insect Circadian Rhythmicity (NASA Crew)

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 240

4. Session Scenario:
This session will provide the crewmember with an overview of the scientific theory, design, and objectives of the Insect Circadian Rhythmicity experiment.

5. Session Constraints:
1. Session can be performed in conjunction with "Hardware Familiarization"

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	1	0	Classroom instruction

8. Data Processing:
1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 110047 **Exp. ID:** 698 **Russian ID:** Beetle

Invest. Title: Effects of Gravity on Insect Circadian Rhythmicity

Prime ☑
Contingent ☐

US PI: Hoban-Higgins, Tana M. **Russian PI:** Alpatov, Alexei M.

1. Session ID: FB:DEV:P:57

Session Type: Training

2. Session: Hardware Familiarization: Effects of Gravity on Insect Circadian Rhythmicity (NASA Crew)

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 240

4. Session Scenario:
This session will provide crewmembers with an overview of the engineering, theory, design, and operation of the experiment equipment associated with the Insect Circadian Rhythmicity

5. Session Constraints:
1. Session can be performed in conjunction with "Orientation".

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
110114	Beetle Kit	1
855681	Beetle Experiment Logbook #1	1
855683	Beetle kit power cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	1	0	Classroom instructions and hands-on activities

8. Data Processing:
1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 110047 **Exp. ID:** 698 **Russian ID:** Beetle

Invest. Title: Effects of Gravity on Insect Circadian Rhythmicity

Prime ☒
Contingent ☐

US PI: Hoban-Higgins, Tana M. **Russian PI:** Alpatov, Alexei M.

1. Session ID: FB:DEV:P:61

Session Type: Training

2. Session: Beetle Experiment FO: Activiation (NASA Crew)

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 60, 120, 180

4. Session Scenario:
This session will provide the crewmembers with an overview of the procedures associated with activating the equipment.

5. Session Constraints:
1. None.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
110114	Beetle Kit	1
855681	Beetle Experiment Logbook #1	1
855683	Beetle kit power cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	1	0	Perform procedures

8. Data Processing:
1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 110047 **Exp. ID:** 698 **Russian ID:** Beetle

Invest. Title: Effects of Gravity on Insect Circadian Rhythmicity

Prime ☒
Contingent ☐

US PI: Hoban-Higgins, Tana M. **Russian PI:** Alpatov, Alexei M.

1. Session ID: FB:DEV:P:67

Session Type: Training

2. Session: Beetle Experiment FO: Deactivation (NASA Crew)

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: L- 60, 120, 180

4. Session Scenario:
This session will provide the crewmembers with an overview of the procedures associated with deactivating the equipment.

5. Session Constraints:
1. None.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
110114	Beetle Kit	1
855681	Beetle Experiment Logbook #1	1
855683	Beetle kit power cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	0	0	1	0	Perform procedures

8. Data Processing:
1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 110047 **Exp. ID:** 698 **Russian ID:** Beetle

Invest. Title: Effects of Gravity on Insect Circadian Rhythmicity

Prime ☑
Contingent ☐

US PI: Hoban-Higgins, Tana M. **Russian PI:** Alpatov, Alexei M.

1. Session ID: FB:DEV:P:69

Session Type: Training

2. Session: Malfunction (NASA Crew)

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: L- 60, 120, 180

4. Session Scenario:
This session will provide the crewmembers with an overview of the malfunction procedures associated with Insect Circadian Rhythmicity experiment.

5. Session Constraints:
1. None.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
110114	Beetle Kit	1
855681	Beetle Experiment Logbook #1	1
855683	Beetle kit power cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	0	0	1	0	Perform malfunction procedures

8. Data Processing:
1. N/A for preflight sessions.

Mission: STS 84 (SM-06) **Invest. ID:** 110047 **Exp. ID:** 698 **Russian ID:** Beetle

Invest. Title: Effects of Gravity on Insect Circadian Rhythmicity

Prime ☒
Contingent ☐

US PI: Hoban-Higgins, Tana M. **Russian PI:** Alpatov, Alexei M.

1. Session ID: FB:LOG:I:50

Session Type: Up Item

2. Session: Transfer of Beetle Kits, Logbooks, and Power Cable to Priroda

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 4

4. Session Scenario:
Crewmember unstows Beetle Kit #1, Beetle Kit #2, Beetle Experiment Logbook #1, Beetle Experiment Logbook #2, and Beetle Kit Power cable and transfers to Priroda.

5. Session Constraints:
1. Session must be performed following Preparation of Priroda Lockers session.
2. Beetle Kit Assemblies must be handled carefully to avoid shaking, jarring, or any unnecessary stimulation to beetles.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
855679	Beetle kit #1 (Includes Air Pump)	1
855680	Beetle kit #2 (Includes Air Pump)	1
855681	Beetle Experiment Logbook #1	1
855682	Beetle Experiment Logbook #2	1
855683	Beetle kit power cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Crewmember unstows Beetle Kit #1 and #2 from Shuttle middeck.
5	5	1	1	0	Crewmember unstows Beetle Experiment Logbook #1, Beetle Experiment Logbook #2, and Beetle Kit Power cable from Shuttle
20	20	1	1	0	Crewmember transfers hardware from Shuttle to Priroda

8. Data Processing:
1. No data downlink required.
2. Air-to-Ground voice communications may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 110047 **Exp. ID:** 698 **Russian ID:** Beetle

Invest. Title: Effects of Gravity on Insect Circadian Rhythmicity

Prime ☒
Contingent ☐

US PI: Hoban-Higgins, Tana M. **Russian PI:** Alpatov, Alexei M.

1. Session ID: FB:DEV:I:73 **Session Type:** Inflight

2. Session: Preparation of Priroda Lockers

3. Session Timeline: **Crewtime Usage (mins):** 23 **Session Time (mins):** 23

Scheduled Days: FD 4

4. Session Scenario:
Crewmember prepares Priroda lockers for stowage of Beetle kits #1 and #2. Locker prep involves removal and stowage of selected locker panels.

5. Session Constraints:
1. Session must be performed prior to Transfer of Beetle Kits to Priroda session

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854871	Priroda IFM Tool Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
3	3	1	1	0	Crew member unstows TBD screw driver from Priroda IFM tool kit
20	20	1	1	0	Crewmember removes rear and front panels from Priroda lockers and stows.

8. Data Processing:
1. No data downlink required.
2. Air-to-Ground voice communications may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 110047 **Exp. ID:** 698 **Russian ID:** Beetle

Invest. Title: Effects of Gravity on Insect Circadian Rhythmicity

Prime ☒
Contingent ☐

US PI: Hoban-Higgins, Tana M. **Russian PI:** Alpatov, Alexei M.

1. Session ID: FB:DEV:I:75

Session Type: Inflight

2. Session: Beetle Kit Stowage and Experiment Activation

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: FD 4

4. Session Scenario:
Crewmember stows Beetle Kits, connects Beetle Kits to Priroda power, ventilates Beetle Kits, and activates Beetle Kits.

5. Session Constraints:
1. Session must be performed immediately following Transfer of Beetle Kits, logbooks and Power Cable.
2. Event Marker button on Beetle Kit Control Panel must be pressed immediately prior to and immediately following ventilation activity.
3. Activity must be recorded in Beetle Experiment Log Book.
4. Any disturbance of the Beetle Kits must be recorded with the Control Panel event marker, and in the Beetle Experiment Log Book.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
840255	8mm Video Tape	1
855679	Beetle kit #1 (Includes Air Pump)	1
855680	Beetle kit #2 (Includes Air Pump)	1
855681	Beetle Experiment Logbook #1	1
855682	Beetle Experiment Logbook #2	1
855683	Beetle kit power cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Crewmember unstows video camera.
10	10	1	1	0	Videotape experiment location, installation, activation, and ventilation.
10	10	1	1	0	Crewmember stows Beetle Kits in Priroda Lockers.
10	10	1	1	0	Crewmember retrieves Air Pumps, ventilates Beetle Kits, and secures Air Pumps.
10	10	1	1	0	Crewmember connects Beetle kits to Priroda power.
5	5	1	1	0	Crewmember activates Beetle Kits .
5	5	1	1	0	Crewmember retrieves Log Books, records activities, and secures Log Books.
5	5	1	1	0	Crewmember stows video camera.

8. Data Processing:
1. No data downlink required.
2. Air-to-Ground voice communications may be required in the event of a contingency situation.
3. Voice down completion of exact time of experiment activation is required.
4. Voice down of Priroda temperature, relative humidity, and gas composition.
5. Video downlink of experiment set-up and activation.

Mission: NASA 5 **Invest. ID:** 110047 **Exp. ID:** 698 **Russian ID:** Beetle

Invest. Title: Effects of Gravity on Insect Circadian Rhythmicity

Prime ☒
Contingent ☐

US PI: Hoban-Higgins, Tana M. **Russian PI:** Alpatov, Alexei M.

1. Session ID: FB:DEV:I:76

Session Type: Inflight

2. Session: Verify Beetle Kit Power Status

3. Session Timeline: **Crewtime Usage (mins):** 7 **Session Time (mins):** 7

Scheduled Days: FD 11, 18, 21, 25, 32, 39, 46, 48, 53, 60, 67, 74, 75, 81, 88, 95, 102, 109, 116, 123, 129, 130, 137, 156

4. Session Scenario:
Crewmember verifies circuit breakers on Beetle Kits #1 and #2 are in proper position and "Mir Power" LED is illuminated. If off nominal condition exists, notify ground immediately.

5. Session Constraints:
1. Power status must be verified every 7 days for Beetle kits 1 and 2. In addition, power status must be verified for Beetle kit 1 on days scheduled for light pulse administration (prior to a light pulse).
2. Record observation in logbook

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
855679	Beetle kit #1 (Includes Air Pump)	1
855680	Beetle kit #2 (Includes Air Pump)	1
855681	Beetle Experiment Logbook #1	1
855682	Beetle Experiment Logbook #2	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
7	7	1	1	0	Crewmember verifies circuit breakers on Beetle Kits are in "on" position and "Mir Power" LED is illuminated. Record observations in Log books

8. Data Processing:
1. No data downlink required.
2. Air-to-Ground voice communications may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 110047 **Exp. ID:** 698 **Russian ID:** Beetle

Invest. Title: Effects of Gravity on Insect Circadian Rhythmicity

Prime ☒
Contingent ☐

US PI: Hoban-Higgins, Tana M. **Russian PI:** Alpatov, Alexei M.

1. Session ID: FB:DEV:I:77

Session Type: Inflight

2. Session: Beetle Kit Ventilation

3. Session Timeline: **Crewtime Usage (mins):** 15 **Session Time (mins):** 15

Scheduled Days: FD 4, 11, 18, 25, 32, 39, 46, 53, 60, 67, 73, 81, 88, 95, 100, 109, 116, 123, 128, 137

4. Session Scenario:
Crewmember ventilates Beetle Kits #1 and #2.

5. Session Constraints:
1. Session must be performed immediately following Experiment Activation session, and every 7 days thereafter until Experiment Deactivation session.
2. Ventilation of Beetle kit 1 must not occur 48 hours prior to or following a scheduled light pulse.
3. Session may be performed +/- 1 day from scheduled flight day, providing it does not violate constraint number 2.
4. Event Marker button on Beetle kit Control Panel must be pressed immediately prior to and immediately following ventilation activity.
5. Activity must be recorded in Beetle Experiment Logbooks.
6. Activity may be performed at time of Verify Beetle Kit Power Status session.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
855679	Beetle kit #1 (Includes Air Pump)	1
855680	Beetle kit #2 (Includes Air Pump)	1
855681	Beetle Experiment Logbook #1	1
855682	Beetle Experiment Logbook #2	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Crewmember retrieves Air Pumps, ventilates Beetle Kits, and secures Air Pumps
5	5	1	1	0	Crewmember retrieves Log Books, records activities, and secures Log Books

8. Data Processing:
1. No data downlink required.
2. Air-to-Ground voice communications may be required in the event of a contingency situation.
3. Voice down completion of session, and Priroda temperature and humidity.

Mission: NASA 5 **Invest. ID:** 110047 **Exp. ID:** 698 **Russian ID:** Beetle

Invest. Title: Effects of Gravity on Insect Circadian Rhythmicity **Prime** ☒ **Contingent** ☐

US PI: Hoban-Higgins, Tana M. **Russian PI:** Alpatov, Alexei M.

1. Session ID: FB:DEV:I:78

2. Session: Experiment Deactivation **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 35 **Session Time (mins):** 35

Scheduled Days: FD 140

4. Session Scenario:

Crewmember ventilates Beetle kits#1 and #2, deactivates lighting systems on Beetle Kits, disconnects Beetle Kits from Priroda power, and removes Beetle Kits from lockers.

5. Session Constraints:

1. Event Marker button on Beetle kits Control Panel must be pressed immediately prior to and immediately following ventilation activity.
2. Activity must be recorded in Beetle Experiment Log Book.
3. Any disturbance of the Beetle Kits must be recorded with the Control Panel event marker, and in the Log Book.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
855679	Beetle kit #1 (Includes Air Pump)	1
855680	Beetle kit #2 (Includes Air Pump)	1
855681	Beetle Experiment Logbook #1	1
855682	Beetle Experiment Logbook #2	1
855683	Beetle kit power cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Crewmember retrieves Air Pumps, ventilates Beetle Kits.
2	2	1	1	0	Crewmember verifies that circuit breakers on the Beetle Kit Control Panels are in the "on" position and "Mir Power" LED is illuminated
3	3	1	1	0	Crewmember deactivates Beetle Kits
10	10	1	1	0	Crewmember disconnects Beetle Kits and Beetle Power Cable
5	5	1	1	0	Crewmember retrieves Log Books, records activities. and secures Log Books
10	10	1	1	0	Crewmember replaces Air Pumps and removes Beetle kits from lockers

8. Data Processing:

1. No data downlink required.
2. Air-to-Ground voice communications may be required in the event of a contingency situation.
3. Voice down completion of session, and Priroda temperature, humidity, and gas composition.

Mission: STS 86 (SM-07) **Invest. ID:** 110047 **Exp. ID:** 698 **Russian ID:** Beetle

Invest. Title: Effects of Gravity on Insect Circadian Rhythmicity

Prime ☒
Contingent ☐

US PI: Hoban-Higgins, Tana M. **Russian PI:** Alpatov, Alexei M.

1. Session ID: FB:LOG:I:20

Session Type: Down Item

2. Session: Transfer Beetle Kit Assemblies to Shuttle

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 7

4. Session Scenario:
Crewmember transfers Beetle Kit #1, Beetle Kit #2, Beetle Experiment Logbook #1, Beetle Experiment Logbook #2, and Beetle Kit Power cable to Shuttle and stows.

5. Session Constraints:
1. Session must be performed following Experiment Deactivation session.
2. Beetle kits must be handled carefully to avoid shaking, jarring, or any unnecessary stimulation to beetles.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
855679	Beetle kit #1 (Includes Air Pump)	1
855680	Beetle kit #2 (Includes Air Pump)	1
855681	Beetle Experiment Logbook #1	1
855682	Beetle Experiment Logbook #2	1
855683	Beetle kit power cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	1	0	Crewmember transfers Beetle Kits, Logbooks, and Cable from Priroda to Shuttle
10	10	1	1	0	Crewmember stows Beetle Kit #1 and #2 in Shuttle lockers
5	5	1	1	0	Crewmember stows Power Cable, Logbooks in Collabsible Transport Bag

8. Data Processing:
1. No Data Downlink required.
2. Air-to-Ground voice communications may be required in the event of a contigency situation.
3. Voice down completion of session.

Investigation ID: 890268 **Experiment ID:** Greenhouse - 3 **Russian ID:** Greenhouse - 3

Investigation Title: Developmental Analysis of Seeds Grown on Mir

US Investigators: Musgrave, Mary E.

Russian Investigators: Levinskikh, Margarita

Other Investigators:

Payload Category: FB **Sub-Cat.:** DEV **Subjects Requested:**

Description: The experiment outlined will address the problem of seed-to-seed cycling in microgravity. Developmental information on reproductive events in microgravity will be gathered using Brassica rapa grown for three generations in the Svet Greenhouse hardware on Mir. While the overall goal is to understand the nature of disruption of reproductive events by microgravity, the experiment focus will be on the hypothesis that the microgravity environment causes a reduction in the storage reserves available to support reproductive events. In addition to the activities conducted on-orbit, preflight experiment verification and postflight ground control experiments will be conducted duplicating IPRD in-flight sessions.

Science Objectives:
1. To determine space flight effects on reproduction.

Functional Objectives:
1. Preflight verification of experiment operations
2. Integration of Svet and GEMS hardware
3. Planting
4. Observation/Photographs
5. Sample Collection (Experiment 1, 2, &3)
6. Data Downlink
7. Transfer Session
8. Conduct Postflight synchronous ground control

Sample Transfer Rqd: Yes **Hardware Transfer Rqd:** Yes

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
5	Mir 24	6/24/97	☒	☒
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
FB	DEV	Flight	150056	Gas Exchange Measurement System (GEMS)
FBI2	FB	Flight	150058	Moisture Probe Packing Bundle
MG	BT	Flight	150112	GN2 Freezer/Dewer Experiment Assembly
FB	DEV	Flight	410028	SVET Root Module
OPS	SHR	Flight	410037	MIR Interface to Payload Systems-2 (MIPS-2)
FB	DEV	Flight	410039	SVET Greenhouse Unit
OPS	SHR	Flight	510010	35mm film w/container
FB	DEV	Flight	820361	Observation Kit
FB	DEV	Flight	820376	Leaf Bag Assembly
OPS	SHR	Flight	840003	Mir Interface to Payload Systems-2 (MIPS)
SHR	SHR	Flight	840255	8mm Video Tape
OPS		Flight	846720	MIPS2 Optical Disks
FB	DEV	Flight	848836	Root Module Return Kit (empty)
FB	DEV	Flight	848845	Root Module Launch Kit (w/module)
FB	DEV	Flight	852181	Svet Controller
FB	DEV	Flight	852182	Svet Light unit
FB	DEV	Flight	852240	Hard disk package-Svet
FB	FAC	Flight	854792	Standard Interface Glovebox (SIGB)
FB	DEV	Flight	854881	Water container - Svet
			854882	Russian Camera System, FM2
FB	DEV	Flight	854883	GEMS Laptop Computer
FB	DEV	Flight	854884	Hard Disk Package
FB	DEV	Flight	854961	Root Module Return Kit #1 (with RM)
FB	DEV	Flight	854962	Plant Fixative Kit #2

FB	DEV	Flight	854963	Plant Fixative Kit #3
FB	DEV	Flight	854964	Refrigerated Plant Fixative Kit
FB	DEV	Flight	854965	Plant Dry Stowage Kit #3
FB	DEV	Flight	854966	Pollination Kit
FB	DEV	Flight	854967	Silique Collection Kit
FB	DEV	Flight	854968	GN2 Freezer Insert
FB	DEV	Flight	854969	SIGB Cleanup Kit
FB	DEV	Flight	854971	RM launch Kit Nomex Bag
FB	DEV	Flight	854973	FBI logbook kit
FB	DEV	Flight	854974	Plant Fixative Kit #1
FB	DEV	Flight	854975	Plant Dry Stowage Kit #1
FB	DEV	Flight	854977	Plant Harvest kit
FB	DEV	Flight	854978	Seed Operations Kit
FB	DEV	Flight	854979	Plant Dry Stowage Kit #2
FB	DEV	Flight	854984	Gas Analyzers
			854985	Camcorder (Russian)
FB	DEV	Flight	855599	Root Module Return Kit #2 (with Root Module)
			855600	Root Module Return Kit #3 (with Root Module)
FB	DEV	Flight	855601	Environmental Data System
FB	DEV	Flight	855677	Power Distribution System
FB	DEV	Flight	855678	Leaf Bag Assembly #1 Manifold
FB	DEV	Flight	855684	Spare Parts Kit #3

Mission: Mir 24 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:P:78

Session Type: Training

2. Session: Greenhouse FO: Svet Functional Check & Gas Exchange Measurement System (Mir Crew)

3. Session Timeline: **Crewtime Usage (mins):** 480 **Session Time (mins):** 240

Scheduled Days: L- 60, 90

4. Session Scenario:
This session will train the crewmembers in the procedures associated with assembling Svet and GEMS hardware and performing both a calibration and functional check on the Svet Greenhouse system components.

5. Session Constraints:
1. None

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150056	Gas Exchange Measurement System (GEMS)	1
410037	MIR Interface to Payload Systems-2 (MIPS-2)	1
410039	SVET Greenhouse Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
240	0	0	2	0	Perform procedures

8. Data Processing:
1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☑
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:P:81

2. Session: Greenhouse FO: Mir Daily Plant & Svet Unit Monitor & Data Downlink (Mir Crew)

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 480 **Session Time (mins):** 240

Scheduled Days: L- 60, 90

4. Session Scenario:

This session will train the crewmembers in the procedures associated with performing daily plant and Svet unit monitoring and downlinking Svet information.

5. Session Constraints:

1. None

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150056	Gas Exchange Measurement System (GEMS)	1
410039	SVET Greenhouse Unit	1
820360	Logbook Kit	1
840003	Mir Interface to Payload Systems-2 (MIPS)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
240	0	0	2	0	Perform procedures

8. Data Processing:

1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☑
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:P:82

Session Type: Training

2. Session: Orientation: Greenhouse Experiment (Mir Crew)

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 60

Scheduled Days: L- 210

4. Session Scenario:

This session will provide the crewmember with an overview of the scientific theory, design, and objectives of the integrated plant experiments.

5. Session Constraints:

1. Session can be performed in conjunction with "Hardware Familiarization: Greenhouse Experiments".

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	2	0	Classroom instruction

8. Data Processing:

1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:P:83

2. Session: Greenhouse FO: Greenhouse Observations & Photographs (Mir Crew)

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 360 **Session Time (mins):** 180

Scheduled Days: L- 60, 90

4. Session Scenario:

This session will train the crewmembers in the procedures associated with performing observations of the growing plants and photographing them.

5. Session Constraints:

1. None

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150056	Gas Exchange Measurement System (GEMS)	1
390043	Camcorder System (NASA)	1
410039	SVET Greenhouse Unit	1
510010	35mm film w/container	1
810236	Nikon F3 Camera System	1
820361	Observation Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	2	0	Perform procedures

8. Data Processing:

1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:P:84

Session Type: Training

2. Session: Install Root Module (Mir Crew)

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 60

Scheduled Days: L- 60, 90

4. Session Scenario:
This session will train the crewmembers in the procedures associated with the installation of the root module into the Svet greenhouse.

5. Session Constraints:
1. Requires participation of prime Mir Crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
410028	SVET Root Module	1
410039	SVET Greenhouse Unit	1
848845	Root Module Launch Kit (w/module)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	2	0	Perform procedures

8. Data Processing:
1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☑
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:P:85

Session Type: Training

2. Session: Malfunction (Mir Crew)

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 120

Scheduled Days: L- 90, 120

4. Session Scenario:
This session will train the crewmembers in the malfunction procedures associated with the Greenhouse-Integrated Experiments.

5. Session Constraints:
none

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150056	Gas Exchange Measurement System (GEMS)	1
410039	SVET Greenhouse Unit	1
510010	35mm film w/container	1
810236	Nikon F3 Camera System	1
820361	Observation Kit	1
820362	Glovebag Kit	1
820368	Filter Pump Containment Bag Assembly	1
854973	FBI logbook kit	1
854974	Plant Fixative Kit #1	1
854975	Plant Dry Stowage Kit #1	1
854977	Plant Harvest kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	2	0	Perform malfunction procedures

8. Data Processing:

1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:P:93

Session Type: Training

2. Session: Hardware Familiarization : Greenhouse Experiment (Mir Crew)

3. Session Timeline: **Crewtime Usage (mins):** 480 **Session Time (mins):** 240

Scheduled Days: L- 210

4. Session Scenario:

This session will provide the crewmember with an overview of the engineering theory, design, and operation of the experiment equipment associated with the Greenhouse experiment.

5. Session Constraints:

1. Session can be performed in conjunction with "Orientation: Greenhouse Experiments."

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150056	Gas Exchange Measurement System (GEMS)	1
410039	SVET Greenhouse Unit	1
510010	35mm film w/container	1
810236	Nikon F3 Camera System	1
820361	Observation Kit	1
820362	Glovebag Kit	1
820368	Filter Pump Containment Bag Assembly	1
854973	FBI logbook kit	1
854974	Plant Fixative Kit #1	1
854975	Plant Dry Stowage Kit #1	1
854977	Plant Harvest kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
240	0	0	2	0	Classroom instruction and hands-on training

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:P:101

Session Type: Training

2. Session: Greenhouse FO: Final Harvest of Plant Samples (NASA Crew)

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: L- 90, 120, 180

4. Session Scenario:
This session will train the crewmembers in the procedures associated with performing the final harvest of plant samples for the Greenhouse experiment.

5. Session Constraints:
1. None

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150112	GN2 Freezer/Dewer Experiment Assembly	1
410038	Leaf Area Measurement Scanner (LAM)	1
410039	SVET Greenhouse Unit	1
820362	Glovebag Kit	1
854973	FBI logbook kit	1
854974	Plant Fixative Kit #1	1
854975	Plant Dry Stowage Kit #1	1
854977	Plant Harvest kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	1	0	Perform procedures

8. Data Processing:
1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☑
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:P:79

Session Type: Training

2. Session: Greenhouse FO: Mir Daily Plant & Svet Unit Monitor & Data Downlink (NASA Crew)

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: L- 90, 120, 180

4. Session Scenario:
This session will train the crewmembers in the procedures associated with performing daily plant and Svet unit monitoring and downlinking Svet information.

5. Session Constraints:
None

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150056	Gas Exchange Measurement System (GEMS)	1
410039	SVET Greenhouse Unit	1
840003	Mir Interface to Payload Systems-2 (MIPS)	1
854973	FBI logbook kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	1	0	Perform procedures

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:P:80

Session Type: Training

2. Session: Greenhouse FO: Greenhouse Observations & Photographs (NASA Crew)

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: L- 90, 120, 180

4. Session Scenario:
This session will train the crewmembers in the procedures associated with performing observations of the growing plants and photographing them.

5. Session Constraints:
None

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150056	Gas Exchange Measurement System (GEMS)	1
390043	Camcorder System (NASA)	1
410039	SVET Greenhouse Unit	1
510010	35mm film w/container	1
810236	Nikon F3 Camera System	1
820361	Observation Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	1	0	Perform procedures

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☑
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:P:86

Session Type: Training

2. Session: Greenhouse FO: Harvest, Dry, & Fix Plant Samples (NASA Crew)

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: L- 90, 120, 180

4. Session Scenario:

The session will train the crewmembers in the procedures associated with harvesting, drying, and fixing plant samples. This session is repeated in order to provide opportunities for establishing and maintaining proficiency at this task.

5. Session Constraints:

None

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
410039	SVET Greenhouse Unit	1
820362	Glovebag Kit	1
854973	FBI logbook kit	1
854974	Plant Fixative Kit #1	1
854975	Plant Dry Stowage Kit #1	1
854977	Plant Harvest kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
180	0	0	1	0	Perform procedures

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☑
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:P:87

Session Type: Training

2. Session: Greenhouse FO: Seed Planting (NASA Crew)

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 90, 120, 180

4. Session Scenario:
This session will train the crewmembers in the procedures associated with performing seed planting for the Greenhouse experiment. This session is repeated in order to provide opportunities for establishing and maintaining proficiency at this task.

5. Session Constraints:
None

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
410039	SVET Greenhouse Unit	1
846731	Greenhouse Seed Strip Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	1	0	Perform procedures

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:P:88

Session Type: Training

2. Session: Hardware Familiarization: Greenhouse Experiment (NASA Crew)

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 240

Scheduled Days: L- 240

4. Session Scenario:
This session will provide the crewmember with an overview of the engineering theory, design, and operation of the experiment equipment associated with the Greenhouse experiment.

5. Session Constraints:
1. Session can be performed in conjunction with "Orientation: Greenhouse Experiments."

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150056	Gas Exchange Measurement System (GEMS)	1
410039	SVET Greenhouse Unit	1
510010	35mm film w/container	1
810236	Nikon F3 Camera System	1
820361	Observation Kit	1
820362	Glovebag Kit	1
820368	Filter Pump Containment Bag Assembly	1
854973	FBI logbook kit	1
854974	Plant Fixative Kit #1	1
854975	Plant Dry Stowage Kit #1	1
854977	Plant Harvest kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
240	0	0	1	0	Classroom instruction and hands-on training

8. Data Processing:
1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:P:89

Session Type: Training

2. Session: Orientation: Greenhouse Experiment (NASA Crew)

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 240

4. Session Scenario:
This session will provide the crewmember with an overview of the scientific theory, design, and objectives of the integrated plant experiments.

5. Session Constraints:
1. Session can be performed in conjunction with "Hardware Familiarization: Greenhouse Experiments".

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	1	0	Classroom instruction

8. Data Processing:
1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:P:90 **Session Type:** Training

2. Session: Greenhouse FO: Svet Functional Check & Gas Exchange Measurement System (NASA Crew)

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 240

Scheduled Days: L- 90, 120, 180

4. Session Scenario:
This session will train the crewmembers in the procedures associated with assembling Svet and GEMS hardware and performing both a calibration and functional check on the Svet Greenhouse system components.

5. Session Constraints:
1. None

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150056	Gas Exchange Measurement System (GEMS)	1
410037	MIR Interface to Payload Systems-2 (MIPS-2)	1
410039	SVET Greenhouse Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
240	0	0	1	0	Perform procedures

8. Data Processing:
1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir **Prime** ☒ **Contingent** ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:P:91

2. Session: Install Root Module (NASA Crew) **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 90, 120, 180

4. Session Scenario:

This session will train the crewmembers in the procedures associated with the installation of the root module into the Svet greenhouse.

5. Session Constraints:

1. None

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
410028	SVET Root Module	1
410039	SVET Greenhouse Unit	1
848845	Root Module Launch Kit (w/module)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	1	0	Perform procedures

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:P:92

Session Type: Training

2. Session: Malfunction (NASA Crew)

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: L- 90, 120, 180

4. Session Scenario:
This session will train the crewmembers in the malfunction procedures associated with the Greenhouse-Integrated Experiments.

5. Session Constraints:
none

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150056	Gas Exchange Measurement System (GEMS)	1
410039	SVET Greenhouse Unit	1
510010	35mm film w/container	1
810236	Nikon F3 Camera System	1
820361	Observation Kit	1
820362	Glovebag Kit	1
820368	Filter Pump Containment Bag Assembly	1
854973	FBI logbook kit	1
854974	Plant Fixative Kit #1	1
854975	Plant Dry Stowage Kit #1	1
854977	Plant Harvest kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	1	0	Perform malfunction procedures

8. Data Processing:

1. N/A for preflight sessions.

Mission: STS 84 (SM-06) **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:LOG:I:47

Session Type: Up Item

2. Session: Transfer Greenhouse - 3 Support hardware from Shuttle to Mir

3. Session Timeline: **Crewtime Usage (mins):** 90 **Session Time (mins):** 90

Scheduled Days: FD 4

4. Session Scenario:
Support hardware for the Greenhouse-3 experiment will be transported to Mir and stowed.

5. Session Constraints:
1. Must be performed during the docked phase
2. +/- 1 day

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848845	Root Module Launch Kit (w/module)	3
854884	Hard Disk Package	3
854962	Plant Fixative Kit #2	1
854963	Plant Fixative Kit #3	1
854965	Plant Dry Stowage Kit #3	1
854966	Pollination Kit	1
854967	Silique Collection Kit	1
854969	SIGB Cleanup Kit	1
854973	FBI logbook kit	1
854974	Plant Fixative Kit #1	1
854975	Plant Dry Stowage Kit #1	1
854977	Plant Harvest kit	1
854978	Seed Operations Kit	1
854979	Plant Dry Stowage Kit #2	1
854984	Gas Analyzers	2
855677	Power Distribution System	1
855678	Leaf Bag Assembly #1 Manifold	1
855684	Spare Parts Kit #3	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	30	1	1	0	Unstow GH-3 Support hardware
55	55	1	1	0	Transport to Mir Module and stow
5	5	1	1	0	Return to Shuttle

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: Mir 24 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:I:92

Session Type: Inflight

2. Session: Processing of Mir Core Svet Telemetry Data

3. Session Timeline: **Crewtime Usage (mins):** 0 **Session Time (mins):** 0

Scheduled Days: FD 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133

4. Session Scenario:
This is a ground based activity. Data will be downlinked and processed twice daily.

5. Session Constraints:
1. Two telemetered data sets are required daily.
2. Ground controllers will process the data daily.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
852181	Svet Controller	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	1	0	Twice daily downlink of Greenhouse Telemetry

8. Data Processing:
1. Data downlink is required.
2. Ground based processing of data is required.
3. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: Mir 24 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir **Prime** ☑ **Contingent** ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:I:94

2. Session: Svet and GEMS disassembly **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 240

Scheduled Days: FD 96

4. Session Scenario:

The Svet and GEMS hardware will be stowed for use in later missions.

5. Session Constraints:

1. The session must be performed after final harvest and all kits have been transferred from Mir to Shuttle.
2. +/- 1 day

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150056	Gas Exchange Measurement System (GEMS)	1
410039	SVET Greenhouse Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
240	240	1	1	0	Disassemble and stow Svet and GEMS hardware

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:I:33

Session Type: Inflight

2. Session: GEMS Assembly

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 240

Scheduled Days: FD 12

4. Session Scenario:
The Gas Exchange Measurement System (GEMS) is set up, checked out, and prepared for seed planting.

5. Session Constraints:
1. This session to be performed before SVET and GEMS functional check.
2. +/- 1 day

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150056	Gas Exchange Measurement System (GEMS)	1
150058	Moisture Probe Packing Bundle	1
410039	SVET Greenhouse Unit	1
820376	Leaf Bag Assembly	2
852240	Hard disk package-Svet	1
854883	GEMS Laptop Computer	1
854984	Gas Analyzers	2
855601	Environmental Data System	1
855677	Power Distribution System	1
855678	Leaf Bag Assembly #1 Manifold	1
855684	Spare Parts Kit #3	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
160	160	1	1	0	Assemble GEMS hardware
30	30	1	1	0	Install substrate moisture sensors and leaf bag assemblies
10	10	1	1	0	Change out hard drive
20	20	1	1	0	Connect Svet unit electrical power
20	20	1	1	0	Power up GEMS

8. Data Processing:
1. Svet data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:I:34

Session Type: Inflight

2. Session: Seed Planting

3. Session Timeline: **Crewtime Usage (mins):** 43 **Session Time (mins):** 43

Scheduled Days: FD 15, 66, 117

4. Session Scenario:

Three plantings will be performed in flight. Seeds will be planted into cuvettes of root module. A new root module will be used for each planting.

5. Session Constraints:

1. Seed strips should be oriented toward the SVET window. Place seeds so that they face front window.
2. +/- 1 day

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150056	Gas Exchange Measurement System (GEMS)	1
410039	SVET Greenhouse Unit	1
854978	Seed Operations Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow 4 seed strips from seed operations kit
10	10	1	1	0	Disconnect air hoses, air manifolds, and leaf bags
5	5	1	1	0	Adjust light source to the highest position
5	5	1	1	0	Insert seed strips
5	5	1	1	0	Return light source and leaf chambers to original position
10	10	1	1	0	Reconnect air hoses and air manifolds

8. Data Processing:

1. Observe diagram in logbook when installing the different types of seed strips.
2. No data downlink required.
3. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:I:35

Session Type: Inflight

2. Session: Video Observations and Photography of Plants and Hardware

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 18, 22, 26, 30, 34, 38, 42, 46, 50, 54, 58, 62, 69, 73, 77, 81, 85, 89, 93, 97, 101, 105, 109, 113, 120, 124, 128, 132

4. Session Scenario:
Photographs will be taken and observations will be made of the plants. Video images will also be recorded.

5. Session Constraints:
1. Session may occur +/- 1 day from scheduled day.
2. Video from MD 26, 30, 34, 42, 54, 62, 77, 81, 85, 93, 105, 113, 128, 132 must be downlinked.
3. If leaf bags are present, do not raise for observation session.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150056	Gas Exchange Measurement System (GEMS)	1
410039	SVET Greenhouse Unit	1
510010	35mm film w/container	1
820361	Observation Kit	1
840255	8mm Video Tape	1
854882	Russian Camera System, FM2	1
854985	Camcorder (Russian)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow still and video cameras and log book
10	10	1	1	0	Mount bracket and camera on Svet; place ruler in front of Svet
10	10	1	1	0	Photograph and videotape plants from various angles
5	5	1	1	0	Stow camera, bracket, ruler

8. Data Processing:
1. Downlink of video is requested on realtime basis.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:I:36

Session Type: Inflight

2. Session: Daily Operations & Data Downlink

3. Session Timeline: **Crewtime Usage (mins):** 20 **Session Time (mins):** 20

Scheduled Days: FD 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133

4. Session Scenario:
Plants and Svet unit are monitored daily and GEMS and Svet data are downlinked daily and SMP temperature rise and flowmeter data is voiced down daily. Hoses on GEMS are exchanged.

5. Session Constraints:
Session must be performed 1x daily (hard requirement)

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150056	Gas Exchange Measurement System (GEMS)	1
410037	MIR Interface to Payload Systems-2 (MIPS-2)	1
410039	SVET Greenhouse Unit	1
846720	MIPS2 Optical Disks	1
854973	FBI logbook kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
1	1	1	1	0	Examine Svet system for proper functioning. Check for malfunction indication on Svet control panel
3	3	1	1	0	Observe plants. Check for any abnormal reactions. Record in logbook.
6	6	1	1	0	Transfer GEMS data to floppy disk, Record in logbook
3	3	1	1	0	Exchange GEMS hoses. Record in logbook
4	4	1	1	0	Downlink transferred data via MIPS-2
3	3	1	1	0	Crew voice down of SMP temperature rise data

8. Data Processing:

1. Data downlink required via MIPS-2.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:I:37

Session Type: Inflight

2. Session: Final Harvest of Plant Samples - First and Second Planting

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: FD 63, 114

4. Session Scenario:
Samples will be collected and dried at completion of growth cycle. Siliques are collected prior to harvesting and stowed for use during second and third planting sessions.

5. Session Constraints:
1. Drying should be performed as soon as possible after harvesting; therefore session should not be interrupted.
2. Session may be performed +/- 1 days from scheduled days
3. Concurrence from ground before harvest begins.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
410039	SVET Greenhouse Unit	1
854967	Silique Collection Kit	1
854973	FBI logbook kit	1
854975	Plant Dry Stowage Kit #1	1
854977	Plant Harvest kit	1
854979	Plant Dry Stowage Kit #2	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	20	1	1	0	Unstow harvest, dry stowage kits, and Silique Collection Kit to secure to workstation
20	20	1	1	0	Make observations. Fill in logbook entries.
30	30	1	1	0	Remove Silique from plants in each row and store in Silique Collection Kit
60	60	1	1	0	Harvest plants
30	30	1	1	0	Store samples in dry stowage bags
20	20	1	1	0	Restow all hardware

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☑
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:I:39

Session Type: Inflight

2. Session: Svet and GEMS Functional Check, Water Container Installation, and Test Data Transfer

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: FD 13

4. Session Scenario:

The Svet greenhouse and GEMS are functionally tested prior to seed planting.

5. Session Constraints:

1. Session must be performed prior to seed planting
2. +/- 1 day
3. Potable water must be used.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150056	Gas Exchange Measurement System (GEMS)	1
410037	MIR Interface to Payload Systems-2 (MIPS-2)	1
410039	SVET Greenhouse Unit	1
846720	MIPS2 Optical Disks	1
854881	Water container - Svet	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
110	110	1	1	0	Check gas exchange measurement system and Svet greenhouse function
5	5	1	1	0	Eliminate pressure differences in system
5	5	1	1	0	Enter O2 content values
30	30	1	1	0	Deactivate and activate GEMS and Activate Svet
20	20	1	1	0	Fill and install water container
10	10	1	1	0	GEMS test data transfer/downlink

8. Data Processing:

1. Data downlink required from MIPS-2 and Greenhouse. If MIPS-2 is not available, voice down of data required once per day.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:I:40

Session Type: Inflight

2. Session: Svet Assembly and Program 1

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: FD 9

4. Session Scenario:
Svet Greenhouse is assembled, root module is installed, and functional check is performed (Program 1)

5. Session Constraints:
1. Must be performed before GEMS assembly
2. +/- 1 day

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
410028	SVET Root Module	1
410039	SVET Greenhouse Unit	1
848845	Root Module Launch Kit (w/module)	1
852181	Svet Controller	1
852182	Svet Light unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Retrieve root module launch kit, controller, and light block
15	15	1	1	0	Transport to Svet greenhouse, remove root module from launch kit, and install into unit
15	15	1	1	0	Remove root modules from launch kit
70	70	1	1	0	Assemble remaining Svet hardware
10	10	1	1	0	Perform Svet functional check (program 1)

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:I:41

Session Type: Inflight

2. Session: Svet Root Module and Soil Moisture Probe Installation

3. Session Timeline: **Crewtime Usage (mins):** 90 **Session Time (mins):** 90

Scheduled Days: FD 64, 114

4. Session Scenario:
Crewmember installs new root module for 2nd and 3rd plantings

5. Session Constraints:
1. Session must be performed following de-installation of RM and soil moisture probes.
2. +/- 1 day

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150058	Moisture Probe Packing Bundle	1
410028	SVET Root Module	1
410039	SVET Greenhouse Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	1	0	Obtain unused RM launch kit and soil moisture probes and transport to greenhouse
15	15	1	1	0	Remove RM from foil and Nomex bag
45	45	1	1	0	Install RM and moisture probes into greenhouse
15	15	1	1	0	Stow nomex bag for use on return and discard foil bag

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:I:42

Session Type: Inflight

2. Session: De-Install Root Module from Svet

3. Session Timeline: **Crewtime Usage (mins):** 80 **Session Time (mins):** 80

Scheduled Days: FD 63, 114, 133

4. Session Scenario:
Crewmember removes root module and soil moisture probes from Svet greenhouse in preparation for the subsequent plantings and end of experiment. The root module will be stowed for return in Nomex bag.

5. Session Constraints:
1. Session must be performed following the final harvest of each planting.
2. This session must be performed prior to "Transfer SVET Root Module from Mir to Shuttle" sessions.
3. +/- 1 day

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
410028	SVET Root Module	1
410039	SVET Greenhouse Unit	1
854971	RM launch Kit Nomex Bag	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	1	0	Obtain empty Nomex bag from launch kit and transport to Svet Greenhouse unit
45	45	1	1	0	De-install root module from Svet Greenhouse
10	10	1	1	0	Insert root module into Nomex bag. Note experiment number and date on label.
10	10	1	1	0	Stow for return on STS-86

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:I:43

Session Type: Inflight

2. Session: Final Harvest of Plant Samples - Third Planting

3. Session Timeline: **Crewtime Usage (mins):** 200 **Session Time (mins):** 180

Scheduled Days: FD 133

4. Session Scenario:

One half of plants are harvested and prepared for GN2 freezer. The remaining half of the plants are harvested and fixed in refrigerated fix kit (4.0 deg C). In the event of a shuttle slip and plants reach full maturity, all plants will be dried in Dry Stowage kit #3.

5. Session Constraints:

1. Session may be performed +/- 2 days from scheduled day, but should be scheduled during the docked phase of the STS-86 mission.
2. Refrigerated fix kit and GN2 freezer will be transported by STS-86.
3. Time between plant harvest of 3rd planting and stowage of GN2 insert cannot exceed 30 minutes.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
410039	SVET Greenhouse Unit	1
854792	Standard Interface Glovebox (SIGB)	1
854964	Refrigerated Plant Fixative Kit	1
854965	Plant Dry Stowage Kit #3	1
854968	GN2 Freezer Insert	1
854969	SIGB Cleanup Kit	1
854973	FBI logbook kit	1
854977	Plant Harvest kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	20	1	1	0	Unstow harvest, dry stowage, refrigerated fixative kit.
20	20	1	1	0	Make observations. Fill in logbook.
45	45	1	1	0	Harvest plants for fixations and transport to SIGB located in Priroda module
60	60	1	1	0	Perform fixation in SIGB
20	20	1	2	0	Harvest remaining plants and insert into GN2 Dewar insert
15	15	1	1	0	Transport insert to shuttle for installation into GN2 Dewar

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:I:80

Session Type: Inflight

2. Session: GEMS hardware Collection and Preparation

3. Session Timeline: **Crewtime Usage (mins):** 150 **Session Time (mins):** 150

Scheduled Days: FD 9

4. Session Scenario:
GEMS hardware will be collected from stowage and stored near the Svet Greenhouse Unit in preparation for the GEMS assembly

5. Session Constraints:
1. Session must be performed before GEMS assembly
2. +/- 1 day

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150056	Gas Exchange Measurement System (GEMS)	1
854883	GEMS Laptop Computer	1
854984	Gas Analyzers	1
855601	Environmental Data System	1
855684	Spare Parts Kit #3	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	60	1	1	0	Collect GEMS hardware and store near Svet unit
30	30	1	1	0	Change GEMS filters
60	60	1	1	0	Replace integration bag vents

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir **Prime** ☒ **Contingent** ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:I:81

2. Session: Svet and GEMS Inventory Check **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: FD 5

4. Session Scenario:

Crewmember takes inventory of all Svet and GEMS hardware in preparation for assembly.

5. Session Constraints:

1. Must be performed before Svet and GEMS assembly.
2. +/- 1 day

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150056	Gas Exchange Measurement System (GEMS)	1
410039	SVET Greenhouse Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	30	1	1	0	Inventory Svet hardware
30	30	1	1	0	Inventory GEMS hardware

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:I:82

Session Type: Inflight

2. Session: Program 2

3. Session Timeline: **Crewtime Usage (mins):** 20 **Session Time (mins):** 20

Scheduled Days: FD 13, 14, 15, 64, 65, 66, 115, 116, 117

4. Session Scenario:
Program 2 from Svet controller is run to provide initial wetting.

5. Session Constraints:
1. Program 2 must be run after Svet & GEMS Functional check.
2. Program 2 must be run on 3 consecutive days with no interruptions.
3. +/- 1 day

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150056	Gas Exchange Measurement System (GEMS)	1
410039	SVET Greenhouse Unit	1
840003	Mir Interface to Payload Systems-2 (MIPS)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	20	1	1	0	Initiate Svet Controller Program 2

8. Data Processing:

1. Data downlink required on MIPS-2 and Svet Telemetry. If either system has failed, voice down of data required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:I:83

Session Type: Inflight

2. Session: Program 3

3. Session Timeline: **Crewtime Usage (mins):** 10 **Session Time (mins):** 10

Scheduled Days: FD 15, 66, 117

4. Session Scenario:
Program 3 from Svet Controler is initiated and Svet will operate in the automatic mode.

5. Session Constraints:
+/- 1 day

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150056	Gas Exchange Measurement System (GEMS)	1
410039	SVET Greenhouse Unit	1
840003	Mir Interface to Payload Systems-2 (MIPS)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Initiate Svet controller Program 3

8. Data Processing:

1. Data downlink required on MIPS-2 & Svet telemetry. If either system has failed, voice down of data required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:I:84

Session Type: Inflight

2. Session: Zeroing Differential Pressures

3. Session Timeline: **Crewtime Usage (mins):** 5 **Session Time (mins):** 5

Scheduled Days: FD 19, 68, 120

4. Session Scenario:
Crewmember will eliminate pressure differences in the GEMS system.

5. Session Constraints:
1. Session must be performed 1 X weekly while leaf bag assemblies are installed.
2. +/- 1 day

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150056	Gas Exchange Measurement System (GEMS)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Perform zeroing differential pressure procedures

8. Data Processing:
1. No data downlink required .
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir **Prime** ☒ **Contingent** ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:I:85

2. Session: Leaf Bag Assembly Removal **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: FD 28, 79, 130

4. Session Scenario:

Crewmember will remove Leaf Bag Assemblies before initiation of the first fixation session for each experiment. Leaf Bags will remain out until beginning on subsequent experiments.

5. Session Constraints:

1. Session must be performed before 1st Fixation session of each experiment.
2. +/- 1 day

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
410039	SVET Greenhouse Unit	1
820376	Leaf Bag Assembly	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	20	1	1	0	Disconnect air hoses, air manifolds, and leaf bags
25	25	1	1	0	Lift Light unit and remove leaf bags
15	15	1	1	0	Replace Light unit and stow leaf bags for use in subsequent plantings.

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☑
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:I:86

Session Type: Inflight

2. Session: 1st Fixation

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: FD 28, 79, 130

4. Session Scenario:
Crewmember will harvest three (3) plants from each row of the RM at day 13 of plant growth. Plants will be fixed, and stowed for return on STS-86.

5. Session Constraints:
1. Concurrence from ground before harvest begins.
2. Session can only be performed after the leaf bags have been removed.
3. Fixation should be performed as soon after harvesting as possible, therefore, session should not be interrupted.
4. +/- 1 day

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
410039	SVET Greenhouse Unit	1
854792	Standard Interface Glovebox (SIGB)	1
854962	Plant Fixative Kit #2	1
854963	Plant Fixative Kit #3	1
854969	SIGB Cleanup Kit	1
854973	FBI logbook kit	1
854974	Plant Fixative Kit #1	1
854977	Plant Harvest kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	1	0	Unstow harvest kit and plant fixative kit
15	15	1	1	0	Make observations and record in logbook.
30	30	1	1	0	Harvest plants and transport to SIGB located in Priroda module
45	45	1	1	0	Perform fixation in SIGB
15	15	1	1	0	Restow all hardware

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:I:87

Session Type: Inflight

2. Session: Pollination

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: FD 29, 30, 31, 32, 33, 34, 35, 80, 81, 82, 83, 84, 85, 86, 131, 132

4. Session Scenario:
Crewmember will use "beestick" to artificially pollinate the plants

5. Session Constraints:
1. Pollination must be performed for 5-7 consecutive days with no interruptions.
2. +/- 1 day
3. Pollination will begin when 3 plants of each seed type have open flowers.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
410039	SVET Greenhouse Unit	1
854966	Pollination Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Unstow Pollination Kit and retrieve appropriate vial
5	5	1	1	0	Remove "beestick" and attach to extension wand
35	35	1	1	0	Perform pollination, use new beestick for every cuvette and seed type
10	10	1	1	0	Replace wand and "beestick" in kit and restow kit

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:I:88

Session Type: Inflight

2. Session: Terminalization and Second Fixation

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: FD 33, 84

4. Session Scenario:
Crewmember will harvest two (2) plants from each row of the RM at day 18 of plant growth and then remove the tips of all remaining plants (terminalize). Plants and tips will be fixed, and stowed for return on STS-86.

5. Session Constraints:
1. Concurrence from ground before harvest begins.
2. Fixation should be performed as soon after harvesting as possible, therefore, the session should not be interrupted.
3. +/- 1 day

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
410039	SVET Greenhouse Unit	1
854792	Standard Interface Glovebox (SIGB)	1
854962	Plant Fixative Kit #2	1
854969	SIGB Cleanup Kit	1
854973	FBI logbook kit	1
854974	Plant Fixative Kit #1	1
854977	Plant Harvest kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	1	0	Unstow Harvest kit and Plant Fixative kit.
15	15	1	1	0	Make observations and record in logbook
30	30	1	1	0	Harvest plants and transport to SIGB located in Priroda module
45	45	1	1	0	Perform fixation in SIGB
15	15	1	1	0	Restow all hardware

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication required for verification of task completion.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:I:89

Session Type: Inflight

2. Session: Hard Drive (Winchester) Replacement

3. Session Timeline: **Crewtime Usage (mins):** 10 **Session Time (mins):** 10

Scheduled Days: FD 112

4. Session Scenario:
Crewmember will change out used hard disk with a new one.

5. Session Constraints:
1. Session must be performed prior to running program 2 for experiment 3
2. +/- 1 day

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854883	GEMS Laptop Computer	1
854884	Hard Disk Package	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
3	3	1	1	0	Unstow replacement hard drive
4	4	1	1	0	Exchange hard drive in laptop computer
3	3	1	1	0	Stow used hard drive for return on STS-86

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:I:90

Session Type: Inflight

2. Session: Leaf Bag Assembly Installation, Experiment 2 and 3

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 64, 114

4. Session Scenario:
Crewmember will assemble the leaf bag assemblies for use during the first 14 days of the plant growth.

5. Session Constraints:
1. Session can only be performed after root module and soil moisture probe installation.
2. +/- 1 day

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150056	Gas Exchange Measurement System (GEMS)	1
410039	SVET Greenhouse Unit	1
820376	Leaf Bag Assembly	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Unstow leaf bag assemblies
20	20	1	1	0	Install leaf bag assemblies

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:I:91

2. Session: Seed Strip Preparation

Session Type: Inflight

3. Session Timeline: **Crewtime Usage (mins):** 90 **Session Time (mins):** 90

Scheduled Days: FD 13, 64, 116

4. Session Scenario:
Crewmember will prepare seed strips for each planting using earth seeds and seeds collected in siliques from the first and second plantings.

5. Session Constraints:
1. Session cannot be performed before the final harvest of an experiment.
2. +/- 1 day

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
410039	SVET Greenhouse Unit	1
854967	Silique Collection Kit	1
854978	Seed Operations Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Unstow Seed Operations Kit and Silique collection kit from Mir stowage
70	70	1	1	0	Prepare seed strip for next experiment.
10	10	1	1	0	Restow kit until seed planting session

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:DEV:I:93

Session Type: Inflight

2. Session: Refill Water Container

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 64, 114

4. Session Scenario:
The Svet water container is refilled with water.

5. Session Constraints:
1. Session must be performed prior to seed planting.
2. +/- 1 day
3. Potable water must be used.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854881	Water container - Svet	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Obtain water container
20	20	1	1	0	Fill water container
5	5	1	1	0	Replace container to proper location

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir **Prime** ☑ **Contingent** ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:LOG:I:35

2. Session: Transfer Greenhouse Frozen Samples in GN2 Dewar to Shuttle **Session Type:** Down Item

3. Session Timeline: **Crewtime Usage (mins):** 17 **Session Time (mins):** 17

Scheduled Days: FD 7

4. Session Scenario:

Crewmember transfers harvested plant samples in GN2 insert and returns insert to middeck and stows in GN2 freezer dewar.

5. Session Constraints:

1. Session must be performed in conjunction with final harvest of third planting.
2. Session must occur during docked phase.
3. Time between completion of final harvest of third planting and stowage of samples in GN2 dewar cannot exceed 30 min.
4. +/- 1 day

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150112	GN2 Freezer/Dewer Experiment Assembly	1
854968	GN2 Freezer Insert	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
12	12	1	1	0	Remove GN2 dewar insert from temp stow location and load harvested plant samples
5	5	1	1	0	Return insert to shuttle middeck and stow in dewar

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication required for confirmation of task completion.

Mission: STS 86 (SM-07) **Invest. ID:** 890268 **Exp. ID:** Greenhouse - **Russian ID:** Greenhou

Invest. Title: Developmental Analysis of Seeds Grown on Mir

Prime ☒
Contingent ☐

US PI: Musgrave, Mary E. **Russian PI:** Levinskikh, Margarita

1. Session ID: FB:LOG:I:48

Session Type: Down Item

2. Session: Transfer Greenhouse - 3 Support hardware from Mir to Shuttle

3. Session Timeline: **Crewtime Usage (mins):** 90 **Session Time (mins):** 90

Scheduled Days: FD 4

4. Session Scenario:
Support hardware for the Greenhouse-3 experiment will be transported to Shuttle and stowed.

5. Session Constraints:
1. Must be performed during the docked phase
2. +/- 1 day

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854884	Hard Disk Package	3
854961	Root Module Return Kit #1 (with RM)	1
854962	Plant Fixative Kit #2	1
854963	Plant Fixative Kit #3	1
854964	Refrigerated Plant Fixative Kit	1
854965	Plant Dry Stowage Kit #3	1
854966	Pollination Kit	1
854967	Silique Collection Kit	1
854973	FBI logbook kit	1
854974	Plant Fixative Kit #1	1
854975	Plant Dry Stowage Kit #1	1
854979	Plant Dry Stowage Kit #2	1
855599	Root Module Return Kit #2 (with Root Module)	1
855600	Root Module Return Kit #3 (with Root Module)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
35	35	1	1	0	Unstow GH-3 Support hardware
55	55	1	1	0	Transport to Shuttle and stow

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication required for verification of task completion.

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Investigation ID: 9 **Experiment ID:** 598 **Russian ID:** Bone

Investigation Title: Bone Mineral Loss and Recovery after Shuttle/Mir Flights

US Investigators: Shackelford, Linda C.

Russian Investigators: Oganov, Viktor; Koslovskaya, Inessa; Morukov, Boris

Other Investigators: A. LeBlanc, H. Lane, S. Smith, S Siconolfi, L. Mallette

Payload Category: HLS **Sub-Cat.:** MS **Subjects Requested:**

Description: Our research group has participated in a joint Soviet/American research project to determine the bone mineral loss of cosmonauts after long duration space flight lasting from 4 to 12 months. This program was the first to study bone loss in weightlessness in a comprehensive manner and included measurements of the spine, hip, tibia, whole body and subregions of the whole body. To date 13 cosmonauts have been studied. While this study is extremely valuable, there is however only limited data on the very important issue of recovery of bone after return to 1-g. This proposal will measure the space flight-induced bone loss of the crewmembers of the Shuttle/Mir flights and follow the recovery with bone mineral measurements every six to twelve months for up to three years or until full recovery has occurred. In order to gain information on the role of muscular fitness with respect to bone loss and recovery, muscle strength testing will be performed at the same time points as bone mineral measurements. Muscular fitness will be used as an indicator of a crewmember's level of load-bearing physical activity throughout the study. Knowledge of the rate and degree of bone recovery is important not only for NASA, but for clinical investigators interested in reversing the effects of osteoporosis.

The effects of space flight on bone metabolism (e.g. changes in bone resorption and/or formation) can be assessed indirectly by measuring the serum and urinary levels of several markers of bone turnover. This information will compliment the densitometry data and may shed light on the mechanisms of altered bone metabolism during spaceflight. During the Phase 1B missions (NASA 7 and Mir 26), the study will be expanded by testing an inflight pharmaceutical countermeasure to bone loss. We will test the biophosphate alendronate, which acts by inhibiting bone resorption and which may therefore decrease or even prevent spaceflight induced bone loss.

Science Objectives: Determine the regional losses in bone mineral density and lean body mass of the three crewmembers of each of the Phase 1B flights. Determine the regional rate and extent of recovery of the bone mineral and lean tissue in the above crewmembers. Determine the muscle strength of the lower extremities and back before and after flight. Relate muscle strength data to the bone loss during flight and to the degree and rate of bone recovery postflight.

Determine pre- and postflight levels of serum and urinary markers of bone metabolism. Starting with Phase 1C missions, the objectives will be expanded to include the following: (1) determine the efficacy of a daily in-flight dose of alendronate in the prevention of spaceflight-induced bone loss; (2) measure inflight urinary excretion of alendronate; (3) monitor serum ionized calcium every two weeks while inflight; (4) measure serum and urinary markers of bone metabolism every six to twelve months for up to three years.

Functional Objectives: Crewmembers will participate in up to seven testing sessions each over a 3 year period. Bone densitometry and muscle strength testing will be performed two times before flight, once within one week following landing, and at 6 months, 12 months, 24 months, and 36 months postflight, or until complete recovery has been confirmed. Densitometry will be used to measure whole body and regional bone mineral and lean tissue mass. Muscular fitness (determined by isokinetic strength testing) will be used as an indicator of each crewmember's load-bearing physical activity throughout his or her participation in the study. Blood and urine markers of bone metabolism will be measured before flight (twice) and after flight (four times), with the final blood/urine measurements taking place at R+6 months. For Phase 1C missions, the functional objectives will be expanded to include several new objectives related to the alendronate countermeasure. Alendronate will be given to participating crewmembers as a daily dose throughout the entire Mir mission. Each crewmember will participate in a 3-day medical tolerance test of alendronate 30-60 days prior to flight. The efficacy of alendronate will be assessed by the pre and postflight bone densitometry measurements described earlier. Serum ionized calcium will be monitored every two weeks while inflight, and 24-hour inflight urine collection will be used to measure alendronate excretion. The serum and urinary markers of bone metabolism described above will continue past the 6-month time point to include measurements at R+12 months, 24 months, and 36 months.

Sample Transfer Rqd: Yes **Hardware Transfer Rqd:** No

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
1	Mir 18	3/14/95	☐	☒
2	Mir 21	2/21/96	☒	☒
2	NASA 2	3/22/96	☒	☒
3	Mir 22	8/17/96	☒	☒
3	NASA 3	9/16/96	☒	☒
4	Mir 23	2/2/97	☒	☒

4	NASA 4	1/16/97	☒	☒
5	Mir 24	6/24/97	☒	☒
5	NASA 5	5/15/97	☒	☒
6	Mir 25	12/12/97	☒	☒
6	NASA 6	9/18/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒
7	Mir 26	5/30/98	☒	☒
7	NASA 7	1/15/98	☒	☒
7	STS 89 (SM-08)	1/15/98	☒	☒
7	STS 91 (SM-09)	5/29/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
HLS	MET	Flight	15089	Pouch Kit Assembly, Preserved Urine Syringe
HLS	MET	Flight	150096	Frozen Saliva Kit
HLS	MET	Flight	820385	Sharps Containers
HLS	MET	Flight	820388	Metabolic Accessory Kit
HLS	MET	Flight	820389	Blood Tube Kit
HLS	MET	Flight	820395	Contingency Urine Collection Assembly
SMP	MET	Flight	820423	PCBA Cartridge Kit
HLS	MET	BDC	840386	Tracer Kit
HLS		BDC	846752	Blood Collection Kit
HLS		Flight	846757	Log Book, Metabolic(Sample)
			850987	Assy & Details, Container Urine Samples
HLS	MS	Flight	854832	Alendronate Kit

Mission: Mir 24 **Invest. ID:** 9 **Exp. ID:** 598 **Russian ID:** Bone

Invest. Title: Bone Mineral Loss and Recovery after Shuttle/Mir Flights **Prime** ☒ **Contingent** ☐

US PI: Shackelford, Linda C. **Russian PI:** Oganov, Viktor; Koslovskaya, Iness

1. Session ID: HLS:MS:P:35

2. Session: Familiarization Session - Bone and Mineral Loss **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 60

Scheduled Days: L- 180

4. Session Scenario:
Classroom instruction overview of investigation science, procedure and equipment.

5. Session Constraints:
1. None.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
846743	Carrier (insulated)	1
846744	Freezer packs	1
846751	Urine Bottles (Void-by-Void)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	2	0	Classroom instruction

8. Data Processing:
1. N/A

Mission: NASA 5 **Invest. ID:** 9 **Exp. ID:** 598 **Russian ID:** Bone

Invest. Title: Bone Mineral Loss and Recovery after Shuttle/Mir Flights **Prime** ☒ **Contingent** ☐

US PI: Shackelford, Linda C. **Russian PI:** Oganov, Viktor; Koslovskaya, Iness

1. Session ID: HLS:MS:P:30

2. Session: Familiarization Session - Bone and Mineral Loss **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 180

4. Session Scenario:

Classroom instruction overview of investigation science, procedure and equipment.

5. Session Constraints:

1. None.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
846743	Carrier (insulated)	1
846744	Freezer packs	1
846751	Urine Bottles (Void-by-Void)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	1	0	Classroom Instruction

8. Data Processing:

N/A for pre/postflight sessions

Mission: Mir 24 **Invest. ID:** 9 **Exp. ID:** 598 **Russian ID:** Bone

Invest. Title: Bone Mineral Loss and Recovery after Shuttle/Mir Flights

Prime ☑
Contingent ☐

US PI: Shackelford, Linda C. **Russian PI:** Oganov, Viktor; Koslovskaya, Iness

1. Session ID: HLS:MS:P:33

Session Type: BDC

2. Session: Blood and Urine Markers - Mir Crew

3. Session Timeline: **Crewtime Usage (mins):** 50 **Session Time (mins):** 25

Scheduled Days: L- 7, 30

4. Session Scenario:
Blood samples and a 48 hour urine collection will be used to measure bone markers..

5. Session Constraints:
1. Crewmembers must fast for 10 hrs prior to blood collection.
2. Return urine samples to lab at least once every 24 hours.
3. Urine samples must be kept chilled.
4. One session is required between 3 and 7 days prior to launch.
5. Exact performance days are estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150077	Blood Collection System	1
820329	Logbook	1
846743	Carrier (insulated)	1
846744	Freezer packs	4
846751	Urine Bottles (Void-by-Void)	20

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	0	0	0	2	Blood draw
10	0	0	0	2	Urine collection for 48 hrs

8. Data Processing:

N/A

Mission: Mir 24 **Invest. ID:** 9 **Exp. ID:** 598 **Russian ID:** Bone

Invest. Title: Bone Mineral Loss and Recovery after Shuttle/Mir Flights **Prime** ☒ **Contingent** ☐

US PI: Shackelford, Linda C. **Russian PI:** Oganov, Viktor; Koslovskaya, Iness

1. Session ID: HLS:MS:P:4

Session Type: BDC

2. Session: BDC - Bone and Mineral Loss and Recovery (Mir Crew)

3. Session Timeline: **Crewtime Usage (mins):** 320 **Session Time (mins):** 160

Scheduled Days: L- 30, 60

4. Session Scenario:

Bone densitometry scans and strength testing will be performed 2 times preflight. Radiation exposure will be logged.

5. Session Constraints:

1. Subject must remove all metal (i.e. jewelry) or clothes containing metal prior to scans. Clothing will be provided.
2. Session for Mir cosmonauts.
3. No radioisotopes or radio-opaques contrast agents for one week prior to study.
4. First densitometry session can be scheduled between 180 and 60 days preflight.
5. All scans should be performed on the same densitometer in Russia.
6. No exercise for 24 hours pre-LIDO session.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
110014	Hologic 1000 (Russia)	1
846750	LIDO System (Russia)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
75	0	0	0	2	Bone densitometry
80	0	0	0	2	Strength testing
5	0	0	0	2	Radiation exposure log

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 9 **Exp. ID:** 598 **Russian ID:** Bone

Invest. Title: Bone Mineral Loss and Recovery after Shuttle/Mir Flights

Prime ☒
Contingent ☐

US PI: Shackelford, Linda C. **Russian PI:** Oganov, Viktor; Koslovskaya, Iness

1. Session ID: HLS:MS:P:11

Session Type: BDC

2. Session: BDC - Bone and Mineral Loss and Recovery (NASA Crew)

3. Session Timeline: **Crewtime Usage (mins):** 160 **Session Time (mins):** 160

Scheduled Days: L- 30, 60

4. Session Scenario:

Bone densitometry scans and strength testing will be performed 2 times preflight. Radiation exposure will be logged.

5. Session Constraints:

1. Subject must remove all metal (i.e. jewelry) or clothes containing metal prior to scans. Clothing will be provided.
2. Session for NASA astronaut.
3. Densitometry testing must be done in the U.S.on the same machine.
4. First densitometry session can be scheduled between 180 and 60 days preflight.
5. No radioisotopes or radio opaque contrast agents for one week prior to study.
6. No exercise for 24 hours pre-LIDO test.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
110015	Hologic 2000 (U.S.)	1
840388	LIDO Systems (U.S.)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
75	0	0	0	1	Bone densitometry
80	0	0	0	1	Strength testing
5	0	0	0	1	Radiation exposure log

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 9 **Exp. ID:** 598 **Russian ID:** Bone

Invest. Title: Bone Mineral Loss and Recovery after Shuttle/Mir Flights **Prime** ☒ **Contingent** ☐

US PI: Shackelford, Linda C. **Russian PI:** Oganov, Viktor; Koslovskaya, Iness

1. Session ID: HLS:MS:P:34

2. Session: Blood and Urine Markers - NASA Crew **Session Type:** BDC

3. Session Timeline: **Crewtime Usage (mins):** 25 **Session Time (mins):** 25

Scheduled Days: L- 3, 30

4. Session Scenario:

Blood samples and a 48 hour urine collection will be used to measure bone markers.

5. Session Constraints:

1. Crewmembers must fast for 10 hrs prior to blood collection.
2. Return urine samples to lab at least once every 24 hours.
3. Urine samples must be kept chilled.
4. One session is required between 3 and 7 days prior to launch.
5. Exact performance days are estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150077	Blood Collection System	1
820329	Logbook	1
846743	Carrier (insulated)	1
846744	Freezer packs	4
846751	Urine Bottles (Void-by-Void)	20

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	0	0	0	1	Blood draw
10	0	0	0	1	Urine collection for 48 hrs

8. Data Processing:

N/A

Mission: Mir 24 **Invest. ID:** 9 **Exp. ID:** 598 **Russian ID:** Bone

Invest. Title: Bone Mineral Loss and Recovery after Shuttle/Mir Flights **Prime** ☒ **Contingent** ☐

US PI: Shackelford, Linda C. **Russian PI:** Oganov, Viktor; Koslovskaya, Iness

1. Session ID: HLS:MS:R:12

Session Type: Postflight

2. Session: Blood and Urine Markers - Mir crew

3. Session Timeline: **Crewtime Usage (mins):** 50 **Session Time (mins):** 25

Scheduled Days: R+ 0, 7, 14, 180

4. Session Scenario:

Blood samples and a 48 hour urine collection will be used to measure bone markers.

5. Session Constraints:

1. Crewmembers must fast for 10 hrs prior to blood collection.
2. Return urine samples to lab at least once every 24 hours.
3. Urine samples must be kept chilled.
4. Exact performance days are estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820329	Logbook	2
846743	Carrier (insulated)	2
846744	Freezer packs	8
846751	Urine Bottles (Void-by-Void)	40
846752	Blood Collection Kit	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	0	0	0	2	Blood draw
10	0	0	0	2	Urine collection for 48 hrs

8. Data Processing:

N/A

Mission: Mir 24 **Invest. ID:** 9 **Exp. ID:** 598 **Russian ID:** Bone

Invest. Title: Bone Mineral Loss and Recovery after Shuttle/Mir Flights **Prime** ☒ **Contingent** ☐

US PI: Shackelford, Linda C. **Russian PI:** Oganov, Viktor; Koslovskaya, Iness

1. Session ID: HLS:MS:R:4

2. Session: Postflight - Bone and Mineral Loss and Recovery (Mir Crew) **Session Type:** Postflight

3. Session Timeline: **Crewtime Usage (mins):** 320 **Session Time (mins):** 160

Scheduled Days: R+ 5, 180, 360, 720, 1080

4. Session Scenario:

Bone densitometry scans and strength testing will be performed 5 times postflight. Radiation exposure will be logged.

5. Session Constraints:

1. Subject must remove all metal (i.e. jewelry) or clothes containing metal prior to scans. Clothing will be provided.
2. No radioisotopes or contrast solutions one week prior to study.
3. Densitometry should be performed on the same machine in Russia.
4. One data collection during first week (R+3 to 7 days for DEXA; R+5 to 7 days for LIDO).
5. Exact performance days have been estimated.
6. LIDO constraint - no exercise for 24 hrs pre test.
7. Session for returning Mir cosmonauts.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
110014	Hologic 1000 (Russia)	1
846750	LIDO System (Russia)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
75	0	0	0	2	Bone densitometry
80	0	0	0	2	Strength testing
5	0	0	0	2	Radiation exposure log

8. Data Processing:

1. N/A for postflight sessions.

Mission: NASA 5 **Invest. ID:** 9 **Exp. ID:** 598 **Russian ID:** Bone

Invest. Title: Bone Mineral Loss and Recovery after Shuttle/Mir Flights **Prime** ☒ **Contingent** ☐

US PI: Shackelford, Linda C. **Russian PI:** Oganov, Viktor; Koslovskaya, Iness

1. Session ID: HLS:MS:R:10

2. Session: Postflight - Bone and Mineral Loss and Recovery (NASA Crew) **Session Type:** Postflight

3. Session Timeline: **Crewtime Usage (mins):** 160 **Session Time (mins):** 160

Scheduled Days: R+ 5, 180, 360, 720, 1080

4. Session Scenario:

Bone densitometry scans and strength testing will be performed 5 times postflight. Radiation exposure will be logged.

5. Session Constraints:

1. Subject must remove all metal (i.e. jewelry) or clothes containing metal prior to scans. Clothing will be provided.
2. No radioisotopes or contrast solutions one week prior to study.
3. Densitometry should be performed on the same machine in Russia.
4. One data collection during first week (R+3 to 7 days for DEXA; R+5 to 7 days for LIDO).
5. Exact performance days have been estimated.
6. LIDO constraint - no exercise for 24 hrs pre test.
7. Session for returning NASA astronaut.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
110015	Hologic 2000 (U.S.)	1
840388	LIDO Systems (U.S.)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
75	0	0	0	1	Bone densitometry
80	0	0	0	1	Strength testing
5	0	0	0	1	Radiation exposure log

8. Data Processing:

1. N/A for postflight sessions.

Mission: NASA 5 **Invest. ID:** 9 **Exp. ID:** 598 **Russian ID:** Bone

Invest. Title: Bone Mineral Loss and Recovery after Shuttle/Mir Flights

Prime ☒
Contingent ☐

US PI: Shackelford, Linda C. **Russian PI:** Oganov, Viktor; Koslovskaya, Iness

1. Session ID: HLS:MS:R:13

Session Type: Postflight

2. Session: Blood and Urine Markers - NASA crew

3. Session Timeline: **Crewtime Usage (mins):** 25 **Session Time (mins):** 25

Scheduled Days: R+ 0, 7, 14, 180

4. Session Scenario:
Blood samples and a 48 hour urine collection will be used to measure bone markers

5. Session Constraints:
1. Crewmembers must fast for 10 hrs prior to blood collection.
2. Return urine samples to lab at least once every 24 hours.
3. Urine samples must be kept chilled.
4. Exact performance days are estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820329	Logbook	1
846743	Carrier (insulated)	1
846744	Freezer packs	4
846751	Urine Bottles (Void-by-Void)	20
846752	Blood Collection Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	0	0	0	1	Blood draw
10	0	0	0	1	Urine collection for 48 hrs

8. Data Processing:

1. N/A

Investigation ID: 110019 **Experiment ID:** 639 **Russian ID:** Sleep

Investigation Title: Sleep Investigations (639/663/710)

US Investigators: Monk, Timothy, Ph.D

Russian Investigators: Ponomareva, Irina; Larina, Irina

Other Investigators: Moldofsky, Harvey, Ph.D. Hobson, Allen, Ph.D., Stickgold, Robert, Ph.D.

Payload Category: HLS **Sub-Cat.:** MET **Subjects Requested:** 12

Description: Hypotheses:
Vestibular adaptation both provokes and is enhanced by REM sleep under both ground-based and space conditions. Immune Function is altered during sleep in microgravity. Circadian physiology is altered in microgravity. Postflight, sleep, circadian rhythm, and immune function will return to baseline levels and be indistinguishable within 3 months.

Science Objectives:
1. Examine the immune system alterations in microgravity as it relates to sleep .
2. Obtain long term data on the physiology and behavior of human sleep under prolonged microgravity conditions.
3. Study interactions between altered vestibular inputs and sleep in ground-based experiments.

Functional Objectives:
1. Presleep questionaire completion.
2. Complete mood and activation tests (5 times per day), oral temperature measurements (5 times per day), and performance test (once per day).
3. Don Headband and wear during sleep.
4. Blood draws mid and late during the mission.
5. MSRR recording mid and late during the mission.
6. Mid-sleep awakening/dream recording if subject wakes up mid sleep.
7. Awakening and complete post-sleep questionnaire.

Sample Transfer Rqd: Yes **Hardware Transfer Rqd:** Yes

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
3	STS 79 (SM-04)	9/16/96	☐	☒
4	Mir 23	2/2/97	☒	☒
4	NASA 4	1/16/97	☒	☒
4	STS 81 (SM-05)	1/16/97	☒	☒
5	Mir 24	6/24/97	☒	☒
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
SMP	SHR	Back Up	150100	Thermal Electric Freezer (TEF)
HLS	SHR	Flight	150104	Centrifuge
HLS	NEU	Flight	390136	Night Headband Kit
HLS	SHR	Flight	820340	MIPS-2L Laptop Computer
HLS	MET	Flight	820385	Sharps Containers
MET1	MET	Flight	820390	Blood Collection Belt
SHR	SHR	Flight	820433	MIPS-2C Controller
OPS		Flight	820467	MIPS-2L computer data cable
OPS		Flight	846720	MIPS2 Optical Disks
HLS		Flight	846737	Blood Tube (frozen)
HLS		Flight	846755	Thermal Electric Holding Facility (TEHOF) - 20 degrees C
HLS		Flight	846757	Log Book, Metabolic(Sample)
HLS	SHR	Flight	852241	Barcode and Data Logger (BDL) Assy.
HLS	MET	Flight	854888	Sleep Blood Collection Kit
HLS	MET	Flight	854889	Sleep Blood Tube Kit
HLS	MET	Flight	854890	Medilog Sleep Research Recorder (MSRR) Assy Kit

Mission: Mir 24 **Invest. ID:** 110019 **Exp. ID:** 639 **Russian ID:** Sleep

Invest. Title: Sleep Investigations (639/663/710)

Prime ☒
Contingent ☐

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

1. Session ID: HLS:MET:P:119

Session Type: Training

2. Session: Phlebotomy Training - Sleep/Immune Function

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 120

Scheduled Days: L- 30, 60, 90, 120, 150, 180, 265, 270, 275, 285

4. Session Scenario:
Crew will become familiar with blood collection hardware and will be trained to collect blood samples.

5. Session Constraints:
1. None at this time

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854888	Sleep Blood Collection Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	2	0	Blood collection training session

8. Data Processing:
1. N/A for pre/post flight sessions

Mission: Mir 24 **Invest. ID:** 110019 **Exp. ID:** 639 **Russian ID:** Sleep

Invest. Title: Sleep Investigations (639/663/710)

Prime ☒
Contingent ☐

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

1. Session ID: HLS:MET:P:50

Session Type: Training

2. Session: Familiarization - Sleep and Circadian Physiology

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 120

Scheduled Days: L- 180

4. Session Scenario:

Orientation session will cover basic sleep and circadian physiology theories of sleep and circadian rhythms; especially as related to temperature, performance, mood, activation, pain, and immune functions. Methods of data collection for temperature, mood, performance, activation, pain, and blood collection and assay preparation will also be covered.

5. Session Constraints:

1. Session must take place no earlier than L-180 days.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150100	Thermal Electric Freezer (TEF)	1
150104	Centrifuge	1
390136	Night Headband Kit	1
820385	Sharps Containers	1
820390	Blood Collection Belt	1
846755	Thermal Electric Holding Facility (TEHOF) - 20 degrees C	1
848763	ThinkPad	1
854888	Sleep Blood Collection Kit	1
854889	Sleep Blood Tube Kit	1
854890	Medilog Sleep Research Recorder (MSRR) Assy Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	2	0	Classroom instruction.

8. Data Processing:

N/A

Mission: Mir 24 **Invest. ID:** 110019 **Exp. ID:** 639 **Russian ID:** Sleep

Invest. Title: Sleep Investigations (639/663/710)

Prime ☒
Contingent ☐

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

1. Session ID: HLS:MET:P:61

Session Type: Training

2. Session: Task Training

3. Session Timeline: **Crewtime Usage (mins):** 340 **Session Time (mins):** 170

Scheduled Days: L- 60, 180

4. Session Scenario:
Eight specific tasks require training to ensure proper data collection: 1) Oral Temperature measurement; 2) Performance Tests; 3) Mood and Activation Tests; 4) Pre- and Post- Sleep Questionnaires; 5) Electrode placement for MSRR; 6) Operation of MSRR; 7) Blood collection and processing introduction; 8) Night Headband operation.

5. Session Constraints:
1. Session may take place no earlier than L-180 days.
2. Electrode placement training could be done in conjunction with the crew's preflight assessment, less than 6 months but more than 1 month prior to the mission.
3. Exact performance days have been estimated.
4. Blood collection/processing will occur with other investigator's training.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150100	Thermal Electric Freezer (TEF)	1
150104	Centrifuge	1
390136	Night Headband Kit	1
820385	Sharps Containers	1
820390	Blood Collection Belt	1
820431	MIPS-2L Laptop	2
846755	Thermal Electric Holding Facility (TEHOF) - 20 degrees C	1
848763	ThinkPad	1
854888	Sleep Blood Collection Kit	1
854889	Sleep Blood Tube Kit	1
854890	Medilog Sleep Research Recorder (MSRR) Assy Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	0	0	2	0	Temperature Measurement
30	0	0	2	0	Performance Tests
20	0	0	2	0	Mood and Activation Tests
20	0	0	2	0	Sleep Questionnaires
30	0	0	2	0	Electrode Placement
30	0	0	2	0	MSRR Training
25	0	0	2	0	Night Headband training
5	0	0	2	0	Blood Collection/Processing Introduction

8. Data Processing:

N/A

Mission: Mir 24 **Invest. ID:** 110019 **Exp. ID:** 639 **Russian ID:** Sleep

Invest. Title: Sleep Investigations (639/663/710)

Prime ☒
Contingent ☐

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

1. Session ID: HLS:MET:P:70

2. Session: Ground Based Night Headband Training

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 90

Scheduled Days: L- 36, 60

4. Session Scenario:

Subjects practice donning, activating, and doffing the Night Headband. Downloading and analyses of data will be discussed. Subjects will complete a pre- and postsleep questionnaire, and practice using the Pearlcorder for fictive movement reports. Battery change outs for the Night Headband and Pearlcorder as well as tape change out for the Pearlcorder are practiced. Troubleshooting the hardware is discussed.

5. Session Constraints:

1. Session #1 must take place before L-59 days.
2. Session #2 must take place before L-35 days.
3. Thinkpad has data collection software and questionnaires installed.
4. Exact performance days have been estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390136	Night Headband Kit	2
848763	ThinkPad	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
90	0	0	2	0	Night Headband Training

8. Data Processing:

N/A

Mission: Mir 24 **Invest. ID:** 110019 **Exp. ID:** 639 **Russian ID:** Sleep

Invest. Title: Sleep Investigations (639/663/710)

Prime ☑
Contingent ☐

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

1. Session ID: HLS:MET:P:72

Session Type: Training

2. Session: Mir Night Headband Training

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 60

Scheduled Days: L- 54

4. Session Scenario:

Cosmonauts will repeat, in the simulated Mir environment, all steps of the Night Headband use which they will perform in flight following docking. In addition, cosmonauts will learn and practice unstowing the Night Headband and related equipment aboard the Mir. Uploading the Night Headband data to the Thinkpad and downlinking the data to MCC will be practiced.

5. Session Constraints:

1. Training should occur after the first preflight sleep monitoring period (L-59 to L-55 days).
2. Training must take place at a NASA/RSA facility which can provide simulated Mir environment.
3. Exact performance days have been estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390136	Night Headband Kit	2
848763	ThinkPad	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	2	0	Mir Night Headband Training

8. Data Processing:

N/A

Mission: NASA 5 **Invest. ID:** 110019 **Exp. ID:** 639 **Russian ID:** Sleep

Invest. Title: Sleep Investigations (639/663/710)

Prime ☒
Contingent ☐

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

1. Session ID: HLS:MET:P:100

Session Type: Training

2. Session: Familiarization - Sleep and Circadian Physiology

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: L- 210

4. Session Scenario:
Orientation session will cover basic sleep and circadian physiology theories of sleep and circadian rhythms; especially as related to temperature, performance, mood, activation, pain, and immune functions. Methods of data collection for temperature, mood, performance, activation, pain, and blood collection and assay preparation will also be covered.

5. Session Constraints:
1. Session must take place no earlier than L-180 days.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150100	Thermal Electric Freezer (TEF)	1
150104	Centrifuge	1
390136	Night Headband Kit	1
820385	Sharps Containers	1
820390	Blood Collection Belt	1
846755	Thermal Electric Holding Facility (TEHOF) - 20 degrees C	1
848763	ThinkPad	1
854888	Sleep Blood Collection Kit	1
854889	Sleep Blood Tube Kit	1
854890	Medilog Sleep Research Recorder (MSRR) Assy Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	1	0	Classroom instruction.

8. Data Processing:

N/A

Mission: NASA 5 **Invest. ID:** 110019 **Exp. ID:** 639 **Russian ID:** Sleep

Invest. Title: Sleep Investigations (639/663/710)

Prime ☒
Contingent ☐

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

1. Session ID: HLS:MET:P:118

Session Type: Training

2. Session: Phlebotomy Training - Sleep/Immune Function

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: L- 30, 60, 90, 120, 150, 180, 265, 270, 275, 285

4. Session Scenario:
Crew will become familiar with blood collection hardware and will be trained to collect blood samples.

5. Session Constraints:
1. None at this time

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854888	Sleep Blood Collection Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	1	0	Blood collection training session

8. Data Processing:
1. N/A for pre/post flight sessions

Mission: NASA 5 **Invest. ID:** 110019 **Exp. ID:** 639 **Russian ID:** Sleep

Invest. Title: Sleep Investigations (639/663/710)

Prime ☒
Contingent ☐

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

1. Session ID: HLS:MET:P:93

Session Type: Training

2. Session: Task Training

3. Session Timeline: **Crewtime Usage (mins):** 170 **Session Time (mins):** 170

Scheduled Days: L- 60, 180

4. Session Scenario:

Eight specific tasks require training to ensure proper data collection: 1) Oral Temperature measurement; 2) Performance Tests; 3) Mood and Activation Tests; 4) Pre- and Post- Sleep Questionnaire; 5) Electrode placement for MSRR;6) Operation of MSRR; 7) Blood collection and processing introduction; 8) Night Headband operation.

5. Session Constraints:

1. Session may take place no earlier than L-180 days.
2. Electrode placement training could be done in conjunction with the crew's preflight assessment, less than 6 months but more than 1 month prior to the mission.
3. Exact performance days have been estimated.
4. Blood collection/processing will occur with other investigator's training.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150100	Thermal Electric Freezer (TEF)	1
150104	Centrifuge	1
390136	Night Headband Kit	1
820385	Sharps Containers	1
820390	Blood Collection Belt	1
820431	MIPS-2L Laptop	1
846755	Thermal Electric Holding Facility (TEHOF) - 20 degrees C	1
848763	ThinkPad	1
854888	Sleep Blood Collection Kit	1
854889	Sleep Blood Tube Kit	1
854890	Medilog Sleep Research Recorder (MSRR) Assy Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	0	0	1	0	Temperature Measurement
30	0	0	1	0	Performance Tests
20	0	0	1	0	Mood and Activation Tests
20	0	0	1	0	Sleep Questionnaire
30	0	0	1	0	Electrode Placement
30	0	0	1	0	MSRR Training
25	0	0	1	0	Night Headband training
5	0	0	1	0	Blood Collection/Processing Introduction

8. Data Processing:

N/A

Mission: NASA 5 **Invest. ID:** 110019 **Exp. ID:** 639 **Russian ID:** Sleep

Invest. Title: Sleep Investigations (639/663/710)

Prime ☒
Contingent ☐

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

1. Session ID: HLS:MET:P:94

Session Type: Training

2. Session: Ground Based Night Headband Training

3. Session Timeline: **Crewtime Usage (mins):** 90 **Session Time (mins):** 90

Scheduled Days: L- 36, 60

4. Session Scenario:

Subjects practice donning, activating, and doffing the Night Headband. Downloading and analyses of data will be discussed. Subjects will complete a pre- and postsleep questionnaire, and practice using the Pearlcorder for fictive movement reports. Battery change outs for the Night Headband and Pearlcorder as well as tape change out for the Pearlcorder are practiced. Troubleshooting the hardware is discussed.

5. Session Constraints:

1. Session #1 must take place before L-59 days.
2. Session #2 must take place before L-35 days.
3. Thinkpad will also have questionnaire and data collection software installed.
4. Exact performance days have been estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390136	Night Headband Kit	1
848763	ThinkPad	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
90	0	0	1	0	Night Headband Training

8. Data Processing:

N/A

Mission: NASA 5 **Invest. ID:** 110019 **Exp. ID:** 639 **Russian ID:** Sleep

Invest. Title: Sleep Investigations (639/663/710)

Prime ☒
Contingent ☐

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

1. Session ID: HLS:MET:P:96

Session Type: Training

2. Session: Mir Night Headband Training

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 54

4. Session Scenario:

Subject will repeat, in the simulated Mir environment, all steps of the Night Headband use which they will perform in flight following docking. In addition, the subject will learn and practice unstowing the Night Headband and related equipment aboard the Mir. Uploading the Night Headband data to the Thinkpad and downlinking the data to MCC will be practiced.

5. Session Constraints:

1. Training should occur after the first preflight sleep monitoring period (L-59 to L-55 days).
2. Training must take place at a NASA/RSA facility which can provide simulated Mir environment.
3. Exact performance days have been estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390136	Night Headband Kit	1
848763	ThinkPad	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	1	0	Mir Night Headband Training

8. Data Processing:

N/A

Mission: Mir 24 **Invest. ID:** 110019 **Exp. ID:** 639 **Russian ID:** Sleep

Invest. Title: Sleep Investigations (639/663/710) **Prime** ☒ **Contingent** ☐

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

1. Session ID: HLS:MET:P:73

2. Session: Night Headband Recording & Presleep Questionnaire **Session Type:** BDC

3. Session Timeline: **Crewtime Usage (mins):** 16 **Session Time (mins):** 8

Scheduled Days: L- 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91

4. Session Scenario:

Prior to going to sleep, subjects will complete the pre-sleep questionnaire, don the Night Headband, attach an eyelid sensor, activate the Night Headband, check the battery status light and go to sleep. The battery is changed on L- 21, L-53, & L-85 days. The Pearlcorder should be left within reach for use during mid sleep awakenings and in the morning.

5. Session Constraints:

1. If a shift of more than 2 days is necessary, 12 day recording periods should be shifted so that there are at least 20 days between the end of the first block and the start of the second block.
2. The timing of the first recording period should be coordinated with Immune Function BDC sessions. The immune function session should follow the first recording period.
3. Sessions should occur at least 5 days after overseas travel.
4. Thinkpad will have data collection software and questionnaires installed.
5. No air currents should be blowing across the face (i.e. fans)
6. The first BDC session must occur in US. Performance days are estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390136	Night Headband Kit	2
848763	ThinkPad	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
8	0	0	0	2	Presleep Questionnaire, don Night Headband and sensor.

8. Data Processing:

N/A

Mission: Mir 24 **Invest. ID:** 110019 **Exp. ID:** 639 **Russian ID:** Sleep

Invest. Title: Sleep Investigations (639/663/710)

Prime ☒
Contingent ☐

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

1. Session ID: HLS:MET:P:74

2. Session: Sleep/Wake Immune Functions

Session Type: BDC

3. Session Timeline: **Crewtime Usage (mins):** 1620 **Session Time (mins):** 1410

Scheduled Days: L- 55, 56

4. Session Scenario:

For each subject, one session of physiologic monitoring of sleep/wakefulness, comprising of an overnight acclimatization to the sleep laboratory followed by serial venous blood sampling for 24 hours during wakefulness and sleep, for the purpose of assessing immune and neuro endocrine functions. The pre- and postsleep questionnaires will be completed for both days.

5. Session Constraints:

1. The session may occur at any point less than 10 months prior to launch following as soon as possible after the Night Headband sleep recording session.
2. Minimize use of alcohol or caffeine beverages, or nicotine on the day prior to the circadian sleep/wake study.
3. Minimize use of sedative/hypnotics, alcohol, nicotine, or caffeine the day prior to and throughout the study.
4. Each subject will attend one session in the sleep environment starting approximately two hours before bedtime for preparation for surface wire electrode application to the body (to monitor sleep/wake physiology) and for insertion of heparinized venous catheter for blood sampling of circadian immune functions.
5. Session must occur in US on weekdays.
6. Thinkpad will be installed with survey questionnaires.
7. Session will occur after at least 4 nights of Headband recording.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150077	Blood Collection System	2
820385	Sharps Containers	1
848763	ThinkPad	1
854890	Medilog Sleep Research Recorder (MSRR) Assy Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	0	0	0	2	Catheter insertion
15	0	0	0	2	Blood collection (T=8 am)
90	0	0	0	0	Break (1.5 hours)
15	0	0	0	2	Blood collection (T=10 am)
90	0	0	0	0	Break (1.5 hours)
15	0	0	0	2	Blood collection (T=12 pm)
90	0	0	0	0	Break (1.5 hours)
15	0	0	0	2	Blood collection (T=2 pm)
90	0	0	0	0	Break (1.5 hours)
15	0	0	0	2	Blood collection (T=4 pm)
240	0	0	0	0	Break (4 hours)
120	0	0	0	2	Instrumentation for MSRR, Night headband and blood collection

600	0	0	0	2	Overnight blood collection (blood draws every half hour starting 10 pm and ending 8 am)

8. Data Processing:

N/A

Mission: Mir 24 **Invest. ID:** 110019 **Exp. ID:** 639 **Russian ID:** Sleep

Invest. Title: Sleep Investigations (639/663/710)

Prime ☒
Contingent ☐

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

1. Session ID: HLS:MET:P:91

Session Type: BDC

2. Session: Doff Night Headband & Postsleep Questionnaire

3. Session Timeline: **Crewtime Usage (mins):** 44 **Session Time (mins):** 22

Scheduled Days: L- 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90

4. Session Scenario:
Upon waking a dream report is dictated, then the Night Headband is turned off, doffed and the eyelid sensor removed. The post-sleep questionnaire is completed.

5. Session Constraints:
1. If a shift of more than 2 days is necessary, 12 day recording periods should be shifted so that there are at least 20 days between the end of the first block and the start of the second block.
2. The timing of the first recording period should be coordinated with Immune Function BDC sessions. The immune function session should follow the first recording period.
3. The first BDC session must occur in the U.S. Performance days are estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390136	Night Headband Kit	2
848763	ThinkPad	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
7	0	0	0	2	Dictate a dream report with special attention to imagined movements.
2	0	0	0	2	Deactivate the Night Headband monitor. Doff headband and sensor.
3	0	0	0	2	Power on Thinkpad.
5	0	0	0	2	Complete Postsleep questionnaire.
5	0	0	0	2	Download the Night Headband data, review data and note any anomalies.

8. Data Processing:

N/A

Mission: STS 84 (SM-06) **Invest. ID:** 110019 **Exp. ID:** 639 **Russian ID:** Sleep

Invest. Title: Sleep Investigations (639/663/710) **Prime** ☒ **Contingent** ☐

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

1. Session ID: HLS:LOG:I:86

2. Session: Transfer - Sleep Investigation H/W from Shuttle to Mir **Session Type:** Up Item

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 6

4. Session Scenario:

Items are transferred from the Shuttle to the Mir

5. Session Constraints:

1. Session can be performed in conjunction with other up item sessions to optimize crew time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390136	Night Headband Kit	4
820385	Sharps Containers	1
820390	Blood Collection Belt	1
854888	Sleep Blood Collection Kit	3
854889	Sleep Blood Tube Kit	1
854890	Medilog Sleep Research Recorder (MSRR) Assy Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	30	1	1	0	Transfer experiment items from Shuttle to Mir

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: Mir 24 **Invest. ID:** 110019 **Exp. ID:** 639 **Russian ID:** Sleep

Invest. Title: Sleep Investigations (639/663/710) **Prime** ☒ **Contingent** ☐

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

1. Session ID: HLS:MET:I:36

2. Session: Night Headband - Presleep **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 38 **Session Time (mins):** 28

Scheduled Days: FD 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151

4. Session Scenario:

Crewmembers will complete measurements relating to the combined sleep protocol for measurement blocks spread throughout the mission. The preferred session is 12 consecutive days, labeled a "block". Each evening of this block prior to sleep, mood and activation testing occur followed by oral temperature measurements . A presleep questionnaire is completed at the end of each work day prior to sleep. Then, the crewmember dons the Night Headband, attaches the eyelid sensor, activates the hardware, checks the battery status light, and goes to sleep. The Night Headband battery is changed before each session "block" and after 6 days of consecutive monitoring. The Pearlcorder will be placed within reach for use during mid-sleep awakenings and in the morning.

5. Session Constraints:

1. The final measurement block should be within 4 weeks of return.
2. Night Headband monitor should be started at lights-out (or its equivalent) after subject is "in bed".
3. Mood and activation tests (and concurrent oral temperature recording) should be scheduled , last thing at "night" (before retiring to bed). This session should be scheduled at least 30 minutes after exercise, bathing, or the ingestion of food or drink.
4. Subjects must sleep without significant air current blowing in their faces (e.g. fans).
5. In the event of an EVA, the session blocks may be moved after the EVA.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390136	Night Headband Kit	2
820340	MIPS-2L Laptop Computer	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow diskette and set-up MIPS 2L
5	5	1	0	2	Mood Activation Test with Oral Temp
1	1	1	0	2	Pre-sleep questionnaire
3	3	1	1	0	Stow diskette and stow MIPS-2L
5	5	1	1	0	Unstow Night Headband kit
3	3	1	1	0	Change battery (FDs 29, 78, 85, 140, 147)
1	1	1	0	2	Prepare Night headband and Eyelid Sensor
3	3	1	0	2	Don Night headband, apply sensor, and activate H/W.
2	2	1	1	0	Place voice recorder nearby subject

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: Mir 24 **Invest. ID:** 110019 **Exp. ID:** 639 **Russian ID:** Sleep

Invest. Title: Sleep Investigations (639/663/710)

Prime ☒
Contingent ☐

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

1. Session ID: HLS:MET:I:40

2. Session: MIPS Data Download

Session Type: Inflight

3. Session Timeline: **Crewtime Usage (mins):** 8 **Session Time (mins):** 4

Scheduled Days: FD 27, 34, 83, 90, 145, 152

4. Session Scenario:
Data is downloaded from the MIPS laptop to the MIPS optical disk.

5. Session Constraints:
1. Night Headband downloading to MIPS-2L must take place prior to this session.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820340	MIPS-2L Laptop Computer	2
820433	MIPS-2C Controller	1
820467	MIPS-2L computer data cable	1
846720	MIPS2 Optical Disks	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
2	2	1	0	2	Set up link with computer
2	2	1	0	2	Complete data transfer

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: Mir 24 **Invest. ID:** 110019 **Exp. ID:** 639 **Russian ID:** Sleep

Invest. Title: Sleep Investigations (639/663/710)

Prime ☒
Contingent ☐

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

1. Session ID: HLS:MET:I:43

Session Type: Inflight

2. Session: Blood Collection and Processing

3. Session Timeline: **Crewtime Usage (mins):** 160 **Session Time (mins):** 400

Scheduled Days: FD 81, 82, 143, 144

4. Session Scenario:

Each subject gives 4 blood samples per day for 2 consecutive days twice during the mission. The first 2-day period occurs mid-way through the mission and the second two day period occurs late in the mission. A butterfly needle will be inserted into the arm and blood will be drawn. Two blood samples will be drawn mid-afternoon (~2pm) and two blood samples will be drawn prior to sleep. The butterfly needle is removed after each draw. Blood tubes will be scanned with the Barcode Data Logger or tube number is registered in Logbook.

5. Session Constraints:

1. Each crewmember will complete two in-flight sessions covering 2 consecutive days each.
2. In-flight sessions will begin no earlier than 4 weeks prior to the end of the mission.
3. These sessions should occur in conjunction with Night headband and MSRR, sleep diary, and temperature recording.
4. The second blood draw should occur after a minimum of 4 hours from the first and as close to sleep time as possible.
5. These sessions should occur on the same day as each of the two consecutive MSRR sleep recording nights.
6. Crewmember may perform other tasks during break.
7. Minimize use of sedatives/hypnotics, alcohol, nicotine, or caffeine the day prior to and throughout the study.
8. Switch on TEF 1 and 2, one to two hours before sample collection.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150100	Thermal Electric Freezer (TEF)	1
150104	Centrifuge	1
820385	Sharps Containers	1
820390	Blood Collection Belt	1
846755	Thermal Electric Holding Facility (TEHOF) - 20 degrees C	1
846757	Log Book. Metabolic(Sample)	1
852241	Barcode and Data Logger (BDL) Assy.	1
854888	Sleep Blood Collection Kit	1
854889	Sleep Blood Tube Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Hardware Set up and switch on TEF 1 and TEF 2
60	60	1	0	0	BREAK-1 hour for TEF cooling.
15	15	1	1	2	Insert butterfly needle and collect blood (2 samples). remove butterfly needle. Scan tubes with BDL.
15	15	1	1	0	Centrifuge and transfer to freezer (1 sample).
10	10	1	1	0	From other sample, transfer 1 ml blood into each of 3 prefilled tubes
5	5	1	1	0	Mix prefilled tubes, scan tubes with BDL, and freeze.

240	240	1	0	0	Break for 4 hours minimum
15	15	1	1	2	Insert butterfly needle and collect blood (2 samples), remove butterfly needle. Scan tubes with BDL.
15	15	1	1	0	Centrifuge and transfer one sample to freezer.
10	10	1	1	0	From other sample transfer 1 ml blood into each of 3 prefilled tubes
5	5	1	1	0	Mix prefilled tubes, scan tubes with BDL, and freeze.
5	5	1	1	0	Stow hardware and switch off TEF 1 and TEF 2.

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: Mir 24 **Invest. ID:** 110019 **Exp. ID:** 639 **Russian ID:** Sleep

Invest. Title: Sleep Investigations (639/663/710)

Prime ☒
Contingent ☐

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

1. Session ID: HLS:MET:I:46

Session Type: Inflight

2. Session: MSRR Recording

3. Session Timeline: **Crewtime Usage (mins):** 80 **Session Time (mins):** 40

Scheduled Days: FD 81, 82, 143, 144

4. Session Scenario:

For two consecutive days at mid and late mission, each subject will have sleep recorded using the Medilog system. Electrodes will be placed on the face and on the head using the MSRR Skull Cap. The following morning, electrodes are removed and the skull cap is stowed.

5. Session Constraints:

1. Each crewmember will complete two in-flight sessions covering 2 consecutive nights each. In-flight sessions will begin no sooner than mid mission.
2. The Medilog recorder will be attached within 2 hours before sleep period and removed within two hours after awakening on two consecutive nights, same day as two consecutive blood collection days.
3. These sessions will be co-incident with Night Headband sleep recording and should occur in conjunction with Night Headband, sleep questionnaire, and temperature recording.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854890	Medilog Sleep Research Recorder (MSRR) Assy Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	30	1	0	2	Unstow and don electrodes. Check impedance and document in FDF.
10	10	1	0	2	Medilog preparation and start

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: Mir 24 **Invest. ID:** 110019 **Exp. ID:** 639 **Russian ID:** Sleep

Invest. Title: Sleep Investigations (639/663/710) **Prime** ☒ **Contingent** ☐

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

1. Session ID: HLS:MET:I:48

2. Session: Night Headband Postsleep **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 74 **Session Time (mins):** 42

Scheduled Days: FD 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152

4. Session Scenario:

Crewmembers will complete measurements relating to the combined sleep protocol for measurement blocks spread throughout the mission. The preferred session is 12 consecutive days, labeled a "block". Upon awakening each crewmember will record his dream recall on his personal voice recorder. Then a postsleep questionnaire is completed and Night Headband data is downloaded to the MIPS laptop. Mood and activation testing and oral temperature measurements will occur 5 times during the wake cycle and performance testing occurs around mid day.

5. Session Constraints:

1. The final measurement block should be within 4 weeks of return.
2. Dream recall should be recorded immediately upon waking, before all other activities of the day.
3. Mood and activation tests (and concurrent oral temperature recording) should be scheduled first thing in the morning, mid morning, mid day and mid afternoon (at least one hour apart). These sessions should be scheduled at least 30 minutes after exercise, bathing, or the ingestion of food or drink.
4. The post-sleep questionnaire should be completed within 60 minutes of the end of a sleep period.
5. Midsleep awakening will be followed by a dream report and then return to sleep.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390136	Night Headband Kit	2
820340	MIPS-2L Laptop Computer	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
7	7	1	0	2	Dictate a dream report with special attention to imagined movements
1	1	1	0	2	Deactivate H/W, doff Night Headband and sensor.
5	5	1	1	0	Unstow diskettes and set up MIPS-2L
4	4	1	0	2	Post-sleep questionnaire
6	6	1	0	2	Night Headband data is downloaded to MIPS-2L
3	3	1	0	2	Mood and activation testing (5 times).
5	5	1	0	2	Oral Temperature Measurement (5 times)
6	6	1	0	2	Performance Test
5	5	1	1	0	Stow MIPS-2L and hardware

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: Mir 24 **Invest. ID:** 110019 **Exp. ID:** 639 **Russian ID:** Sleep

Invest. Title: Sleep Investigations (639/663/710)

Prime ☑
Contingent ☐

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

1. Session ID: HLS:MET:I:49

Session Type: Inflight

2. Session: Doff MSRR Hardware and Stow Associated Hardware

3. Session Timeline: **Crewtime Usage (mins):** 35 **Session Time (mins):** 15

Scheduled Days: FD 82, 83, 144, 145

4. Session Scenario:
For two consecutive nights, each subject will have sleep recorded using the Medilog system. After 10 hours of sleep and 2 hours postsleep crewmember will doff the skull cap and stow hardware.

5. Session Constraints:
1. Each crewmember will complete two in-flight sessions covering 2 consecutive night each. In-flight sessions will begin no sooner than mid-mission.
2. The Medilog recorder will be attached within 2 hours before sleep period and removed within two hours after awakening on two consecutive nights, on each of two consecutive blood collection days.
3. These sessions will be co-incident with Night Headband sleep recording and should occur in conjunction with Night Headband, post-sleep questionnaire, and temperature recording.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
846720	MIPS2 Optical Disks	1
854890	Medilog Sleep Research Recorder (MSRR) Assy Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	2	Check electrical impedance. Record values above 10 in FDF.
10	10	1	0	2	Doff electrode Skullcap and stow hardware

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 110019 **Exp. ID:** 639 **Russian ID:** Sleep

Invest. Title: Sleep Investigations (639/663/710)

Prime ☒
Contingent ☐

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

1. Session ID: HLS:MET:I:52

2. Session: MIPS Data Download

Session Type: Inflight

3. Session Timeline: **Crewtime Usage (mins):** 4 **Session Time (mins):** 4

Scheduled Days: FD 27, 34, 83, 90, 145, 152

4. Session Scenario:
Data is downloaded from the MIPS laptop to the MIPS Optical disk.

5. Session Constraints:
1. Night Headband downloading to MIPS-2L must take place prior to this session.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820340	MIPS-2L Laptop Computer	1
820433	MIPS-2C Controller	1
820467	MIPS-2L computer data cable	1
846720	MIPS2 Optical Disks	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
2	2	1	0	1	Set up link with computer
2	2	1	0	1	Complete data transfer

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 110019 **Exp. ID:** 639 **Russian ID:** Sleep

Invest. Title: Sleep Investigations (639/663/710)

Prime ☒
Contingent ☐

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

1. Session ID: HLS:MET:I:77

Session Type: Inflight

2. Session: Night Headband - Presleep

3. Session Timeline: **Crewtime Usage (mins):** 28 **Session Time (mins):** 28

Scheduled Days: FD 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130

4. Session Scenario:

Crewmembers will complete measurements relating to the combined sleep protocol for measurement blocks spread throughout the mission. The preferred session is 12 consecutive days, labelled a "block". Each evening of this block prior to sleep, mood and activation testing occur followed by oral temperature measurements . A presleep questionnaire is completed at the end of each work day prior to sleep. Then, the crewmember dons the Night Headband, attaches the eyelid sensor, activates the hardware, checks the battery status light, and goes to sleep. The Night Headband battery is changed, before each "block" and after 6 days of consecutive monitoring. The Pearlcorder will be placed within reach for use during midsleep awakenings and in morning.

5. Session Constraints:

1. The final measurement block should be within 4 weeks of return.
2. Night Headband monitor should be started at lights-out (or its equivalent) after subject is "in bed".
3. Mood and activation tests (and concurrent oral temperature recording) should be scheduled , last thing at "night" (before retiring to bed). This session should be scheduled at least 30 minutes after exercise, bathing, or the ingestion of food or drink.
4. Subjects must sleep without significant air current blowing in their faces (e.g. fans).
5. In the event of an EVA, the session blocks may be moved after the EVA.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390136	Night Headband Kit	1
820340	MIPS-2L Laptop Computer	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow diskette. Set up MIPS-2L
5	5	1	0	1	Mood Activation Test with Oral Temperature
1	1	1	0	1	Pre-sleep questionnaire
3	3	1	1	0	Stow diskette and stow MIPS-2L
5	5	1	1	0	Unstow Night Headband kit
3	3	1	1	0	Change battery (FDs 29, 78, 85, 140, 147)
1	1	1	0	1	Prepare Night Headband and Eyelid Sensor
3	3	1	0	1	Don Night headband, apply sensor, and activate H/W
2	2	1	1	0	Place voice recorder nearby subject

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 110019 **Exp. ID:** 639 **Russian ID:** Sleep

Invest. Title: Sleep Investigations (639/663/710) **Prime** ☑ **Contingent** ☐

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

1. Session ID: HLS:LOG:I:87

2. Session: Transfer - Sleep Investigation items from Mir to Shuttle **Session Type:** Down Item

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 6

4. Session Scenario:

Items will be transferred from Mir to the Shuttle.

5. Session Constraints:

1. Session can be performed in conjunction with other down item sessions to optimize crew time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390136	Night Headband Kit	3
820390	Blood Collection Belt	1
846737	Blood Tube (frozen)	64
854888	Sleep Blood Collection Kit	2
854889	Sleep Blood Tube Kit	1
854890	Medilog Sleep Research Recorder (MSRR) Assy Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	30	1	1	0	Transfer experiment items from Mir to Shuttle

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: Mir 24 **Invest. ID:** 110019 **Exp. ID:** 639 **Russian ID:** Sleep

Invest. Title: Sleep Investigations (639/663/710)

Prime ☒
Contingent ☐

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

1. Session ID: HLS:MET:R:13

Session Type: Postflight

2. Session: Night Headband Flight Debriefing

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 60

Scheduled Days: R+ 15

4. Session Scenario:

Each subject is debriefed on use of the Night Headband, data, questionnaire, and taped comments.

5. Session Constraints:

1. Debriefing should be carried out as soon after retrieval as possible.
2. Session can be interrupted at any point.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390136	Night Headband Kit	2
848763	ThinkPad	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	0	2	Review questionnaires and Night Headband use.

8. Data Processing:

N/A

Mission: Mir 24 **Invest. ID:** 110019 **Exp. ID:** 639 **Russian ID:** Sleep

Invest. Title: Sleep Investigations (639/663/710)

Prime ☒
Contingent ☐

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

1. Session ID: HLS:MET:R:14

Session Type: Postflight

2. Session: Presleep and Postsleep Questionnaire

3. Session Timeline: **Crewtime Usage (mins):** 63 **Session Time (mins):** 35

Scheduled Days: R+ 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52

4. Session Scenario:

Immediately prior to going to sleep, subjects will complete presleep questionnaire, put on the Night Headband, attach the eyelid sensor, turn on the Night Headband monitor, check battery status light, and then go to sleep. Immediately upon awakening in the morning, the subject dictates a report of movements imagined during any dreams. The subject turns off and removes the Night Headband. The subject fills out the postsleep questionnaire on sleep quality during the previous night and dictates a report of movements imagined during any dreams. The Night Headband is downloaded to the Thinkpad, analyzes the data and notes any anomalies in the data.

5. Session Constraints:

1. There are two 12-day recording periods. If recording on the night of R+0 is not possible, the entire 12 day recording period should be moved forward one or more days. If a shift of more than 15 days is necessary, all 12 day recording periods should be shifted. The last recording period should occur 3 days before the last period of the session "Sleep/Wake Immune Functions (Postflight)".
2. If low battery is indicated, the battery is replaced.
3. For optimal data collection, the first recording should begin the night after the return to normal gravity.
4. All hardware includes spares.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390136	Night Headband Kit	2
848763	ThinkPad	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
4	0	0	0	2	Fill out the presleep questionnaire.
5	0	0	0	2	Don Night Headband and eyelid sensor. Activate Night Headband.
0	0	0	0	2	Break for 8 hours of sleep.
10	0	0	0	2	Dictate a dream report with special attention to imagined movments
4	0	0	0	2	Fill out postsleep questionnaire
5	0	0	0	2	Doff Night Headband and eyelid sensor
5	0	0	1	0	Download data onto Thinkpad note any anomalies
2	0	0	1	0	Stow hardware

8. Data Processing:

N/A

Mission: Mir 24 **Invest. ID:** 110019 **Exp. ID:** 639 **Russian ID:** Sleep

Invest. Title: Sleep Investigations (639/663/710)

Prime ☒
Contingent ☐

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

1. Session ID: HLS:MET:R:15

Session Type: Postflight

2. Session: Sleep/Wake Immune Functions (Postflight)

3. Session Timeline: **Crewtime Usage (mins):** 1620 **Session Time (mins):** 1410

Scheduled Days: R+ 3, 4, 44, 45

4. Session Scenario:

For each subject, one session of physiologic monitoring of sleep/wakefulness, comprised of an overnight acclimatization to the sleep laboratory followed by serial venous blood sampling for 24 hours during wakefulness and sleep, for the purpose of assessing immune and neuroendocrine functions. The pre- and postsleep questionnaires will be completed for both days.

5. Session Constraints:

1. First test period to be run 3 to 7 days postflight.
2. Minimize alcohol, caffeine beverages, and nicotine on the day prior to the study.
3. Minimize use of sedative/hypnotics, alcohol, caffeine, and nicotine throughout the study.
4. The last test period should coincide with the second recording session using the Night Headband.
5. Each subject will attend one session in the sleep laboratory starting approximately two hours before bedtime for preparation of surface wire electrode application to the body (to monitor sleep/wake physiology) and for insertion of the heparinized venous catheter for blood sampling of circadian immune functions.
6. Sessions must occur on weekdays.
7. Thinkpad will be installed with survey questionnaires.
8. Session will occur after at least 3 nights of Headband recording.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150077	Blood Collection System	2
820385	Sharps Containers	2
848763	ThinkPad	2
854890	Medilog Sleep Research Recorder (MSRR) Assy Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	0	0	0	2	Catheter insertion
15	0	0	0	2	Blood collection (T = 8am)
90	0	0	0	0	Break (1.5 hours)
15	0	0	0	2	Blood collection (T = 10am)
90	0	0	0	0	Break (1.5 hours)
15	0	0	0	2	Blood collection (T = 12pm)
90	0	0	0	0	Break (1.5 hours)
15	0	0	0	2	Blood collection (T = 2pm)
90	0	0	0	0	Break (1.5 hours)
15	0	0	0	2	Blood collection (T = 4pm)
240	0	0	0	0	Break (4 hours)
120	0	0	0	2	Instrumentation for MSRR, Night Headband & blood collection

600	0	0	0	2	Overnight blood collection (blood draws every half hr starting 10pm and ending 8am)

8. Data Processing:

N/A

Mission: NASA 5 **Invest. ID:** 110019 **Exp. ID:** 639 **Russian ID:** Sleep

Invest. Title: Sleep Investigations (639/663/710)

Prime ☑
Contingent ☐

US PI: Monk, Timothy, Ph.D **Russian PI:** Ponomareva, Irina; Larina, Irina

1. Session ID: HLS:MET:R:21

Session Type: Postflight

2. Session: Night Headband Flight Debriefing

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: R+ 15

4. Session Scenario:
Each subject is debriefed on use of the Night Headband , data, questionnnaire, and taped comments.

5. Session Constraints:
1. Debriefing should be carried out as soon after retrieval as possible.
2. Session can be interrupted at any point.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390136	Night Headband Kit	1
848763	ThinkPad	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	0	1	Review questionnaires and Night Headband use.

8. Data Processing:

N/A

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Investigation ID: 110028 **Experiment ID:** 701 **Russian ID:** Orientation

Investigation Title: Frames of Reference for Sensori-motor Transformations

US Investigators: Berthoz, Alain

Russian Investigators: Gurfinkel, Viktor

Other Investigators: McIntyre, J.

Payload Category: HLS **Sub-Cat.:** NEU **Subjects Requested:** 8

Description: The scientific goals will be pursued of a series psychophysical experiments conducted in microgravity. Subjects will be asked to perceive differences in stimuli either visually or haptically. These sensory modalities will be studied both independently and in coordination. The independent analysis will serve to identify the intrinsic reference frames associated with each sense. Making comparisons with the independent tasks of 2 modalities will test whether exposures to microgravity invokes global changes in sensory perception or whether modifications are restricted to a particular sensory system. Finally by performing tasks which require a simultaneous effort with the 2 sensory modalities, we will test for a role of gravity facilitating visuo-motor transformations.

Science Objectives: 1. To identify the role of gravity in defining the reference frames used to do visual, proprioceptive and haptic information. By extension, measure the adaptation of the perceptual system to an environment lacking gravity.

2. To test the hypothesis that gravity can be used to align visual and motor frames of reference.

3. To collect fundamental baseline data on the capacities of the human visual proprioceptive and haptic perceptual systems under conditions of microgravity.

Functional Objectives: 1. To identify the role of gravity in defining the reference frames used to do visual, proprioceptive and haptic information. By extension, measure the adaptation of the perceptual system to an environment lacking gravity.

2. To test the hypothesis that gravity can be used to align visual and motor frames of reference.

3. To collect fundamental baseline data on the capacities of the human visual proprioceptive and haptic perceptual systems under conditions of microgravity.

1. Visual Perception of Length
2. Perception of Orientation
3. Force Magnitude
4. Force Direction
5. Haptic Perception of Length
6. Hand Orientation in Space
7. Haptic Perception of Orientation
8. Visuo-motor Coordination
9. Visuo-Haptic Coordination
10. Visuo-motor Realignment

Sample Transfer Rqd: Yes **Hardware Transfer Rqd:** Yes

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
3	STS 79 (SM-04)	9/16/96	☐	☒
4	NASA 4	1/16/97	☒	☒
4	STS 81 (SM-05)	1/16/97	☒	☒
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
HLS	NEU	Flight	820258	ROBOTOP Joystick
OPS	SHR	Flight	820442	PCMCIA Card Kit
HLS		Flight	848759	Video Monitor
HLS		Flight	848839	COGNILAB Experimental Post

Mission: NASA 5 **Invest. ID:** 110028 **Exp. ID:** 701 **Russian ID:** Orientatio

Invest. Title: Frames of Reference for Sensori-motor Transformations

Prime ☒
Contingent ☐

US PI: Berthoz, Alain **Russian PI:** Gurfinkel, Viktor

1. Session ID: HLS:NEU:P:23

2. Session: COGNILAB Familiarization

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 240

4. Session Scenario:
Familiarization with the scientific objectives.

5. Session Constraints:
1. All crewmembers, both primary and backup should participate.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	1	0	Familiarization session

8. Data Processing:
1. N/A

Mission: NASA 5 **Invest. ID:** 110028 **Exp. ID:** 701 **Russian ID:** Orientatio

Invest. Title: Frames of Reference for Sensori-motor Transformations

Prime ☒
Contingent ☐

US PI: Berthoz, Alain **Russian PI:** Gurfinkel, Viktor

1. Session ID: HLS:NEU:P:24

Session Type: Training

2. Session: COGNILAB Familiarization II

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: L- 200

4. Session Scenario:
Familiarization with the scientific objectives, protocol, and hardware.

5. Session Constraints:
1. All crewmembers, both primary and backup, should participate.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848839	COGNILAB Experimental Post	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	1	0	Familiarization session for protocol and hardware

8. Data Processing:
1. N/A

Mission: NASA 5 **Invest. ID:** 110028 **Exp. ID:** 701 **Russian ID:** Orientatio

Invest. Title: Frames of Reference for Sensori-motor Transformations

Prime ☒
Contingent ☐

US PI: Berthoz, Alain **Russian PI:** Gurfinkel, Viktor

1. Session ID: HLS:NEU:P:25

Session Type: Training

2. Session: COGNILAB Task Training

3. Session Timeline: **Crewtime Usage (mins):** 90 **Session Time (mins):** 90

Scheduled Days: L- 149, 150, 179, 180

4. Session Scenario:

Subjects will learn to perform each of the experimental tasks using the ground (laboratory) hardware, with time allocated for questions and answers with the experimenter.

5. Session Constraints:

1. Session should be scheduled prior to Baseline Data Collection.
2. Training is to be conducted on all crew members, both primary, and backup.
3. Subject data will be collected to evaluate training.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848839	COGNILAB Experimental Post	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
90	0	0	1	0	Training on Hardware Installation, Anomalies & Stowage. Training on Visual & Haptic Orientation Tests and Visual & Haptic Length Tests.

8. Data Processing:

1. N/A

Mission: NASA 5 **Invest. ID:** 110028 **Exp. ID:** 701 **Russian ID:** Orientatio

Invest. Title: Frames of Reference for Sensori-motor Transformations

Prime ☒
Contingent ☐

US PI: Berthoz, Alain **Russian PI:** Gurfinkel, Viktor

1. Session ID: HLS:NEU:P:26

Session Type: BDC

2. Session: COGNILAB Test A

3. Session Timeline: **Crewtime Usage (mins):** 90 **Session Time (mins):** 90

Scheduled Days: L- 40, 80, 120

4. Session Scenario:

The subject performs a set of psychophysical experiments in which the orientation of a visually or haptically presented stimulus is adjusted to match that of a second, reference stimulus.

The subject reviews the procedures for setting up and adjusting the COGNILAB equipment.

5. Session Constraints:

1. Each test should be performed at approximately the same time of day (morning or evening) throughout pre-, post-, and inflight testing.
2. Each of these sessions should be performed within 3 days of the corresponding session COGNILAB Test B, preferably the day before.
3. Testing is to be conducted on primary and backup crewmembers.
4. BDC tests should be repeated once every 4-6 weeks for launch delays of more than 2 weeks.
5. A 40-minute segment of hardware review will occur between testings.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848839	COGNILAB Experimental Post	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	0	0	0	1	Visual/Haptic Coordination Test
40	0	0	1	0	Hardware Review
10	0	0	0	1	Visual Orientation Test
20	0	0	0	1	Haptic Orientation Test

8. Data Processing:

1. N/A

Mission: NASA 5 **Invest. ID:** 110028 **Exp. ID:** 701 **Russian ID:** Orientatio

Invest. Title: Frames of Reference for Sensori-motor Transformations **Prime** ☒ **Contingent** ☐

US PI: Berthoz, Alain **Russian PI:** Gurfinkel, Viktor

1. Session ID: HLS:NEU:P:27

2. Session: COGNILAB Test B **Session Type:** BDC

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 39, 79, 119

4. Session Scenario:

The subject performs a set of psychophysical experiments in which the orientation of a visually or haptically presented stimulus is adjusted to match that of a second, reference stimulus.

The subject reviews the procedures for the Robotop calibration procedure.

5. Session Constraints:

1. Each test should be performed at approximately same time of day (morning or evening) throughout pre-, post- and in-flight testing.
2. Each of these sessions should be performed within 3 days of the corresponding session of COGNILAB Test A, preferably the day after.
3. Testing is to be conducted on primary and backup crewmembers.
4. BDC tests should be repeated once every 4-6 weeks for launch delays of more than 2 weeks.
5. A 15-minute segment for hardware review will occur between testings.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848839	COGNILAB Experimental Post	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	0	0	0	1	Visual/Haptic Coordination Test
15	0	0	1	0	Robotop Calibration Review
10	0	0	0	1	Visual Length Test
15	0	0	0	1	Haptic Length Test

8. Data Processing:

N/A

Mission: STS 84 (SM-06) **Invest. ID:** 110028 **Exp. ID:** 701 **Russian ID:** Orientatio

Invest. Title: Frames of Reference for Sensori-motor Transformations

Prime ☒
Contingent ☐

US PI: Berthoz, Alain **Russian PI:** Gurfinkel, Viktor

1. Session ID: HLS:LOG:I:30

Session Type: Up Item

2. Session: Transfer Session - Frames of Reference Sensorimotor Transformations

3. Session Timeline: **Crewtime Usage (mins):** 15 **Session Time (mins):** 15

Scheduled Days: FD 6

4. Session Scenario:
Items will be transferred from Shuttle to the Mir and placed in the Cognilab kit.

5. Session Constraints:
1. Session can be performed in conjunction with other up item sessions to optimize crew time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820442	PCMCIA Card Kit	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow hardware
5	5	1	1	0	Transfer to Mir
5	5	1	1	0	Return to Shuttle

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 110028 **Exp. ID:** 701 **Russian ID:** Orientatio

Invest. Title: Frames of Reference for Sensori-motor Transformations

Prime ☒
Contingent ☐

US PI: Berthoz, Alain **Russian PI:** Gurfinkel, Viktor

1. Session ID: HLS:NEU:I:23

Session Type: Inflight

2. Session: COGNILAB Test A

3. Session Timeline: **Crewtime Usage (mins):** 55 **Session Time (mins):** 55

Scheduled Days: FD 30, 75, 120

4. Session Scenario:

The subject prepares the COGNILAB equipment and performs a set of psychophysical experiments in which the orientation of a visually presented stimulus is adjusted to match that of a haptically presented stimulus.

5. Session Constraints:

1. Each test should be performed at approximately the same time of day (morning or evening) throughout pre-, post-, and inflight testing.
2. Each of these sessions should be performed within 3 days of the corresponding session of COGNILAB Test B, preferably the day before.
3. Testing is to be conducted on primary and backup crewmembers.
4. If the hardware is already installed prior to the beginning of the session (e.g. it has been left installed since the previous use), the subject may, on a time available basis, repeat the Visual Haptic Coordination test, using the elastic shock cords to simulate gravity acting on the body.
5. If time permits, after a 2-minute break the following Reserve Activities may be performed: Visual/Haptic with simulated gravity (10-20 minutes).

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820442	PCMCIA Card Kit	1
848839	COGNILAB Experimental Post	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	20	1	0	1	Set-up
10	10	1	1	0	Robotop Calibration
23	23	1	0	1	Visual/Haptic Coordination
2	2	1	1	0	Release and Shutdown

8. Data Processing:

1. Data downlink is desirable, but not required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 110028 **Exp. ID:** 701 **Russian ID:** Orientatio

Invest. Title: Frames of Reference for Sensori-motor Transformations

Prime ☒
Contingent ☐

US PI: Berthoz, Alain **Russian PI:** Gurfinkel, Viktor

1. Session ID: HLS:NEU:I:24

Session Type: Inflight

2. Session: COGNILAB Test B

3. Session Timeline: **Crewtime Usage (mins):** 65 **Session Time (mins):** 80

Scheduled Days: FD 31, 76, 121

4. Session Scenario:

The subject performs a set of psychophysical experiments in which the orientation of a visually or haptically presented stimulus is adjusted to match that of a second, reference stimulus. The subject then stows the COGNILAB equipment.

5. Session Constraints:

1. Each test should be performed at approximately the same time of day (morning or evening) throughout pre-, post-, and inflight testing.
2. Each of these sessions should be performed within 3 days of the corresponding session of COGNILAB Test A, preferably the day after.
3. Testing is to be conducted on primary and backup crewmembers.
4. Ground testing of backup crewmembers should occur 7 days after test on primary crewmembers.
5. Another activity to reduce fatigue and maximize attentiveness should be scheduled at the break point indicated below. (The activity should be non-taxing mentally and physically).
6. Break duration can be a minimum of 15 minutes and a maximum of 6 hours.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820442	PCMCIA Card Kit	1
848839	COGNILAB Experimental Post	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
2	2	1	1	0	Power-up and adjustment
10	10	1	0	1	Visual Orientation Test
20	20	1	0	1	Haptic Orientation Test
15	15	1	0	0	Break (may be up to 6 hours if necessary)
10	10	1	0	1	Visual Length Test
15	15	1	0	1	Haptic Length Test
8	8	1	1	0	Power-down and Stowage

8. Data Processing:

1. Data downlink is desireable, but not required.
2. Air to ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 110028 **Exp. ID:** 701 **Russian ID:** Orientatio

Invest. Title: Frames of Reference for Sensori-motor Transformations **Prime** ☑ **Contingent** ☐

US PI: Berthoz, Alain **Russian PI:** Gurfinkel, Viktor

1. Session ID: HLS:NEU:I:40

2. Session: Locate COGNILAB Equipment **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 10 **Session Time (mins):** 10

Scheduled Days: FD 29, 74, 119

4. Session Scenario:

The crewmember locates the COGNILAB hardware one day prior to experiment use.

5. Session Constraints:

1. Session can be performed at any time one day prior to experiment session.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820258	ROBOTOP Joystick	1
820442	PCMCIA Card Kit	1
848759	Video Monitor	1
848839	COGNILAB Experimental Post	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Locate COGNILAB hardware

8. Data Processing:

1. No data downlink is required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 110028 **Exp. ID:** 701 **Russian ID:** Orientatio

Invest. Title: Frames of Reference for Sensori-motor Transformations

Prime ☑
Contingent ☐

US PI: Berthoz, Alain **Russian PI:** Gurfinkel, Viktor

1. Session ID: HLS:LOG:I:88

Session Type: Down Item

2. Session: Transfer Session - Frames of Reference Sensorimotor Transformations from Mir to Shuttle

3. Session Timeline: **Crewtime Usage (mins):** 15 **Session Time (mins):** 15

Scheduled Days: FD 8

4. Session Scenario:
Items will be transferred from Mir to Shuttle.

5. Session Constraints:
1. Session can be performed in conjunction with other down item session to optimize crew time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820442	PCMCIA Card Kit	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	1	0	Items will be transferred from the Mir to the Shuttle.

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 110028 **Exp. ID:** 701 **Russian ID:** Orientatio

Invest. Title: Frames of Reference for Sensori-motor Transformations

Prime ☒
Contingent ☐

US PI: Berthoz, Alain **Russian PI:** Gurfinkel, Viktor

1. Session ID: HLS:NEU:R:12

2. Session: COGNILAB Test A

Session Type: Postflight

3. Session Timeline: **Crewtime Usage (mins):** 50 **Session Time (mins):** 80

Scheduled Days: R+ 1, 15, 30

4. Session Scenario:

The subject performs a set of psychophysical experiments in which the orientation of a visually or haptically presented stimulus is adjusted to match that of a second, reference stimulus.

5. Session Constraints:

1. Each test should be performed at approximately the same time of day (morning or evening) throughout pre-, post-, and inflight testing.
2. Each of these sessions should be performed within 3 days of the corresponding session COGNILAB Test B, preferably the day before.
3. Testing is to be conducted on primary and backup crewmembers.
4. Another activity to reduce fatigue and maximize attentiveness should be scheduled at the break point indicated below. (An activity which is non-taxing physically and mentally).

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848839	COGNILAB Experimental Post	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	0	0	0	1	Visual/Haptic Coordination Test
30	0	0	0	0	Break
10	0	0	0	1	Visual Orientation Test
20	0	0	0	1	Haptic Orientation Test

8. Data Processing:

1. N/A

Mission: NASA 5 **Invest. ID:** 110028 **Exp. ID:** 701 **Russian ID:** Orientatio

Invest. Title: Frames of Reference for Sensori-motor Transformations

Prime ☑
Contingent ☐

US PI: Berthoz, Alain **Russian PI:** Gurfinkel, Viktor

1. Session ID: HLS:NEU:R:13

Session Type: Postflight

2. Session: COGNILAB Test B

3. Session Timeline: **Crewtime Usage (mins):** 45 **Session Time (mins):** 75

Scheduled Days: R+ 2, 16, 31

4. Session Scenario:
The subject performs a set of psychophysical experiments in which the orientation of a visually or haptically presented stimulus is adjusted to match that of a second, reference stimulus.

5. Session Constraints:
1. Each test should be performed at approximately the same time of day (morning or evening) throughout pre-, post-, and inflight testing.
2. Each of these sessions should be performed within 3 days of the corresponding session COGNILAB Test A, preferably the day before.
3. Testing is to be conducted on primary and backup crewmembers.
4. Another activity to reduce fatigue and maximize attentiveness should be scheduled at the break point indicated below. (An activity which is non-taxing physically and mentally).

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848839	COGNILAB Experimental Post	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	0	0	0	1	Visual/Haptic Coordination Test
30	0	0	0	0	Break
10	0	0	0	1	Visual Length Test
15	0	0	0	1	Haptic Length Test

8. Data Processing:
1. N/A

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Investigation ID: 110034 **Experiment ID:** 586 **Russian ID:** MRI

Investigation Title: Magnetic Resonance Imaging (MRI) After Exposure to Microgravity

US Investigators: LeBlanc, Adrian L.

Russian Investigators: Kozlovskaya, Inessa

Other Investigators: TBD

Payload Category: HLS **Sub-Cat.:** MS **Subjects Requested:** 12

Description: Measurements on the crew of Spacelab-Japan (SL-J) demonstrated significant muscle-specific atrophy after only 8 days in weightlessness. Published bed-rest studies by the investigator have documented the degree of expected atrophy after 4 months of disuse. This investigation proposes to repeat these muscle measurements on long-duration mission crewmembers. Previous bed-rest studies by the investigator have shown that when normal subjects are put in bed rest, partially unloading the spinal column, significant intervertebral disc expansion occurs. This expansion reverts to normal shortly after reambulation following bed rest lasting days to a few weeks. Longer duration bed rest (17 weeks) however, results in some residual expansion that remains for some time following reambulation. Results from SL-J revealed that 8 days of weightlessness does not result in residual expansion 24 hours after landing. It is speculated that disc expansion during flight may be causally related to the back pain reported to occur during flight and that longer duration space flight will result in residual disc expansion that may pose some risk of disc damage during the landing and early post-flight period. This disc expansion with back muscle atrophy may be causally related to the back pain experienced after long duration space flight. Several space experiments have documented altered hematopoietic activity which may be related to cellularity changes in the bone marow. This investigation will measure the intervertebral disc cross-sectional area, muscle volumes and spinal bone marrow cellularity of the crewmembers before and after the NASA/Mir flights to test the following hypotheses:

1. Significant intervertebral disc expansion occurs during space flight which will remain for some period of time after return to earth's gravity.

2. Muscle specific atrophy occurs during weightlessness. As a result of the inflight exercise countermeasure regime, the degree of atrophy will be less than the atrophy that occurs during bed rest of similar duration without exercise, but similar to that anticipated for bed rest with resistive exercise.

3. Spinal bone marrow cellularity decreases (increased percentage of fat) during space flight and is correlated with bone loss in the spine to be measured in a separate protocol.

Science Objectives:
1. To measure the intervertebral disc size before and after long duration space flight to determine if residual disc expansion remains after return to one-g gravity.
2. To measure the muscle volumes of the calf, thigh, back, and neck before and after flight.
3. To measure the bone marrow cellularity of the spine before and after flight.
4. The results of science objectives 1 & 2 will be compared to data from bed rest with and without exercise countermeasures. The results of objective 3 will be compared with measurements performed before and after long duration bed rest from control and treated subjects.
5. To document the occurence of back discomfort during and after flight and evaluate the association with residual disc expansion.

Functional Objectives:
1. Questionnaire: concerns the occurrence of back pain or discomfort
2. MRI will be performed pre- and postflight

Sample Transfer Rqd: Yes **Hardware Transfer Rqd:** No

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
2	Mir 21	2/21/96	☒	☒
2	NASA 2	3/22/96	☒	☒
2	STS 74 (SM-02)	11/12/95	☒	☒
2	STS 76 (SM-03)	3/22/96	☒	☒
3	Mir 22	8/17/96	☒	☒
3	NASA 3	9/16/96	☒	☒
3	STS 79 (SM-04)	9/16/96	☒	☒
4	Mir 23	2/2/97	☒	☒
4	NASA 4	1/16/97	☒	☒
4	STS 81 (SM-05)	1/16/97	☒	☒
5	Mir 24	6/24/97	☒	☒
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	Mir 25	12/12/97	☒	☒

6	NASA 6	9/18/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒
7	Mir 26	5/30/98	☒	☒
7	NASA 7	1/15/98	☒	☒
7	STS 89 (SM-08)	1/15/98	☒	☒
7	STS 91 (SM-09)	5/29/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
OPS	SHR	Flight	410037	MIR Interface to Payload Systems-2 (MIPS-2)
SHR	SHR	Flight	848745	Magneto Optical Cartridge (MIPS)
HLS	MS	Flight	852159	Logbook, Questionnaire (English)
HLS	MS	Flight	852169	Logbook, Questionnaire (Russian)

Mission: Mir 24 **Invest. ID:** 110034 **Exp. ID:** 586 **Russian ID:** MRI

Invest. Title: Magnetic Resonance Imaging (MRI) After Exposure to Microgravity

Prime ☑
Contingent ☐

US PI: LeBlanc, Adrian L. **Russian PI:** Kozlovskaya, Inessa

1. Session ID: HLS:MS:P:31

Session Type: Training

2. Session: Familiarization Session - MRI Mir Crew

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 60

Scheduled Days: L- 180

4. Session Scenario:
Crewmembers receive instructional overview of science, hardware, and procedures.

5. Session Constraints:
1. N/A

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
410037	MIR Interface to Payload Systems-2 (MIPS-2)	1
848745	Magneto Optical Cartridge (MIPS)	2
852169	Logbook, Questionnaire (Russian)	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	2	0	Classroom instruction

8. Data Processing:
1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 110034 **Exp. ID:** 586 **Russian ID:** MRI

Invest. Title: Magnetic Resonance Imaging (MRI) After Exposure to Microgravity

Prime ☑
Contingent ☐

US PI: LeBlanc, Adrian L. **Russian PI:** Kozlovskaya, Inessa

1. Session ID: HLS:MS:P:32

Session Type: Training

2. Session: Familiarization Session - MRI NASA Crew

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 180

4. Session Scenario:
Crewmembers receive instructional overview of science, hardware, and procedures.

5. Session Constraints:
1. None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
410037	MIR Interface to Payload Systems-2 (MIPS-2)	1
848745	Magneto Optical Cartridge (MIPS)	1
852159	Logbook, Questionnaire (English)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	1	0	Classroom instruction

8. Data Processing:
1. N/A for pre/postflight sessions.

Mission: Mir 24 **Invest. ID:** 110034 **Exp. ID:** 586 **Russian ID:** MRI

Invest. Title: Magnetic Resonance Imaging (MRI) After Exposure to Microgravity

Prime ☒
Contingent ☐

US PI: LeBlanc, Adrian L. **Russian PI:** Kozlovskaya, Inessa

1. Session ID: HLS:MS:P:1

Session Type: BDC

2. Session: Magnetic Resonance Imaging - BDC Mir Crew

3. Session Timeline: **Crewtime Usage (mins):** 720 **Session Time (mins):** 360

Scheduled Days: L- 30, 60

4. Session Scenario:
MRI of the muscles of the back, legs, and neck; bone marrow and discs (L3 vertebra). L-60 day session will include training on back pain questionnaire.

5. Session Constraints:
1. Subjects will be screened for metallic implants.
2. Session must be performed prior to any exercise.
3. Session for Mir cosmonauts.
4. Transportation time is included in crewtime (MRI session is 135 minutes).

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
846761	Magnetic Resonance Imaging (MRI) Russian	1
852169	Logbook, Questionnaire (Russian)	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
135	0	0	0	2	MRI Session
30	0	0	0	2	Training for back pain questionnaire
195	0	0	0	2	Transportation

8. Data Processing:
1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 110034 **Exp. ID:** 586 **Russian ID:** MRI

Invest. Title: Magnetic Resonance Imaging (MRI) After Exposure to Microgravity

Prime ☑
Contingent ☐

US PI: LeBlanc, Adrian L. **Russian PI:** Kozlovskaya, Inessa

1. Session ID: HLS:MS:P:2

Session Type: BDC

2. Session: Magnetic Resonance Imaging - BDC NASA Crew

3. Session Timeline: **Crewtime Usage (mins):** 255 **Session Time (mins):** 255

Scheduled Days: L- 30, 60

4. Session Scenario:

MRI of the muscles of the back, legs, and neck; bone marrow and discs (L3 vertebra). L-60 day sessions will include training on back pain questionnaire.

5. Session Constraints:

1. Subjects will be screened for metallic implants.
2. Session must be performed prior to any exercise.
3. Session for NASA astronaut.
4. Transportation time is included in crew time (90 min).

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
846762	Magnetic Resonance Imaging (MRI) U.S.	1
852159	Logbook, Questionnaire (English)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
135	0	0	0	1	MRI Session
30	0	0	0	1	Training for back pain questionnaire
90	0	0	0	1	Transportation

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: STS 84 (SM-06) **Invest. ID:** 110034 **Exp. ID:** 586 **Russian ID:** MRI

Invest. Title: Magnetic Resonance Imaging (MRI) After Exposure to Microgravity **Prime** ☒ **Contingent** ☐

US PI: LeBlanc, Adrian L. **Russian PI:** Kozlovskaya, Inessa

1. Session ID: HLS:LOG:I:6

Session Type: Up Item

2. Session: Transfer Session - Items from Shuttle to Mir

3. Session Timeline: **Crewtime Usage (mins):** 15 **Session Time (mins):** 15

Scheduled Days: FD 4

4. Session Scenario:
Transfer logbooks to Mir from the Shuttle.

5. Session Constraints:
1. None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
852159	Logbook, Questionnaire (English)	1
852169	Logbook, Questionnaire (Russian)	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow logbooks
5	5	1	1	0	Transfer items to Mir
5	5	1	1	0	Return to Shuttle

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: Mir 24 **Invest. ID:** 110034 **Exp. ID:** 586 **Russian ID:** MRI

Invest. Title: Magnetic Resonance Imaging (MRI) After Exposure to Microgravity **Prime** ☒ **Contingent** ☐

US PI: LeBlanc, Adrian L. **Russian PI:** Kozlovskaya, Inessa

1. Session ID: HLS:MS:I:2

Session Type: Inflight

2. Session: Back Pain Questionnaire - Mir Crew

3. Session Timeline: **Crewtime Usage (mins):** 20 **Session Time (mins):** 10

Scheduled Days: FD 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13

4. Session Scenario:

Crewmembers will complete questionnaire with information on back pain or discomfort every day for the first 10 days after reaching the Mir station and then whenever back pain occurs. Data is stored on the optical cartridge.

5. Session Constraints:

1. After the scheduled data collection days, session should be performed whenever back pain occurs.
2. Logbooks may be used as a contingency to the MIPS questionnaire.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
410037	MIR Interface to Payload Systems-2 (MIPS-2)	1
848745	Magneto Optical Cartridge (MIPS)	1
852169	Logbook, Questionnaire (Russian)	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
1	1	1	0	2	Power up MIPS, unstow, and insert Magneto Optical Cartridges into MIPS
8	8	1	0	2	Complete questionnaire
1	1	1	0	2	Power down MIPS and stow Magneto Optical Cartridges

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 110034 **Exp. ID:** 586 **Russian ID:** MRI

Invest. Title: Magnetic Resonance Imaging (MRI) After Exposure to Microgravity **Prime** ☑ **Contingent** ☐

US PI: LeBlanc, Adrian L. **Russian PI:** Kozlovskaya, Inessa

1. Session ID: HLS:MS:I:8 **Session Type:** Inflight

2. Session: Back Pain Questionnaire - NASA Crew

3. Session Timeline: **Crewtime Usage (mins):** 10 **Session Time (mins):** 10

Scheduled Days: FD 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13

4. Session Scenario:

Crewmember will complete questionnaire with information on back pain or discomfort every day for the first 10 days after reaching the Mir station and then whenever back pain occurs.

5. Session Constraints:

1. After the scheduled data collection days, session should be performed whenever back pain occurs.
2. Logbooks may be used as a contingency to the MIPS questionnaire.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
410037	MIR Interface to Payload Systems-2 (MIPS-2)	1
848745	Magneto Optical Cartridge (MIPS)	1
852159	Logbook, Questionnaire (English)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
1	1	1	0	1	Power up MIPS. Unstow Magneto Optical Cartridges and insert into MIPS.
8	8	1	0	1	Complete questionnaire
1	1	1	0	1	Power down MIPS and stow Magneto Optical Cartridges

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 110034 **Exp. ID:** 586 **Russian ID:** MRI

Invest. Title: Magnetic Resonance Imaging (MRI) After Exposure to Microgravity **Prime** ☐ **Contingent** ☐

US PI: LeBlanc, Adrian L. **Russian PI:** Kozlovskaya, Inessa

1. Session ID: HLS:LOG:I:9

2. Session: Transfer Session - Items from Mir to Shuttle **Session Type:** Down Item

3. Session Timeline: **Crewtime Usage (mins):** 15 **Session Time (mins):** 15

Scheduled Days: FD 5

4. Session Scenario:
Transfer return items from Mir to Shuttle.

5. Session Constraints:
1. None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
852159	Logbook, Questionnaire (English)	1
852169	Logbook, Questionnaire (Russian)	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow Logbooks and magneto optical cartridges
5	5	1	1	0	Transfer items from Mir to Shuttle
5	5	1	1	0	Stow items on Shuttle

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: Mir 24 **Invest. ID:** 110034 **Exp. ID:** 586 **Russian ID:** MRI

Invest. Title: Magnetic Resonance Imaging (MRI) After Exposure to Microgravity **Prime** ☒ **Contingent** ☐

US PI: LeBlanc, Adrian L. **Russian PI:** Kozlovskaya, Inessa

1. Session ID: HLS:MS:R:11

2. Session: Magnetic Resonance Imaging - Postflight Mir Crew **Session Type:** Postflight

3. Session Timeline: **Crewtime Usage (mins):** 720 **Session Time (mins):** 360

Scheduled Days: R+ 0, 3, 14, 30

4. Session Scenario:

MRI of the muscles of the back, legs, and neck; bone marrow and discs (L3 vertebra).

5. Session Constraints:

1. Subjects will be screened for metallic implants.
2. Subject must remove all metal (i.e. jewelry) or clothes containing metal prior to scans.
3. Session for returning Mir cosmonauts.
4. Session days are estimated. The first session may be scheduled between R+0 and R+3 days. The next scheduled session will be performed on R+14 days. The last session may be scheduled between R+30 and R+45 days.
5. Includes transportation time of 225 minutes.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
846761	Magnetic Resonance Imaging (MRI) Russian	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
135	0	0	0	2	MRI test
225	0	0	0	2	Transportation

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: Mir 24 **Invest. ID:** 110034 **Exp. ID:** 586 **Russian ID:** MRI

Invest. Title: Magnetic Resonance Imaging (MRI) After Exposure to Microgravity **Prime** ☑ **Contingent** ☐

US PI: LeBlanc, Adrian L. **Russian PI:** Kozlovskaya, Inessa

1. Session ID: HLS:MS:R:2

Session Type: Postflight

2. Session: Back Pain Questionnaire - Postflight Mir Crew

3. Session Timeline: **Crewtime Usage (mins):** 20 **Session Time (mins):** 10

Scheduled Days: R+ 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

4. Session Scenario:

Back Pain Questionnaire completed every day from R+0 to R+10 and then whenever back pain occurs, until R+30.

5. Session Constraints:

1. Session for returning Mir cosmonauts.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
852169	Logbook, Questionnaire (Russian)	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	0	0	0	2	Back pain questionnaire

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 110034 **Exp. ID:** 586 **Russian ID:** MRI

Invest. Title: Magnetic Resonance Imaging (MRI) After Exposure to Microgravity **Prime** ☒ **Contingent** ☐

US PI: LeBlanc, Adrian L. **Russian PI:** Kozlovskaya, Inessa

1. Session ID: HLS:MS:R:1

Session Type: Postflight

2. Session: Magnetic Resonance Imaging - Postflight NASA Crew

3. Session Timeline: **Crewtime Usage (mins):** 225 **Session Time (mins):** 225

Scheduled Days: R+ 0, 3, 14, 30

4. Session Scenario:

MRI of the muscles of the back, legs, and neck; bone marrow and discs (L3 vertebra).

5. Session Constraints:

1. Subjects will be screened for metallic implants.
2. Subject must remove all metal (i.e. jewelry) or clothes containing metal prior to scans.
3. Session for returning NASA astronaut.
4. The sessions are performed at R+0, R+3 days, and R+14 days. The last session may be performed between R+30 and R+45 days.
5. Transportation time is included for all sessions except R+0, which requires no transportation time..

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
846762	Magnetic Resonance Imaging (MRI) U.S.	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
135	0	0	0	1	MRI test
90	0	0	0	1	Transportation

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 110034 **Exp. ID:** 586 **Russian ID:** MRI

Invest. Title: Magnetic Resonance Imaging (MRI) After Exposure to Microgravity **Prime** ☑ **Contingent** ☐

US PI: LeBlanc, Adrian L. **Russian PI:** Kozlovskaya, Inessa

1. Session ID: HLS:MS:R:3

Session Type: Postflight

2. Session: Back Pain Questionnaire - Postflight NASA Crew

3. Session Timeline: **Crewtime Usage (mins):** 10 **Session Time (mins):** 10

Scheduled Days: R+ 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

4. Session Scenario:

Back Pain Questionnaire completed every day from R+0 to R+10 and then whenever back pain occurs, until R+30.

5. Session Constraints:

1. Session for returning NASA astronaut.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
852159	Logbook, Questionnaire (English)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	0	0	0	1	Back pain questionnaire

8. Data Processing:

1. N/A for pre/postflight sessions.

Investigation ID: 110037 **Experiment ID:** 628 **Russian ID:** Interactions

Investigation Title: Crewmember and Crew-Ground Interactions During NASA-Mir

US Investigators: Kanas, Nick A.

Russian Investigators: Salnitskiy, Vyacheslav

Other Investigators: Marmar, C.R., Weiss, D.S.

Payload Category: HLS **Sub-Cat.:** BP **Subjects Requested:** 12

Description: During future space missions involving a space station or a trip to Mars, international crews will be engaged in complicated activities over long periods of time. A number of interpersonal issues likely to impact on these missions must be addressed in order to ensure healthy crew member interactions and optimal performance. A review of the literature of space analog studies on Earth, anecdotal reports from previous space missions, and the principal investigator's own work involving astronauts and cosmonauts have isolated crew tension, cohesion, and leadership as important interpersonal issues.

The aim of this study is to evaluate the following hypotheses:

1. The crewmembers' perception of intra-crew tension will be much higher halfway into the mission than before. This general effect will be measurable even though specific stressful events that serendipitously occur may transiently raise the level of intra-crew tension.
2. Intra-crew tension will be displaced to the ground personnel as indicated by a negative correlation between crew member perception of this tension and support from ground personnel.
3. Tension in the ground personnel will be displaced to the RSA and NASA management as indicated by a negative correlation between ground personnel perception of intra-group tension and support from management.
4. The crew members will perceive themselves as less cohesive halfway into the mission than before; cohesion scores will transiently rise the last 2 weeks as the crew prepares for the return to Earth.
5. The crewmembers will perceive their leader and ground monitors as less supportive halfway into the mission than before.
6. The ground personnel will perceive their leader and mangement as less supportive halfway into the mission than before.

These hypotheses will be tested by having both the crewmembers and personnel in ground control complete subscales from three standard mood and interpersonal group climate questionnaires: Profile of Mood States, Group Environment Scale, and Work Environment Scale. Along with a critical incident log and an experiences questionnaire, these measures will be completed pre-, in-, and postlfight. By using the interrupted time-series analysis and a number of predicted correlations, a test of the six hypotheses will be made and discussed.

Science Objectives: To complete subscales from 3 standard mood and interpersonal group climate questionnaires: Profile of Mood states, Group Environment Scale, and Work Enivironment Scale

Functional Objectives: complete group climate questionnaires

Sample Transfer Rqd: Yes **Hardware Transfer Rqd:** Yes

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
2	STS 76 (SM-03)	3/22/96	☒	☒
3	Mir 22	8/17/96	☒	☒
3	NASA 3	9/16/96	☒	☒
3	STS 79 (SM-04)	9/16/96	☒	☒
4	Mir 23	2/2/97	☒	☒
4	NASA 4	1/16/97	☒	☒
4	STS 81 (SM-05)	1/16/97	☒	☒
5	Mir 24	6/24/97	☒	☒
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	Mir 25	12/12/97	☒	☒
6	NASA 6	9/18/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒
7	Mir 26	5/30/98	☒	☒
7	NASA 7	1/15/98	☒	☒
7	STS 89 (SM-08)	1/15/98	☒	☒
7	STS 91 (SM-09)	5/29/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
SHR9	SHR	Flight	820431	MIPS-2L Laptop
SHR	SHR	Flight	848745	Magneto Optical Cartridge (MIPS)
HLS	BP	Flight	852235	Ballot Box
HLS	BP	Training	853504	Logbook, Crew Interactions (Russian)
HLS	BP	Training	853506	Logbook, Crew Interactions (English)

Mission: Mir 24 **Invest. ID:** 110037 **Exp. ID:** 628 **Russian ID:** Interactio

Invest. Title: Crewmember and Crew-Ground Interactions During NASA-Mir **Prime** ☒ **Contingent** ☐

US PI: Kanas, Nick A. **Russian PI:** Salnitskiy, Vyacheslav

1. Session ID: HLS:BP:P:1

2. Session: Mir Crew: Training- Completion of Computerized Questionnaire **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 120

Scheduled Days: L- 60

4. Session Scenario:
Crewmembers will be trained to use the computerized questionnaire packet.

5. Session Constraints:

1. Ground participation: Ground crew subjects should be those who are in the best position to evaluate the interpersonal climate of the mission control group. The subjects should consist of both Russian and American personnel. There should be a minimum of 6 ground subjects.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820468	MIPS-2L Hard Drive	1
848745	Magneto Optical Cartridge (MIPS)	1
852235	Ballot Box	1
853504	Logbook, Crew Interactions (Russian)	1
853506	Logbook, Crew Interactions (English)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	2	0	Training session for use and completion of computerized questionnaire packet

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 110037 **Exp. ID:** 628 **Russian ID:** Interactio

Invest. Title: Crewmember and Crew-Ground Interactions During NASA-Mir **Prime** ☒ **Contingent** ☐

US PI: Kanas, Nick A. **Russian PI:** Salnitskiy, Vyacheslav

1. Session ID: HLS:BP:P:2

2. Session: NASA Crew: Training-Completion of Computerized Questionnaire **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: L- 60

4. Session Scenario:

Crewmembers will be trained to use the computerized questionnaire packet.

5. Session Constraints:

1. Ground participation: Ground crew subjects should be those who are in the best position to evaluate the interpersonal climate of the mission control group. The subjects should consist of both Russian and American personnel. There should be a minimum of 6 ground subjects.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820468	MIPS-2L Hard Drive	1
848745	Magneto Optical Cartridge (MIPS)	1
852235	Ballot Box	1
853504	Logbook, Crew Interactions (Russian)	1
853506	Logbook, Crew Interactions (English)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	1	0	Training session for use and completion of computerized questionnaire packet

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: Mir 24 **Invest. ID:** 110037 **Exp. ID:** 628 **Russian ID:** Interactio

Invest. Title: Crewmember and Crew-Ground Interactions During NASA-Mir

Prime ☒
Contingent ☐

US PI: Kanas, Nick A. **Russian PI:** Salnitskiy, Vyacheslav

1. Session ID: HLS:BP:P:5

Session Type: Preflight

2. Session: Fam Session Crew Interactions (Mir)

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 120

Scheduled Days: L- 180

4. Session Scenario:
Familarization Session for the crew to demonstrate the hardware and the questionnaire. The protocol will be explained.

5. Session Constraints:
None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848745	Magneto Optical Cartridge (MIPS)	1
852235	Ballot Box	1
853505	Crew Interactions Logbook Questionnaire (Russian)	2
853507	Crew Interaction Logbook Questionnaire (English)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	2	0	Fam Session

8. Data Processing:

N/A

Mission: NASA 5 **Invest. ID:** 110037 **Exp. ID:** 628 **Russian ID:** Interactio

Invest. Title: Crewmember and Crew-Ground Interactions During NASA-Mir **Prime** ☑ **Contingent** ☐

US PI: Kanas, Nick A. **Russian PI:** Salnitskiy, Vyacheslav

1. Session ID: HLS:BP:P:6

Session Type: Preflight

2. Session: Fam Session Crew Interactions (NASA)

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 180

4. Session Scenario:
Familarization Session for the crew to demonstrate the hardware and the questionnaire. The protocol will be explained.

5. Session Constraints:
None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848745	Magneto Optical Cartridge (MIPS)	1
852235	Ballot Box	1
853505	Crew Interactions Logbook Questionnaire (Russian)	1
853507	Crew Interaction Logbook Questionnaire (English)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	1	0	Fam Session

8. Data Processing:

N/A

Mission: Mir 24 **Invest. ID:** 110037 **Exp. ID:** 628 **Russian ID:** Interactio

Invest. Title: Crewmember and Crew-Ground Interactions During NASA-Mir **Prime** ☒ **Contingent** ☐

US PI: Kanas, Nick A. **Russian PI:** Salnitskiy, Vyacheslav

1. Session ID: HLS:BP:P:3 **Session Type:** BDC

2. Session: Mir Crew: Completion of Computerized Questionnaire

3. Session Timeline: **Crewtime Usage (mins):** 40 **Session Time (mins):** 20

Scheduled Days: L- 30, 37, 44, 51

4. Session Scenario:
Subjects complete computerized questionnaire packet.

5. Session Constraints:
1. Subjects should complete the computerized questionnaire packet on the same day, near the end of the day.
2. Completion should take 15-20 minutes depending on whether critical incidents occurred that need to be recorded.
3. Last session should be as close to launch as possible.
4. Ground participation: Ground crew subjects should be those who are in the best position to evaluate the interpersonal climate of the mission control group. The subjects should consist of both Russian and American personnel. There should be a minimum of 6 ground subjects.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820431	MIPS-2L Laptop	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	0	0	0	2	Completion of computerized questionnaire packet

8. Data Processing:
1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 110037 **Exp. ID:** 628 **Russian ID:** Interactio

Invest. Title: Crewmember and Crew-Ground Interactions During NASA-Mir **Prime** ☑ **Contingent** ☐

US PI: Kanas, Nick A. **Russian PI:** Salnitskiy, Vyacheslav

1. Session ID: HLS:BP:P:4

2. Session: NASA Crew: Completion of Computerized Questionnaire **Session Type:** BDC

3. Session Timeline: **Crewtime Usage (mins):** 20 **Session Time (mins):** 20

Scheduled Days: L- 30, 37, 44, 51

4. Session Scenario:

Subjects complete questionnaire packet.

5. Session Constraints:

1. Subjects should complete the computerized questionnaire packet on the same day, near the end of the day.
2. Completion should take 15-20 minutes depending on whether critical incidents occurred that need to be recorded.
3. Last session should be as close to launch as possible.
4. Ground participation: Ground crew subjects should be those who are in the best position to evaluate the interpersonal climate of the mission control group. The subjects should consist of both Russian and American personnel. There should be a minimum of 6 ground subjects.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820431	MIPS-2L Laptop	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	0	0	0	1	Completion of computerized questionnaire packet

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: STS 84 (SM-06) **Invest. ID:** 110037 **Exp. ID:** 628 **Russian ID:** Interactio

Invest. Title: Crewmember and Crew-Ground Interactions During NASA-Mir **Prime** ☒ **Contingent** ☐

US PI: Kanas, Nick A. **Russian PI:** Salnitskiy, Vyacheslav

1. Session ID: HLS:LOG:I:11 **Session Type:** Up Item

2. Session: Transfer Session - Crewmember and Ground Interaction from Shuttle to Mir

3. Session Timeline: **Crewtime Usage (mins):** 10 **Session Time (mins):** 10

Scheduled Days: FD 5

4. Session Scenario:
Logbooks, and Ballot Box will be transferred from the Shuttle to the Mir.

5. Session Constraints:
1. None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
852235	Ballot Box	1
853504	Logbook, Crew Interactions (Russian)	44
853506	Logbook, Crew Interactions (English)	19

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Unstow items and transfer to Mir

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: Mir 24 **Invest. ID:** 110037 **Exp. ID:** 628 **Russian ID:** Interactio

Invest. Title: Crewmember and Crew-Ground Interactions During NASA-Mir **Prime** ☒ **Contingent** ☐

US PI: Kanas, Nick A. **Russian PI:** Salnitskiy, Vyacheslav

1. Session ID: HLS:BP:I:10

2. Session: Mir Crew: Completion of Computerized Questionnaire Packet **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 50 **Session Time (mins):** 25

Scheduled Days: FD 7, 14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84, 91, 98, 105, 112, 119, 126, 133, 140, 147, 154, 161, 168, 175

4. Session Scenario:

Subjects will complete the computerized Questionnaire packet every 7 days on a Wednesday +/- one day. A Magneto Optical Cartridge will record answers to the questionnaire. After completion of the questionnaire, the cartridge will be stowed in a locked, private area.

5. Session Constraints:

1. The cartridge will need to be secured in a locked, private area until it is released to the PI or his designate at the end of the mission.
2. Subjects should complete the computerized packet in one day, near the end of the day.
3. Ground control subjects should complete their questionnaire packets on the same day as the inflight crew subjects.
4. Completion takes 15-20 minutes per subject depending on whether critical incidents occurred that need to be recorded.
5. Last day of completion should be as close to landing as possible.
6. Ground participation: Ground crew subjects should be those who are in the best position to evaluate the interpersonal climate of the mission control group. The subjects should consist of both Russian and American personnel. There should be a minimum of 6 ground subjects.
7. Logbooks and Ballot Box will be used as a contingency to MIPS.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820431	MIPS-2L Laptop	2
848745	Magneto Optical Cartridge (MIPS)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	20	1	0	2	Complete computerized questionnaire packet
5	5	1	0	2	Stow cartridge in locked, private area

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 110037 **Exp. ID:** 628 **Russian ID:** Interactio

Invest. Title: Crewmember and Crew-Ground Interactions During NASA-Mir **Prime** ☒ **Contingent** ☐

US PI: Kanas, Nick A. **Russian PI:** Salnitskiy, Vyacheslav

1. Session ID: HLS:BP:I:11 **Session Type:** Inflight

2. Session: NASA Crew: Completion of Computerized Questionnaire Packet

3. Session Timeline: **Crewtime Usage (mins):** 25 **Session Time (mins):** 25

Scheduled Days: FD 4, 11, 18, 25, 32, 39, 46, 53, 60, 67, 74, 81, 88, 95, 102, 109, 116, 123, 130, 137, 144

4. Session Scenario:

Subjects will complete the computerized Questionnaire packet every 7 days on a Wednesday +/- one day. After completion of the questionnaire, the cartridge will be stowed in a locked, private area.

5. Session Constraints:

1. The cartridge will need to be secured in a locked, private area until it is released to the PI or his designate at the end of the mission.
2. Subjects should complete the computerized packet in one day, near the end of the day each week.
3. Ground crew subjects should complete their questionnaire packets on the same day as the inflight crew subjects.
4. Completion takes 15-20 minutes per subject depending on whether critical incidents occurred that need to be recorded.
5. Exact flight days have been estimated . NASA crewmember should complete the computerized packet on the same day as the Mir crewmembers.
6. Last day of completion should be as close to landing as possible.
7. Ground participation: Ground crew subjects should be those who are in the best position to evaluate the interpersonal climate of the mission control group. The subjects should consist of both Russian and American personnel. There should be a minimum of 6 ground subjects.
8. Logbook and Ballot Box will be used as a contingency to the MIPS.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820431	MIPS-2L Laptop	1
848745	Magneto Optical Cartridge (MIPS)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	20	1	0	1	Complete computerized questionnaire packet
5	5	1	0	1	Stow cartridge in locked, private area

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 110037 **Exp. ID:** 628 **Russian ID:** Interactio

Invest. Title: Crewmember and Crew-Ground Interactions During NASA-Mir **Prime** ☑ **Contingent** ☐

US PI: Kanas, Nick A. **Russian PI:** Salnitskiy, Vyacheslav

1. Session ID: HLS:LOG:I:155

2. Session: Transfer Session - Crew member and Ground Interaction from Mir to Shuttle **Session Type:** Down Item

3. Session Timeline: **Crewtime Usage (mins):** 15 **Session Time (mins):** 15

Scheduled Days: FD 5

4. Session Scenario:

Questionnaire diskettes will be transferred from the Mir to the Shuttle.

5. Session Constraints:

1. None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
852235	Ballot Box	1
853504	Logbook, Crew Interactions (Russian)	54
853506	Logbook, Crew Interactions (English)	23

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow Magneto Optical Cartridges
5	5	1	1	0	Transfer cartridges to Mir
5	5	1	1	0	Return to Shuttle

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: Mir 24 **Invest. ID:** 110037 **Exp. ID:** 628 **Russian ID:** Interactio

Invest. Title: Crewmember and Crew-Ground Interactions During NASA-Mir **Prime** ☒ **Contingent** ☐

US PI: Kanas, Nick A. **Russian PI:** Salnitskiy, Vyacheslav

1. Session ID: HLS:BP:R:1

Session Type: Postflight

2. Session: Mir Crew: Completion of Computerized Questionnaire Packet

3. Session Timeline: **Crewtime Usage (mins):** 40 **Session Time (mins):** 20

Scheduled Days: R+ 7, 14

4. Session Scenario:

Subjects should complete the computerized questionnaire packet on the same day, near the end of the day.

5. Session Constraints:

1. Subjects should complete the computerized questionnaire packet on the same day, near the end of the day.
2. Completion should take 15-20 minutes depending on whether critical incidents occurred that need to be recorded.
3. Ground participation: Ground crew subjects should be those who are in the best position to evaluate the interpersonal climate of the mission control group. The subjects should consist of both Russian and American personnel. There should be a minimum of 6 ground subjects.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820431	MIPS-2L Laptop	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	0	0	0	2	Completion of computerized questionnaire packet

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 110037 **Exp. ID:** 628 **Russian ID:** Interactio

Invest. Title: Crewmember and Crew-Ground Interactions During NASA-Mir **Prime** ☒ **Contingent** ☐

US PI: Kanas, Nick A. **Russian PI:** Salnitskiy, Vyacheslav

1. Session ID: HLS:BP:R:2

2. Session: NASA Crew: Completion of Computerized Questionnaire Packet **Session Type:** Postflight

3. Session Timeline: **Crewtime Usage (mins):** 20 **Session Time (mins):** 20

Scheduled Days: R+ 7, 14

4. Session Scenario:

Subjects complete computerized questionnaire packet.

5. Session Constraints:

1. Subjects should complete the computerized questionnaire packet on the same day, near the end of the day.
2. Completion should take 15-20 minutes depending on whether critical incidents occurred that need to be recorded.
3. Ground participation: Ground crew subjects should be those who are in the best position to evaluate the interpersonal climate of the mission control group. The subjects should consist of both Russian and American personnel. There should be a minimum of 6 ground subjects.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820431	MIPS-2L Laptop	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	0	0	0	1	Completion of computerized questionnaire packet

8. Data Processing:

1. N/A for pre/postflight sessions.

Investigation ID: 890091 **Experiment ID:** GASMAP **Russian ID:** GASMAP Facility

Investigation Title: GASMAP Facility Operations

US Investigators: Booker, Floyd

Russian Investigators:

Other Investigators:

Payload Category: HLS **Sub-Cat.:** FAC **Subjects Requested:**

Description:

Science Objectives:

Functional Objectives:

Sample Transfer Rqd: No **Hardware Transfer Rqd:** No

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
2	Mir 21	2/21/96	☒	☒
2	NASA 2	3/22/96	☒	☒
2	Priroda	4/14/96	☒	☒
3	NASA 3	9/16/96	☒	☒
4	NASA 4	1/16/97	☒	☒
5	NASA 5	5/15/97	☒	☒
6	NASA 6	9/18/97	☒	☒
7	NASA 7	1/15/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
HLS	CP	Flight	390182	Gas Analysis System (GASMAP)

Mission: NASA 5 **Invest. ID:** 890091 **Exp. ID:** GASMAP **Russian ID:** GASMAP

Invest. Title: GASMAP Facility Operations

Prime ☑
Contingent ☐

US PI: Booker, Floyd **Russian PI:**

1. Session ID: HLS:FAC:P:1

2. Session: GASMAP - Hardware Familiarization

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 90 **Session Time (mins):** 90

Scheduled Days: L- 180

4. Session Scenario:

The crewmember is given an overview of the GASMAP operation and how to assess and maintain the "health" of the system. The crewmember will be given an overall description of the GASMAP and the principles of operation.

5. Session Constraints:

1. None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390182	Gas Analysis System (GASMAP)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
90	0	0	1	0	Classroom instruction

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 890091 **Exp. ID:** GASMAP **Russian ID:** GASMAP

Invest. Title: GASMAP Facility Operations

Prime ☒
Contingent ☐

US PI: Booker, Floyd **Russian PI:**

1. Session ID: HLS:FAC:P:2

Session Type: Training

2. Session: GASMAP - Hardware Familiarization/Operation

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: L- 170

4. Session Scenario:
The crewmember will be instructed how to perform the abbreviated functional procedure, how to identify the need for a system rough out, and execution of a rough-out.

5. Session Constraints:
1. None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390182	Gas Analysis System (GASMAP)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	1	0	Operations training

8. Data Processing:
1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 890091 **Exp. ID:** GASMAP **Russian ID:** GASMAP

Invest. Title: GASMAP Facility Operations

Prime ☒
Contingent ☐

US PI: Booker, Floyd **Russian PI:**

1. Session ID: HLS:FAC:P:3

Session Type: Training

2. Session: GASMAP - Hardware Operations Refresher

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: L- 30

4. Session Scenario:
The crewmember will recieve a refresher session and practice performing the abbreviated functional procedure, identifying the need for a system rough-out, and executing a rough-out.

5. Session Constraints:
1. None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390182	Gas Analysis System (GASMAP)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	1	0	Operations refresher

8. Data Processing:
1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 890091 **Exp. ID:** GASMAP **Russian ID:** GASMAP

Invest. Title: GASMAP Facility Operations

Prime ☒
Contingent ☐

US PI: Booker, Floyd **Russian PI:**

1. Session ID: HLS:FAC:I:1

Session Type: Inflight

2. Session: GASMAP Check-Out

3. Session Timeline: **Crewtime Usage (mins):** 25 **Session Time (mins):** 25

Scheduled Days: FD 14, 44, 74, 104

4. Session Scenario:
The crewmember will run an abbreviated functional test on the GASMAP. The crewmember will also check and record the pressure level of the gases in the calibration module.

5. Session Constraints:
1. Healthcheck or GASMAP usage required every 30 days.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390182	Gas Analysis System (GASMAP)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Activate GASMAP
0	0	1	0	0	BREAK - GASMAP warm up (45 minutes)
15	15	1	1	0	Run GASMAP functional test
5	5	1	1	0	Deactivate GASMAP

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890091 **Exp. ID:** GASMAP **Russian ID:** GASMAP

Invest. Title: GASMAP Facility Operations

Prime ☒
Contingent ☐

US PI: Booker, Floyd **Russian PI:**

1. Session ID: HLS:FAC:I:3

2. Session: GASMAP Rough-Out

Session Type: Inflight

3. Session Timeline: **Crewtime Usage (mins):** 150 **Session Time (mins):** 90

Scheduled Days: FD 0

4. Session Scenario:

If a vacuum leak is discovered during the system check-out, the GASMAP will be transferred to the Krystall module and a rough-out executed.

5. Session Constraints:

1. Session only performed if a vacuum leak is detected during the session "GASMAP Check-Out". Therefore, this session should be scheduled in conjunction with the check-out session.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390182	Gas Analysis System (GASMAP)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	30	1	2	0	Transfer GASMAP to the Krystall module
30	30	1	1	0	Perform rough-out
30	30	1	2	0	Transfer GASMAP back to Spektr

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890091 **Exp. ID:** GASMAP **Russian ID:** GASMAP

Invest. Title: GASMAP Facility Operations

Prime ☒
Contingent ☐

US PI: Booker, Floyd **Russian PI:**

1. Session ID: HLS:FAC:I:4

Session Type: Inflight

2. Session: GASMAP Full Functional Check and Standby Power-up

3. Session Timeline: **Crewtime Usage (mins):** 35 **Session Time (mins):** 275

Scheduled Days: FD 95

4. Session Scenario:
Full functional check on GASMAP is conducted. GASMAP runs in standby mode for 4 hours to pump down the pressure in the analyzer.

5. Session Constraints:
1. Session must be performed once every 90 days to maintain the functional health of the facility.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390182	Gas Analysis System (GASMAP)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	30	1	1	0	Perform GASMAP Analyzer and Tank Pressure Check and power up
240	240	1	0	0	Break - GASMAP runs in standby mode
5	5	1	1	0	GASMAP powered down after 4 hours

8. Data Processing:
1. No data downlink required.
2. Air-to-gound voice communication may be required in the event of a contingency situation.

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International Space Station Risk Mitigation (ISS)

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Investigation ID: 650006 **Experiment ID:** Mir (E18) **Russian ID:** EDLS

Investigation Title: Enhanced Dynamic Load Sensors (EDLS) on Mir

US Investigators: Beck, Sherwin

Russian Investigators: Kharitonov, W.

Other Investigators: Simakov, S.

Payload Category: ISS **Sub-Cat.:** DYN **Subjects Requested:** 1

Description: The purpose of the Enhanced Dynamic Load Sensor (EDLS) experiment is to measure the normal common forces and moments exerted by space station crews during their regular routine activities on board Mir. The experiment hardware is comprised of sensor hardware that includes a handhold, touch pad, and two foot restraints designed to function as normal motion restraint devices. These sensors measure forces and torques and are connected to an Experiment Support Module (ESM). The ESM contains electronics, a computer, data storage device, power supply, and filters to control signal conditioning and data stowage.

Science Objectives: This is a technological evaluation and has the following goals:
1. To measure the magnitude and frequency of the crew induced disturbances to the Mir micro-g environment
2. To provide longer term data from crew members with more on-orbit experience
3. To quantify the variation of loads with time (learning curve/efficiency) and with respect to the experience of the crew member
4. To establish the transfer function(s) between the crew motion forces and spacecraft accelerations
5. To develop a disturbance model to estimate the ISSA micro-gravity environment, assess need for payload isolation
6. To provide magnitudes and frequency content for isolation design

Functional Objectives:
1. Deploy sensors
2. Apply force to sensors throughout the course of normal activities

Sample Transfer Rqd: Yes **Hardware Transfer Rqd:** Yes

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
2	Mir 20	9/3/95	☒	☒
2	Mir 21	2/21/96	☒	☒
2	NASA 2	3/22/96	☒	☒
2	STS 74 (SM-02)	11/12/95	☒	☒
2	STS 76 (SM-03)	3/22/96	☒	☒
3	Mir 22	8/17/96	☒	☒
3	NASA 3	9/16/96	☒	☒
3	STS 79 (SM-04)	9/16/96	☒	☒
4	Mir 23	2/2/97	☒	☒
4	NASA 4	1/16/97	☒	☒
4	STS 81 (SM-05)	1/16/97	☒	☒
5	Mir 24	6/24/97	☒	☒
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
OPS	SHR	Flight	390043	Camcorder System (NASA)
ISS	DYN	Flight	650010	EDLS Experiment Support Module (ESM)
ISS	DYN	Flight	820286	EDLS Force Sensor 1 - Handhold and Adjoining Cable
ISS	DYN	Flight	820291	EDLS Force Sensor 2 - Foot Restraint and Adjoining Cable
ISS	DYN	Flight	820292	EDLS Force Sensor 3 - Touch Pad and Adjoining Cable
SHR	SHR	Flight	820433	MIPS-2C Controller
ISS	DYN	Flight	820464	EDLS Umbillical Cable
ISS	DYN	Flight	820465	ESM Power Cable
SHR	SHR	Flight	840255	8mm Video Tape

ISS	DYN	Flight	846653	EDLS Worm Disk Pouch
ISS	DYN	Flight	846654	Helmet Temporary Stowage Bag
OPS	SHR	Flight	854862	MIPS Serial cable
			855012	EDLS Data Sheets

Mission: Mir 24 **Invest. ID:** 650006 **Exp. ID:** Mir (E18) **Russian ID:** EDLS

Invest. Title: Enhanced Dynamic Load Sensors (EDLS) on Mir

Prime ☒
Contingent ☐

US PI: Beck, Sherwin **Russian PI:** Kharitonov, W.

1. Session ID: ISS:DYN:P:15

2. Session: Dynamic Load Sensor Experiment Training - ESM Procedures and WORM Disk Usage

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 15

Scheduled Days: L- 90, 120

4. Session Scenario:
Mir cosmonauts will be trained in the power connections and activation of the Experiment Support Module, including procedures for time-synchronization using the MIPS. Procedures for activating and terminating data collection will be covered, as well as LCD messages and displays. WORM disk handling and usage will also be covered.

5. Session Constraints:
1. N/A

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
650010	EDLS Experiment Support Module (ESM)	1
820286	EDLS Force Sensor 1 - Handhold and Adjoining Cable	1
820291	EDLS Force Sensor 2 - Foot Restraint and Adjoining Cable	2
820292	EDLS Force Sensor 3 - Touch Pad and Adjoining Cable	1
820464	EDLS Umbillical Cable	1
820465	ESM Power Cable	1
846653	EDLS Worm Disk Pouch	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	2	0	ESM procedures and WORM disk usage

8. Data Processing:
1. N/A for pre/postflight sessions.

Mission: Mir 24 **Invest. ID:** 650006 **Exp. ID:** Mir (E18) **Russian ID:** EDLS

Invest. Title: Enhanced Dynamic Load Sensors (EDLS) on Mir

Prime ☑
Contingent ☐

US PI: Beck, Sherwin **Russian PI:** Kharitonov, W.

1. Session ID: ISS:DYN:P:16

2. Session: Dynamic Load Sensor Experiment Training - Video Data Collection

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 15

Scheduled Days: L- 120

4. Session Scenario:

Mir cosmonauts will be instructed in the video data requirements, including emphasis on ensuring proper synchronization between the video and digital data.

5. Session Constraints:

N/A

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
650010	EDLS Experiment Support Module (ESM)	1
820286	EDLS Force Sensor 1 - Handhold and Adjoining Cable	1
820291	EDLS Force Sensor 2 - Foot Restraint and Adjoining Cable	2
820292	EDLS Force Sensor 3 - Touch Pad and Adjoining Cable	1
820464	EDLS Umbillical Cable	1
820465	ESM Power Cable	1
846653	EDLS Worm Disk Pouch	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	2	0	Video data collection

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: Mir 24 **Invest. ID:** 650006 **Exp. ID:** Mir (E18) **Russian ID:** EDLS

Invest. Title: Enhanced Dynamic Load Sensors (EDLS) on Mir

Prime ☒
Contingent ☐

US PI: Beck, Sherwin **Russian PI:** Kharitonov, W.

1. Session ID: ISS:DYN:P:17

Session Type: Training

2. Session: Dyanmic Load Sensor Experiment Training - Off-nominal & Malfunction

3. Session Timeline: **Crewtime Usage (mins):** 40 **Session Time (mins):** 20

Scheduled Days: L- 120

4. Session Scenario:
Mir cosmonauts will be instructed in all off-nominal procedures, including WORM disk failure, sensor damage and manual test protocol parameter entry.

5. Session Constraints:
N/A

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
650010	EDLS Experiment Support Module (ESM)	1
820286	EDLS Force Sensor 1 - Handhold and Adjoining Cable	1
820291	EDLS Force Sensor 2 - Foot Restraint and Adjoining Cable	2
820292	EDLS Force Sensor 3 - Touch Pad and Adjoining Cable	1
820464	EDLS Umbillical Cable	1
820465	ESM Power Cable	1
846653	EDLS Worm Disk Pouch	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	20	1	2	0	Off-nominal and Malfunction Procedures

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 650006 **Exp. ID:** Mir (E18) **Russian ID:** EDLS

Invest. Title: Enhanced Dynamic Load Sensors (EDLS) on Mir

Prime ☒
Contingent ☐

US PI: Beck, Sherwin **Russian PI:** Kharitonov, W.

1. Session ID: ISS:DYN:P:18

2. Session: Dynamic Load Sensor Experiment Training - Video Data Collection

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 15 **Session Time (mins):** 15

Scheduled Days: L- 180, 270

4. Session Scenario:

Astronaut will be instructed in the video data requirements, including emphasis on ensuring proper synchronization between the video and digital data.

5. Session Constraints:

N/A

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
650010	EDLS Experiment Support Module (ESM)	1
820286	EDLS Force Sensor 1 - Handhold and Adjoining Cable	1
820291	EDLS Force Sensor 2 - Foot Restraint and Adjoining Cable	2
820292	EDLS Force Sensor 3 - Touch Pad and Adjoining Cable	1
820464	EDLS Umbillical Cable	1
820465	ESM Power Cable	1
846653	EDLS Worm Disk Pouch	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	1	0	Video data collection

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 650006 **Exp. ID:** Mir (E18) **Russian ID:** EDLS

Invest. Title: Enhanced Dynamic Load Sensors (EDLS) on Mir

Prime ☒
Contingent ☐

US PI: Beck, Sherwin **Russian PI:** Kharitonov, W.

1. Session ID: ISS:DYN:P:19

Session Type: Training

2. Session: Dynamic Load Sensor Experiment Training - Off-nominal & Malfunction

3. Session Timeline: **Crewtime Usage (mins):** 20 **Session Time (mins):** 20

Scheduled Days: L- 180, 270

4. Session Scenario:
Astronaut will be instructed in all off-nominal procedures, including WORM disk failure, sensor damage and manual test protocol parameter entry.

5. Session Constraints:
N/A

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
650010	EDLS Experiment Support Module (ESM)	1
820286	EDLS Force Sensor 1 - Handhold and Adjoining Cable	1
820291	EDLS Force Sensor 2 - Foot Restraint and Adjoining Cable	2
820292	EDLS Force Sensor 3 - Touch Pad and Adjoining Cable	1
820464	EDLS Umbillical Cable	1
820465	ESM Power Cable	1
846653	EDLS Worm Disk Pouch	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	20	1	1	0	Off-nominal and malfunction procedures

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 650006 **Exp. ID:** Mir (E18) **Russian ID:** EDLS

Invest. Title: Enhanced Dynamic Load Sensors (EDLS) on Mir

Prime ☒
Contingent ☐

US PI: Beck, Sherwin **Russian PI:** Kharitonov, W.

1. Session ID: ISS:DYN:P:20

2. Session: Dynamic Load Sensor Experiment Training - ESM Procedures and WORM Disk

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 15 **Session Time (mins):** 15

Scheduled Days: L- 180, 270

4. Session Scenario:

Astronauts will be trained in the power connections and activation of the Experiment Support Module, including procedures for time-synchronization using the MIPS. Procedures for activating and terminating data collection will be covered, as well as LCD messages and displays. WORM disk handling and usage will also be covered.

5. Session Constraints:

N/A

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
650010	EDLS Experiment Support Module (ESM)	1
820286	EDLS Force Sensor 1 - Handhold and Adjoining Cable	1
820291	EDLS Force Sensor 2 - Foot Restraint and Adjoining Cable	2
820292	EDLS Force Sensor 3 - Touch Pad and Adjoining Cable	1
820464	EDLS Umbillical Cable	1
820465	ESM Power Cable	1
846653	EDLS Worm Disk Pouch	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	1	0	ESM Procedures and WORM disk usage

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 650006 **Exp. ID:** Mir (E18) **Russian ID:** EDLS

Invest. Title: Enhanced Dynamic Load Sensors (EDLS) on Mir

Prime ☒
Contingent ☐

US PI: Beck, Sherwin **Russian PI:** Kharitonov, W.

1. Session ID: ISS:DYN:P:9

Session Type: Training

2. Session: Dynamic Load Sensor Experiment Training - Sensor Setup and Usage

3. Session Timeline: **Crewtime Usage (mins):** 15 **Session Time (mins):** 15

Scheduled Days: L- 180, 270

4. Session Scenario:

Astronaut will be trained in the installation of the DLS brackets, the placement of the sensors around Mir in areas of potential high usage, and in the connection of the sensors to the Experiment Support Module. The crew will also be instructed as to how to use the sensors for both background operations (where the sensors are utilized as any other IVA assisance device) and for crew-specific tasks (where the sensors are consciously used by the crew during other specific tasks).

5. Session Constraints:

N/A

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
650010	EDLS Experiment Support Module (ESM)	1
820286	EDLS Force Sensor 1 - Handhold and Adjoining Cable	1
820291	EDLS Force Sensor 2 - Foot Restraint and Adjoining Cable	2
820292	EDLS Force Sensor 3 - Touch Pad and Adjoining Cable	1
820464	EDLS Umbillical Cable	1
820465	ESM Power Cable	1
846653	EDLS Worm Disk Pouch	1
854862	MIPS Serial cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	1	0	Dynamic Load Sensor Setup

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: Mir 24 **Invest. ID:** 650006 **Exp. ID:** Mir (E18) **Russian ID:** EDLS

Invest. Title: Enhanced Dynamic Load Sensors (EDLS) on Mir **Prime** ☑ **Contingent** ☐

US PI: Beck, Sherwin **Russian PI:** Kharitonov, W.

1. Session ID: ISS:DYN:I:2

2. Session: Enhanced Dynamics Load Sensor (EDLS) Data Takes **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 45 **Session Time (mins):** 525

Scheduled Days: FD 30, 34, 38, 42, 46, 50, 54, 58, 62, 66, 70, 74, 78, 82, 86, 90, 94, 98, 102, 106, 110, 114, 118, 122, 126, 130, 134

4. Session Scenario:

The purpose of EDLS is to measure forces imposed on vehicle by crew in the execution of their normal duties. Attainment of "unbiased" data requires crew to incorporate sensors into their normal work routine in Priroda (eg. use foot restraint while performing an experiment within a glovebox). Crewmember will unstow (or relocate) hardware, mount ESM, forces sensors and TV camcorder at preselected locations. Operator powers EDLS Experiment Support Module (ESM), performs ESM start-up protocol, checks disc status (replaces disk if necessary). ESM is synchronized using MIPS. Camcorder is setup to view and record EDLS sensors for a specified time period. Crew uses handhold and footloops as IVA aids as desired during normal work routine. Crewmember halts ESM at end of work shift, powers off ESM and camcorder. Data will be recorded on optical Write Once/Read Many (WORM) disks. Disks will be returned to ground for data analysis (Refer to session EDLS - Used Data Disk Transport to Shuttle from Mir)

5. Session Constraints:

1. Measurements over extended time intervals (approximately 8 hrs) are necessary to obtain characteristics of nominal crew force inputs (force/torque amplitude ranges, quasi-steady state inputs, aperiodic/impulsive inputs, spectral frequency, time content, time history, etc.). Continuous hardware operation for 8-10 hrs is preferred.
2. To minimize unstow/stow operations, it is preferable to leave hardware in place and operate.
3. Camcorder must be used to correlate body movement with force input characteristics.
4. Unique operations are highly desired. These are the same as normal operations except crewmembers perform specific, prearranged maneuvers using one or more EDLS sensors (e.g. fast/slow rotation of torso while using foot restraint or soft/hard push-offs from touch pad). 15 to 30 mins of unique ops are required (will not exceed 3 to 5 hrs total for mission).
5. Sessions should be performed 3 times per week on average. Actual flight days may vary from scheduled days. Session performance should be scheduled to occur simultaneously with other scheduled Priroda activities.
6. It is desirable to have both cosmonauts perform this session.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
650010	EDLS Experiment Support Module (ESM)	1
820286	EDLS Force Sensor 1 - Handhold and Adjoining Cable	1
820291	EDLS Force Sensor 2 - Foot Restraint and Adjoining Cable	2
820292	EDLS Force Sensor 3 - Touch Pad and Adjoining Cable	1
820433	MIPS-2C Controller	1
820464	EDLS Umbillical Cable	1
820465	ESM Power Cable	1
840255	8mm Video Tape	1
846653	EDLS Worm Disk Pouch	1
846654	Helmet Temporary Stowage Bag	1
854862	MIPS Serial cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Turn on ESM and perform initialization protocol, including synchronization w/ MIPS
5	5	1	1	0	Replace/stow data disc (as needed), restart ESM
10	10	1	1	0	Setup TV camcorder (at pre-arranged times only)
5	5	1	1	0	Incorporate force sensors into normal work routine
480	480	1	0	0	Break - normal work routine in Priroda module incorporating EDLS sensors into work
5	5	1	1	0	Replace/stow data disc (as required) and TV tape
5	5	1	1	0	Restow TV camcorder
5	5	1	1	0	Stop ESM, turn off power; stop TV camcorder

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: Mir 24 **Invest. ID:** 650006 **Exp. ID:** Mir (E18) **Russian ID:** EDLS

Invest. Title: Enhanced Dynamic Load Sensors (EDLS) on Mir **Prime** ☑ **Contingent** ☐

US PI: Beck, Sherwin **Russian PI:** Kharitonov, W.

1. Session ID: ISS:DYN:I:36

2. Session: Enhanced Dynamics Load Sensor (EDLS) Unique Data Takes **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 85 **Session Time (mins):** 85

Scheduled Days: FD 34, 38, 42, 46, 90, 94, 118, 122, 126, 130

4. Session Scenario:

The purpose of EDLS is to measure forces imposed on vehicle by crew during unique operations. Prearranged maneuvers using one or more EDLS sensors (e.g. fast/slow rotation of torso while using foot restraint or soft/hard push-offs from touch pad) are required 15 to 30 mins. Crewmember will unstow (or relocate) hardware, mount ESM, forces sensors and TV camcorder at preselected locations. Operator powers EDLS Experiment Support Module (ESM), performs ESM start-up protocol, checks disc status (replaces disk if necessary). ESM is synchronized using MIPS. Camcorder is setup to view and record EDLS sensors for a specified time period. Crew uses handhold and footloops as IVA aids. Crewmember halts ESM at end of work shift, powers off ESM and camcorder. Data will be recorded on optical Write Once/Read Many (WORM) disks. Data sheets will be filled out by the crew. Disks will be returned to ground for data analysis (Refer to session EDLS - Used Data Disk Transport to Shuttle from Mir).

5. Session Constraints:

1. To minimize unstow/stow operations, it is preferable to leave hardware in place and operate.
2. Camcorder must be used to correlate body movement with force input characteristics.
3. Actual flight days may vary from scheduled days.
4. It is desirable to have both cosmonauts perform this session.
5. Minimum of 5 sesions total (early, mid, and late) for each cosmonaut.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
650010	EDLS Experiment Support Module (ESM)	1
820286	EDLS Force Sensor 1 - Handhold and Adjoining Cable	1
820291	EDLS Force Sensor 2 - Foot Restraint and Adjoining Cable	2
820292	EDLS Force Sensor 3 - Touch Pad and Adjoining Cable	1
820433	MIPS-2C Controller	1
820464	EDLS Umbillical Cable	1
820465	ESM Power Cable	1
840255	8mm Video Tape	1
846653	EDLS Worm Disk Pouch	1
854862	MIPS Serial cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Turn on ESM and perform initialization protocol, including synchronization w/ MIPS
5	5	1	1	0	Replace/stow data disc (as needed), restart ESM
10	10	1	1	0	Setup TV camcorder (at pre-arranged times only)
45	45	1	1	0	Perform Unique operations (including filling out data sheets)

5	5	1	1	0	Replace/stow data disc (as required) and TV tape
5	5	1	1	0	Restow TV camcorder
5	5	1	1	0	Stop ESM, turn off power; stop TV camcorder

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 650006 **Exp. ID:** Mir (E18) **Russian ID:** EDLS

Invest. Title: Enhanced Dynamic Load Sensors (EDLS) on Mir **Prime** ☑ **Contingent** ☐

US PI: Beck, Sherwin **Russian PI:** Kharitonov, W.

1. Session ID: ISS:DYN:I:2

2. Session: Enhanced Dynamics Load Sensor (EDLS) Data Takes **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 45 **Session Time (mins):** 525

Scheduled Days: FD 14, 17, 20, 23, 26, 29, 32, 35, 38, 41, 44, 47, 50, 53, 56, 59, 62, 65, 68, 71, 74, 77, 80, 83, 86, 89, 92, 95, 98, 101, 104, 107, 110, 113, 116, 119, 122, 125, 128, 131, 134

4. Session Scenario:

The purpose of EDLS is to measure forces imposed on vehicle by crew in the execution of their normal duties. Attainment of "unbiased" data requires crew to incorporate sensors into their normal work routine in Priroda (eg. use foot restraint while performing an experiment within a glovebox). Crewmember will unstow (or relocate) hardware, mount ESM, forces sensors and TV camcorder at preselected locations. Operator powers EDLS Experiment Support Module (ESM), performs ESM start-up protocol, checks disc status (replaces disk if necessary). ESM is synchronized using MIPS. Camcorder is setup to view and record EDLS sensors for a specified time period. Crew uses handhold and footloops as IVA aids as desired during normal work routine. Crewmember halts ESM at end of work shift, powers off ESM and camcorder. Data will be recorded on optical Write Once/Read Many (WORM) disks. Disks will be returned to ground for data analysis (Refer to session EDLS - Used Data Disk Transport to Shuttle from Mir)

5. Session Constraints:

1. Measurements over extended time intervals (approximately 8 hrs) are necessary to obtain characteristics of nominal crew force inputs (force/torque amplitude ranges, quasi-steady state inputs, aperiodic/impulsive inputs, spectral frequency, time content, time history, etc.). Continuous hardware operation for 8-10 hrs is preferred.
2. To minimize unstow/stow operations, it is preferable to leave hardware in place and operate.
3. Camcorder must be used to correlate body movement with force input characteristics.
4. Unique operations are highly desired. These are the same as normal operations except crewmembers perform specific, prearranged maneuvers using one or more EDLS sensors (e.g. fast/slow rotation of torso while using foot restraint or soft/hard push-offs from touch pad). 15 to 30 mins of unique ops are required (will not exceed 3 to 5 hrs total for mission).
5. Sessions should be performed 3 times per week on average. Actual flight days may vary from scheduled days. Session performance should be scheduled to occur simultaneously with other scheduled Priroda activities.
6. It is desirable to have both cosmonauts perform this session.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
650010	EDLS Experiment Support Module (ESM)	1
820286	EDLS Force Sensor 1 - Handhold and Adjoining Cable	1
820291	EDLS Force Sensor 2 - Foot Restraint and Adjoining Cable	2
820292	EDLS Force Sensor 3 - Touch Pad and Adjoining Cable	1
820433	MIPS-2C Controller	1
820464	EDLS Umbillical Cable	1
820465	ESM Power Cable	1
840255	8mm Video Tape	1
846653	EDLS Worm Disk Pouch	1
846654	Helmet Temporary Stowage Bag	1
854862	MIPS Serial cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Turn on ESM and perform initialization protocol, including synchronization w/ MIPS
5	5	1	1	0	Replace/stow data disc (as needed), restart ESM
10	10	1	1	0	Setup TV camcorder (at pre-arranged times only)
5	5	1	1	0	Incorporate force sensors into normal work routine
480	480	1	0	0	Break - normal work routine in Priroda module incorporating EDLS sensors into work
5	5	1	1	0	Replace/stow data disc (as required) and TV tape
5	5	1	1	0	Restow TV camcorder
5	5	1	1	0	Stop ESM, turn off power; stop TV camcorder

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 650006 **Exp. ID:** Mir (E18) **Russian ID:** EDLS

Invest. Title: Enhanced Dynamic Load Sensors (EDLS) on Mir **Prime** ☒ **Contingent** ☐

US PI: Beck, Sherwin **Russian PI:** Kharitonov, W.

1. Session ID: ISS:DYN:I:26

2. Session: Enhanced Dynamics Load Sensor Unique (EDLS) Data Takes **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 85 **Session Time (mins):** 85

Scheduled Days: FD 17, 20, 23, 26, 80, 83, 86, 128, 131, 134

4. Session Scenario:

The purpose of EDLS is to measure forces imposed on vehicle by crew during unique operations. Prearranged maneuvers using one or more EDLS sensors (e.g. fast/slow rotation of torso while using foot restraint or soft/hard push-offs from touch pad) are required 15 to 30 mins. Crewmember will unstow (or relocate) hardware, mount ESM, forces sensors and TV camcorder at preselected locations. Operator powers EDLS Experiment Support Module (ESM), performs ESM start-up protocol, checks disc status (replaces disk if necessary). ESM is synchronized using MIPS. Camcorder is setup to view and record EDLS sensors for a specified time period. Crew uses handhold and footloops as IVA aids. Crewmember halts ESM at end of work shift, powers off ESM and camcorder. Data will be recorded on optical Write Once/Read Many (WORM) disks. Data sheets will be filled out by the crew. Disks will be returned to ground for data analysis (Refer to session EDLS - Used Data Disk Transport to Shuttle from Mir).

5. Session Constraints:

1. Measurements over extended time intervals (approximately 8 hrs) are necessary to obtain characteristics of nominal crew force inputs (force/torque amplitude ranges, quasi-steady state inputs, aperiodic/impulsive inputs, spectral frequency, time content, time history, etc.). Continuous hardware operation for 8-10 hrs is preferred.
2. To minimize unstow/stow operations, it is preferable to leave hardware in place and operate.
3. Camcorder must be used to correlate body movement with force input characteristics.
4. Actual flight days may vary from scheduled days.
5. Minimum of 10 sessions total (early, mid, and late) for the astronaut.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
650010	EDLS Experiment Support Module (ESM)	1
820286	EDLS Force Sensor 1 - Handhold and Adjoining Cable	1
820291	EDLS Force Sensor 2 - Foot Restraint and Adjoining Cable	2
820292	EDLS Force Sensor 3 - Touch Pad and Adjoining Cable	1
820433	MIPS-2C Controller	1
820464	EDLS Umbillical Cable	1
820465	ESM Power Cable	1
840255	8mm Video Tape	1
846653	EDLS Worm Disk Pouch	1
854862	MIPS Serial cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Turn on ESM and perform initialization protocol, including synchronization w/ MIPS
5	5	1	1	0	Replace/stow data disc (as needed), restart ESM

10	10	1	1	0	Setup TV camcorder (at pre-arranged times only)
45	45	1	1	0	Perform Unique operations (including filling out data sheets)
5	5	1	1	0	Replace/stow data disc (as required) and TV tape
5	5	1	1	0	Restow TV camcorder
5	5	1	1	0	Stop ESM, turn off power; stop TV camcorder

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 650006 **Exp. ID:** Mir (E18) **Russian ID:** EDLS

Invest. Title: Enhanced Dynamic Load Sensors (EDLS) on Mir **Prime** ☒ **Contingent** ☐

US PI: Beck, Sherwin **Russian PI:** Kharitonov, W.

1. Session ID: ISS:LOG:I:17

2. Session: EDLS-Used Data Disk Transport to Shuttle from Mir **Session Type:** Down Item

3. Session Timeline: **Crewtime Usage (mins):** 10 **Session Time (mins):** 10

Scheduled Days: FD 5

4. Session Scenario:

Unstow used EDLS data disks, video tapes, and data sheets; transport to Shuttle for return.

5. Session Constraints:

1. None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840255	8mm Video Tape	1
846653	EDLS Worm Disk Pouch	1
855012	EDLS Data Sheets	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Go to Priroda Mir module and retrieve used EDLS disks, video tapes, and data sheets
5	5	1	1	0	Return to Shuttle and stow

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Investigation ID: 650007 **Experiment ID:** RME 1307 **Russian ID:** OPM

Investigation Title: Optical Properties Monitor (OPM)

US Investigators: Wilkes, Don

Russian Investigators: S. Naumov

Other Investigators: Demidov, Sergey

Payload Category: ISS **Sub-Cat.:** ENV **Subjects Requested:** 1

Description: The OPM will expose materials to the external Mir low earth orbital environment and measure the effects of this exposure in-situ with on-board optical instruments. Environmental monitors will also meaure test sample exposure to atomic oxygen, solar/earth irradiance and molecular contamination. The OPM will collect data for about 9 months and then be retireved. Collected data from the OPM will be stored on floppy disks by the Mir crew. These disks should be returned to the ground along with the OPM.

Science Objectives: (1) Determine the effects and damage mechanisms of the Mir space station environment on mataerials. (2) Provide data to validate lifetime prediction models.

Functional Objectives:

Sample Transfer Rqd: No **Hardware Transfer Rqd:** Yes

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
4	Mir 23	2/2/97	☒	☒
4	NASA 4	1/16/97	☒	☒
4	STS 81 (SM-05)	1/16/97	☒	☒
5	Mir 24	6/24/97	☒	☒
5	NASA 5	5/15/97	☒	☒
6	Mir 25	12/12/97	☒	☒
6	NASA 6	9/18/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒
7	STS 89 (SM-08)	1/15/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
ISS	ENV	Flight	650011	Optical Properties Monitor Carousel Assembly
SHR9	SHR	Flight	820431	MIPS-2L Laptop
SHR	SHR	Flight	820433	MIPS-2C Controller
ISS	ENV	Flight	846677	OPM Assembly MIPS-2L Data Cable

Mission: Mir 24 **Invest. ID:** 650007 **Exp. ID:** RME 1307 **Russian ID:** OPM

Invest. Title: Optical Properties Monitor (OPM)

Prime ☒
Contingent ☐

US PI: Wilkes, Don **Russian PI:** S. Naumov

1. Session ID: ISS:ENV:P:5

2. Session: OPM Operations (Checkout, Data Collection, Shutdown)

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: L- 60, 90

4. Session Scenario:

Crewmembers will practice procedures for transfer of OPM stored data to the MIPS computer, verifying operational procedures, data collection, manual override operations, and shutdown of the OPM.

5. Session Constraints:

1. None

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848753	MIPS Laptop Computer Trainer Unit	1
848754	MIPS Controller Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	1	0	Practice procedures used to transfer file data from the OPM to MIPS; practice manual override ops; power down procedures

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 650007 **Exp. ID:** RME 1307 **Russian ID:** OPM

Invest. Title: Optical Properties Monitor (OPM)

Prime ☒
Contingent ☐

US PI: Wilkes, Don **Russian PI:** S. Naumov

1. Session ID: ISS:ENV:P:5

Session Type: Training

2. Session: OPM Operations (Checkout, Data Collection, Shutdown)

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: L- 60, 90

4. Session Scenario:
Crewmembers will practice procedures for transfer of OPM stored data to the MIPS computer, verifying operational procedures, data collection, manual override operations, and shutdown of the OPM.

5. Session Constraints:
1. None

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848753	MIPS Laptop Computer Trainer Unit	1
848754	MIPS Controller Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	1	0	Practice procedures used to transfer file data from the OPM to MIPS; practice manual override ops; power down procedures

8. Data Processing:
1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 650007 **Exp. ID:** RME 1307 **Russian ID:** OPM

Invest. Title: Optical Properties Monitor (OPM) **Prime** ☒ **Contingent** ☐

US PI: Wilkes, Don **Russian PI:** S. Naumov

1. Session ID: ISS:ENV:I:19

2. Session: OPM Data Collection **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 13, 20, 27, 34, 41, 48, 55, 62, 69, 76, 83, 90, 97, 104, 111, 118, 125, 132

4. Session Scenario:

Crewmember will connect the MIPS-2L laptop to the OPM data connector and start the OPM application via power on, reset, or menu selection. The crewmember will execute the OPM data collection procedure. If OPM is operating nominally, OPM data will be transferred to the laptop and status displayed on the screen. If OPM does not respond, reset OPM power, and wait TBD minutes for data collection to be initiated. When the transfer has completed, OPM will resume operating autonomously. The crewmember will then disconnect the laptop and download the OPM data the MIPS Controller for stowage and downlink. This session is to be repeated at one week intevals for the duration of the OPM experiment lifetime on Mir.

5. Session Constraints:

1. The OPM checkout procedure has been previously completed.
2. OPM has been running autonomously for approximately one week collecting data.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
650011	Optical Properties Monitor Carousel Assembly	1
820431	MIPS-2L Laptop	1
820433	MIPS-2C Controller	1
846677	OPM Assembly MIPS-2L Data Cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
3	3	1	1	0	Connect the MIPS-2L laptop to the OPM data connector
12	12	1	1	0	Execute the OPM application via power on, reset, or menu selection
3	3	1	1	0	Disconnect the laptop computer
12	12	1	1	0	Download the OPM data to MIPS Controller

8. Data Processing:

1. Data downlink via MIPS is required.

Investigation ID: 650008 **Experiment ID:** Mir (CHeCS 4) **Russian ID:** WMM

Investigation Title: Water Microbiological Monitoring (WMM)

US Investigators: Pierson, Duane

Russian Investigators: TBD

Other Investigators: TBD

Payload Category: ISS **Sub-Cat.:** CHS **Subjects Requested:** 1

Description: This experiment will demonstrate the zero-gravity operation of water sampling hardware proposed for the microbiological monitoring of the ISS potable water supply. The collection and in-flight microbiological analysis of Mir potable water is necessary to evaluate the operation of hardware and the growth of microorganisms in a zero-gravity environment.

Science Objectives: Quantify the bacterial count in Mir potable water. Three water sources will be evaluated; the hot water from the dispenser, cold water from the dispenser, and water from the rodnick dispenser.

Functional Objectives:

Sample Transfer Rqd: Yes **Hardware Transfer Rqd:** Yes

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
3	NASA 3	9/16/96	☒	☒
3	STS 79 (SM-04)	9/16/96	☒	☒
4	NASA 4	1/16/97	☒	☒
4	STS 81 (SM-05)	1/16/97	☒	☒
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
OPS	SHR	Flight	390043	Camcorder System (NASA)
HLS		Flight	820342	Refrigerator (TEF)
HLS		Flight	840164	Capture Device Assy, Microbial
OPS	SHR	Flight	846732	Incubator, General Use
MG	SHR		852166	8 mm Video Tape (minutes)
SMP	HSR	Flight	853497	Kit Assy III, Water Experiment
SMP	HSR	Flight	853498	Kit Assy IV, Water Experiment

Mission: STS 84 (SM-06) **Invest. ID:** 650008 **Exp. ID:** Mir (CHeCS **Russian ID:** WMM

Invest. Title: Water Microbiological Monitoring (WMM) **Prime** ☒ **Contingent** ☐

US PI: Pierson, Duane **Russian PI:** TBD

1. Session ID: ISS:LOG:I:7

2. Session: Water Experiment Kit #IV Transfer to Mir **Session Type:** Up Item

3. Session Timeline: **Crewtime Usage (mins):** 20 **Session Time (mins):** 20

Scheduled Days: FD 4

4. Session Scenario:

Remove the Water Experiment Kit #4 (WEK #4) from Shuttle locker; transfer to Mir.

5. Session Constraints:

1. Session must occur during the docked phase.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
853498	Kit Assy IV, Water Experiment	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow WEK#4 from Shuttle locker
10	10	1	1	0	Transport WEK#4 to Mir
5	5	1	1	0	Stow WEK#4

8. Data Processing:

1. No data downlink required.
2. Air to ground voice communications may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 650008 **Exp. ID:** Mir (CHeCS **Russian ID:** WMM

Invest. Title: Water Microbiological Monitoring (WMM)

Prime ☒
Contingent ☐

US PI: Pierson, Duane **Russian PI:** TBD

1. Session ID: ISS:CHS:I:13

Session Type: Inflight

2. Session: Microbial Capture Device Processing

3. Session Timeline: **Crewtime Usage (mins):** 165 **Session Time (mins):** 165

Scheduled Days: FD 15, 55, 135

4. Session Scenario:
Water will be collected (hot, cold and SVO-ZV) to process microbial capture devices.

5. Session Constraints:
1. Exact performance days have been estimated.
2. Session should not interfere with meals or exercise.
3. The break time allotted in the session flow includes 45 mins for refill/heatup of water in the pasteurizing unit. Once heat-up is activated, the crewmember may perform other tasks during the break.
4. Session should occur on the same day as E590/703 crew, air, and surface sampling.
5. For the last performance of this session at the end of the mission, processed MCDs should be refrigerated and not incubated if Shuttle docking occurs within 5 days of session performance. Refrigeration is a preferred storage option than ambient storage.

If Shuttle docking occurs longer than 5 days after processing, incubation is required. If MCDs are refrigerated, refrigeration is required through return on the Shuttle.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820342	Refrigerator (TEF)	1
846732	Incubator, General Use	1
853498	Kit Assy IV, Water Experiment	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Unstow WEK #IV
5	5	1	1	0	Activate water heat-up
45	45	1	1	0	Break (45 min for water refill/heatup)
40	40	1	1	0	Collect water
45	45	1	1	0	Process MCDs
10	10	1	1	0	Stow WEK #IV
10	10	1	1	0	Place MCDs in incubator. On FD 135 place processed MCDs in the Mir refrigerator.

8. Data Processing:
1. No data downlink required.
2. Air to ground voice communications may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 650008 **Exp. ID:** Mir (CHeCS **Russian ID:** WMM

Invest. Title: Water Microbiological Monitoring (WMM) **Prime** ☑ **Contingent** ☐

US PI: Pierson, Duane **Russian PI:** TBD

1. Session ID: ISS:CHS:I:15

2. Session: Microbial Capture Device Colony Count and Video **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 77 **Session Time (mins):** 62

Scheduled Days: FD 17, 20, 57, 60, 70, 73, 80, 83

4. Session Scenario:

The crewmember will examine the microbial capture devices (MCDs) stored in the incubator, video record each MCD, and make a written record of the condition of the microbial growth within each MCD.

5. Session Constraints:

1. Session must be performed 2, and 5 days after MCD Processing has been performed.
2. After colony count and video MCDs are returned to incubation. MCDs are observed after 5 days, colony count and video is performed. MCDs will then be placed in the WEK #4 and stowed ambient for return.
3. Video is performed during both observation sessions. Video should be taken of each MCD, about 1 minute of film for each. Place MCD at an angle which avoids glare. Video so that the entire surface of the MCD is included, quantitation may rely on video.
4. Exact performance days have been estimated.
5. Two crewmember are required during video.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
846732	Incubator, General Use	1
852166	8 mm Video Tape (minutes)	9
853498	Kit Assy IV, Water Experiment	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow WEK #4
10	10	1	1	0	Obtain camcorder and set up for video taping of MCDs
2	2	1	1	0	Remove MCDs from incubator
20	20	1	1	0	Visually examine each MCD and compare bacterial colony count to the comparison card. Record findings on data recording sheets and MCD
15	15	1	2	0	Make video recording of each MCD; ensuring written recording on MCD is focused in field of view
5	5	1	1	0	Return the MCDs to the incubator after 2 days or stow in returning kit after 5 days
5	5	1	1	0	Restow WEK #4 in locker and stow camcorder

8. Data Processing:

1. No data downlink required.
2. Air to ground voice communications may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 650008 **Exp. ID:** Mir (CHeCS **Russian ID:** WMM

Invest. Title: Water Microbiological Monitoring (WMM)

Prime ☒
Contingent ☐

US PI: Pierson, Duane **Russian PI:** TBD

1. Session ID: ISS:LOG:I:9

Session Type: Down Item

2. Session: Water Experiment Kit #IV Transfer to Shuttle

3. Session Timeline: **Crewtime Usage (mins):** 25 **Session Time (mins):** 25

Scheduled Days: FD 8

4. Session Scenario:
Remove the Water Experiment Kit #4 (WEK #4) from Mir and transfer to Shuttle. Refrigerated MCDs (9) will also be transferred to the Shuttle refrigerator.

5. Session Constraints:
1. MCDS will be refrigerated aboard the Shuttle for return.
2. Exact performance day has been estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840164	Capture Device Assy, Microbial	9
853498	Kit Assy IV, Water Experiment	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow WEK#4 from Mir
5	5	1	1	0	Transport WEK#4 to Shuttle
5	5	1	1	0	Stow WEK#4
5	5	1	1	0	Remove 9 MCDs from Mir refrigerator
5	5	1	1	0	Transfer to Shuttle refrigerator

8. Data Processing:
1. No data downlink required.
2. Air to ground voice communications may be required in the event of a contingency situation.

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Investigation ID: 650009 **Experiment ID:** Mir (E10) **Russian ID:** MEFC

Investigation Title: Mir Electric Field Characterization (MEFC)

US Investigators: Chavez, Mark

Russian Investigators: Frolov, Igor

Other Investigators:

Payload Category: ISS **Sub-Cat.:** ENV **Subjects Requested:** 1

Description: Measures interior and exterior radio frequency interference at various frequency bands through the use of antennas. The data will be analyzed to determine whether interference mitigation techniques will be necessary for ISS equipment.

Science Objectives: The MEFC experiment is a technology investigation and has the following objectives:
1. To determine if Mir internal RFI sources exceed the allowable emission limits for ISS equipment.
2. To determine the extent of RFI interference and its affect, if any, on space station avionics.

Functional Objectives: 1. Perform electric field measruements aboard Shuttle and Mir

Sample Transfer Rqd: No **Hardware Transfer Rqd:** Yes

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
2	STS 76 (SM-03)	3/22/96	☒	☒
3	STS 79 (SM-04)	9/16/96	☒	☒
4	STS 81 (SM-05)	1/16/97	☒	☒
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
OPS	SHR	Flight	410037	MIR Interface to Payload Systems-2 (MIPS-2)
ISS	ENV	Flight	820281	Electric Field Expmt Spectrum Analyzer
ISS	ENV	Flight	820282	Electri Field Expmt. Power Cables (laptop & Spectrum Analyzer)
ISS	ENV	Flight	820284	Electric Field Experiment Spectrum Analyzer Co-ax Antenna Cable
ISS	ENV	Flight	846656	Mir Electric Field Experiment Mir Antenna
ISS	ENV	Flight	855590	340 MB Hard Drive (1003)
ISS	ENV	Flight	855592	340 MB Hard Drive (1004)
ISS	ENV	Flight	855593	3.5 Inch Floppy Disk

Mission: NASA 5 **Invest. ID:** 650009 **Exp. ID:** Mir (E10) **Russian ID:** MEFC

Invest. Title: Mir Electric Field Characterization (MEFC)

Prime ☒
Contingent ☐

US PI: Chavez, Mark **Russian PI:** Frolov, Igor

1. Session ID: ISS:ENV:P:21

2. Session: MEFC Experiment Training

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: L- 90

4. Session Scenario:

The cremember will be given briefings and perform hands on operation of the MEFC experiment hardware. The training includes briefings on the objectives of the experiment, description of the hardware, and operations of the hardware. The crewmember will perform setup, initiation, and shut down operations of the hardware.

5. Session Constraints:

1. Training should be performed in the U.S.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
410037	MIR Interface to Payload Systems-2 (MIPS-2)	1
820281	Electric Field Expmt Spectrum Analyzer	1
820282	Electri Field Expmt. Power Cables (laptop & Spectrum Analyzer)	1
820284	Electric Field Experiment Spectrum Analyzer Co-ax Antenna Cable	1
846656	Mir Electric Field Experiment Mir Antenna	1
855590	340 MB Hard Drive (1003)	1
855592	340 MB Hard Drive (1004)	1
855593	3.5 Inch Floppy Disk	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	1	0	Experiment objectives briefing. Hands-on hardware training (set-up, operation, & malfunction procedures)

8. Data Processing:

1. N/A for preflight sessions.

Mission: STS 84 (SM-06) **Invest. ID:** 650009 **Exp. ID:** Mir (E10) **Russian ID:** MEFC

Invest. Title: Mir Electric Field Characterization (MEFC)

Prime ☒
Contingent ☐

US PI: Chavez, Mark **Russian PI:** Frolov, Igor

1. Session ID: ISS:LOG:I:23

Session Type: Up Item

2. Session: MEFC Experiment Hardware Transfer to Mir

3. Session Timeline: **Crewtime Usage (mins):** 20 **Session Time (mins):** 20

Scheduled Days: FD 4

4. Session Scenario:
Shuttle crewmember will unstow experiment hardware from the Shuttle and transport the hardware to the Mir for stowage.

5. Session Constraints:
1. None

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820281	Electric Field Expmt Spectrum Analyzer	1
820282	Electri Field Expmt. Power Cables (laptop & Spectrum Analyzer)	1
820284	Electric Field Experiment Spectrum Analyzer Co-ax Antenna Cable	1
846656	Mir Electric Field Experiment Mir Antenna	1
855590	340 MB Hard Drive (1003)	1
855592	340 MB Hard Drive (1004)	1
855593	3.5 Inch Floppy Disk	10

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	20	1	1	0	Unstow MEFC hardware from Shuttle and transfer to Mir

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 650009 **Exp. ID:** Mir (E10) **Russian ID:** MEFC

Invest. Title: Mir Electric Field Characterization (MEFC) **Prime** ☒ **Contingent** ☐

US PI: Chavez, Mark **Russian PI:** Frolov, Igor

1. Session ID: ISS:ENV:I:46

2. Session: MEFC Experiment Set-up and Data Take **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 80 **Session Time (mins):** 440

Scheduled Days: FD 10, 25, 40, 55, 70, 85, 100, 115

4. Session Scenario:

The crewmember will remove the experiment hardware from stowage and set it up at the data take location within the Mir Core module or the Spektr module. An equal number of data takes are desired to be taken within the Core and Spektr modules. The crewmember will also insert the MEFC hard disk into the MIPS 2L computer for the data take. The computer will be connected to the MEFC spectrum analyzer and the data take will be initiated. After approximately 6 hours the data take will be terminated. The crewmember will backup the data on floppy disks. The hardware will be stowed.

5. Session Constraints:

1. Experiment antenna should be mounted near the spextrum analyzer.
2. The flight days identified are approximate and can be adjusted.
3. It is desireable to perform this session on a periodic basis throughout the increment. Four data takes are to be taken within the Core module and four data takes are to be taken within the Spektr module.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
410037	MIR Interface to Payload Systems-2 (MIPS-2)	1
820281	Electric Field Expmt Spectrum Analyzer	1
820282	Electri Field Expmt. Power Cables (laptop & Spectrum Analyzer)	1
820284	Electric Field Experiment Spectrum Analyzer Co-ax Antenna Cable	1
846656	Mir Electric Field Experiment Mir Antenna	1
855590	340 MB Hard Drive (1003)	1
855592	340 MB Hard Drive (1004)	1
855593	3.5 Inch Floppy Disk	10

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow experiment hardware
5	5	1	1	0	Transport the hardware to module location
5	5	1	1	0	Retrieve MIPS-2L laptop computer
20	20	1	1	0	Mount antenna, mount spectrum analyzer, connect cables
5	5	1	1	0	Swap hard drive currently in MIPS-2L with MEFC hard drive and connect computer cable to spectrum analyzer
5	5	1	1	0	Turn on spectrum analyzer and initiate software program in the laptop computer
360	360	1	0	0	BREAK (Recording period for MEFC experiment)
5	5	1	1	0	Terminate experiment data take
5	5	1	1	0	Disconnect cables and dismount hardware
15	15	1	1	0	Backup har disk data on floppy disks and replace hard disk drive
10	10	1	1	0	Stow hardware

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 650009 **Exp. ID:** Mir (E10) **Russian ID:** MEFC

Invest. Title: Mir Electric Field Characterization (MEFC)

Prime ☑
Contingent ☐

US PI: Chavez, Mark **Russian PI:** Frolov, Igor

1. Session ID: ISS:LOG:I:24

Session Type: Down Item

2. Session: MEFC Experiment Hardware Transfer to Shuttle

3. Session Timeline: **Crewtime Usage (mins):** 20 **Session Time (mins):** 20

Scheduled Days: FD 4

4. Session Scenario:

A Shuttle crewmember will unstow the experiment hardware, including all data stowage floppy disks and hard disks, and transport the hardware to the Shuttle for stowage.

5. Session Constraints:

1. None

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820281	Electric Field Expmt Spectrum Analyzer	1
820282	Electri Field Expmt. Power Cables (laptop & Spectrum Analyzer)	1
820284	Electric Field Experiment Spectrum Analyzer Co-ax Antenna Cable	1
846656	Mir Electric Field Experiment Mir Antenna	1
855590	340 MB Hard Drive (1003)	1
855592	340 MB Hard Drive (1004)	1
855593	3.5 Inch Floppy Disk	10

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	20	1	1	0	Unstow hardware from Mir stowage location and transfer to Shuttle

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Investigation ID: 650011 **Experiment ID:** Mir (E6) **Russian ID:** MEEP

Investigation Title: Mir Environmental Effects Payload (MEEP)

US Investigators: Gay, Buck

Russian Investigators: Naumov, S.

Other Investigators: TBD

Payload Category: ISS **Sub-Cat.:** ENV **Subjects Requested:**

Description: This experiment consists of four identical passive experiment carriers each containing one experiment. The four experiments are (1) Orbital Debris Collector (ODC), (2) Passive Optical Sample Assembly #1, (3) Polish Plate Micrometeoroid Debris Collector, and (4) Passive Optical Sample Assembly #2. The MEEP expriments will be transported to orbit by the Shuttle. An EVA by the U.S. astronauts will be performed to mount the MEEP experiments on the Mir Docking Module after the Shuttle has docked to the Mir space station. The MEEP experiments are to remain on the docking module for greater than one year. The MEEP experiments are to be removed from the docking module during an EVA conducted by the U.S. astronauts. The astronauts will remove the MEEP experiments, transport them to the Shuttle for return to the ground.

Science Objectives: The MEEP experiments are designed to measure the space environment at the Mir space station altitude and inclination for micrometeoroid debris.

Functional Objectives: 1. Deploy the POSA #1, POSA #2, PPMD, and the ODC for position on the Mir Docking Module during EVA operations.

Sample Transfer Rqd: No **Hardware Transfer Rqd:** Yes

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
2	STS 76 (SM-03)	3/22/96	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
ISS	ENV	Flight	650016	Passive Optical Sample Assembly (POSA) #2
ISS	ENV	Flight	650017	Orbital Debris Collector (ODC)
ISS	ENV	Flight	650018	Polish Plate Micrometeoroid Debris Collector
ISS	ENV	Flight	840404	Passive Optical Sample Assembly (POSA) #1
ISS	ENV	Flight	846657	Orbital Debris Collector Mir Attachment Bracket
ISS	ENV	Flight	846658	POSA #1 Mir Attachement Bracket
ISS	ENV	Flight	846659	POSA #2 Mir Attachment Bracket
ISS	ENV	Flight	846724	PPMD Mir Attachment Bracket

Mission: STS 86 (SM-07) **Invest. ID:** 650011 **Exp. ID:** Mir (E6) **Russian ID:** MEEP

Invest. Title: Mir Environmental Effects Payload (MEEP) **Prime** ☑ **Contingent** ☐

US PI: Gay, Buck **Russian PI:** Naumov, S.

1. Session ID: ISS:EVA:I:2

2. Session: MEEP Experiments Retrieval - EVA **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 840 **Session Time (mins):** 420

Scheduled Days: FD 7

4. Session Scenario:

U.S. astronauts will perform an EVA to retrieve the Orbital Debris Collector (ODC), Passive Optical Sample Assembly Collector (POSA) #1 & #2, and Polish Plate Micrometeroird Debir Collector (PPMD) and stow them in the Shuttle payload bay.

5. Session Constraints:

1. Shuttle astronaut should perform this session.
2. Session should be scheduled on planned EVA day for Shuttle when docked with Mir.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
650016	Passive Optical Sample Assembly (POSA) #2	1
650017	Orbital Debris Collector (ODC)	1
650018	Polish Plate Micrometeoroid Debris Collector	1
840404	Passive Optical Sample Assembly (POSA) #1	1
846657	Orbital Debris Collector Mir Attachment Bracket	1
846658	POSA #1 Mir Attachement Bracket	1
846659	POSA #2 Mir Attachment Bracket	1
846724	PPMD Mir Attachment Bracket	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
420	420	1	2	0	Retrieve and stow the MEEP experiments and stow them in the Shuttle payload bay.

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Investigation ID: 650013 **Experiment ID:** MiSDE **Russian ID:** MiSDE

Investigation Title: Mir Structural Dynamics Experiment (MiSDE)

US Investigators: Kim, Hyoung-Man

Russian Investigators: Mezhin, Vyacheslav

Other Investigators: Kiselev, Sergey; Simakov, Sergey

Payload Category: ISS **Sub-Cat.:** DYN **Subjects Requested:** 1

Description: The MiSDE experiment will measure structural dynamic response data on the Mir and Mir/Shuttle in a mated configuration during normal operational events using existing Mir space station instrumentation and new experiment unique instrumentation. The MiSDE experiment will utilize the SAMS and EDLS, if they are available. The MiSDE hardware, defined as Mir Auxiliary Sensor Unit (MASU), consists of an Experiment Support Module (ESM), a distribution box (DB), Accelerometer Heads (AHs), and associated cables. Five triaxial and four uni-axial AHs are connected through the DB to the ESM which provides signal conditioning, data processing, and data stowage.

Science Objectives: The overall experiment objective is to obtain data that will be used in the development of verified capability to perform structural dynamic analysis of the International Space Station (ISS). The data will be used to reduce uncertainty factors and mitigate risk in the ISS design and operation by verifying structural forcing functions, dynamic models, and structural loads of the ISS.

Functional Objectives: The MiSDE flight tests consists of excitation of the Mir space station structure, measurement of forcing functions and structural responses, recording the data, and Post-test analyses. Test events may include Mir and Shuttle thruster firings, docking events, IVA and EVA events, and ambient noise measured by the Mir Auxiliary Sensor Unit (MASU) and other existing instrumentation.

Sample Transfer Rqd: No **Hardware Transfer Rqd:** Yes

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
3	Mir 22	8/17/96	☒	☒
3	NASA 3	9/16/96	☒	☒
3	STS 79 (SM-04)	9/16/96	☒	☒
4	NASA 4	1/16/97	☒	☒
4	STS 81 (SM-05)	1/16/97	☒	☒
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	NASA 6	9/18/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒
7	STS 89 (SM-08)	1/15/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
HLS	CP	BDC	114	Treadmill
HLS	CP	Flight	150023	Cycle Ergometer
MG	ENV	Flight	160008	Space Acceleration Measurement System (SAMS)
OPS	SHR	Flight	390043	Camcorder System (NASA)
ISS	DYN	Flight	650010	EDLS Experiment Support Module (ESM)
ISS	DYN	Flight	650019	Mir Auxillary Sensor Unit (MASU)
MG	ENV	Flight	820273	SAMS Optical Disk
ISS	DYN	Flight	820286	EDLS Force Sensor 1 - Handhold and Adjoining Cable
ISS	DYN	Flight	820291	EDLS Force Sensor 2 - Foot Restraint and Adjoining Cable
ISS	DYN	Flight	820292	EDLS Force Sensor 3 - Touch Pad and Adjoining Cable
SHR	SHR	Flight	820433	MIPS-2C Controller
ISS	DYN	Flight	820465	ESM Power Cable
SHR	SHR	Flight	840255	8mm Video Tape
ISS	DYN	Flight	846653	EDLS Worm Disk Pouch
ISS	DYN	Flight	846668	MASU Experiment Support Module
ISS	DYN	Flight	846669	MASU Distribution Box
ISS	DYN	Flight	846670	MASU Accelerometer Sensor Heads
ISS	DYN	Flight	846671	MASU Data Disks with Pouch
ISS	DYN	Flight	846673	MASU Accelerometer Sensor Cables

OPS	SHR	Flight	854862	MIPS Serial cable
OPS	SHR	Flight	854863	PUP Power Cable

Mission: NASA 5 **Invest. ID:** 650013 **Exp. ID:** MiSDE **Russian ID:** MiSDE

Invest. Title: Mir Structural Dynamics Experiment (MiSDE)

Prime ☒
Contingent ☐

US PI: Kim, Hyoung-Man **Russian PI:** Mezhin, Vyacheslav

1. Session ID: ISS:DYN:P:13

2. Session: MiSDE Familiarization

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: L- 120

4. Session Scenario:
The crewmember will be given an introduction to the science history and objectives of the experiment. The crewmember will also be given a brief description of the hardware and its on-orbit operation.

5. Session Constraints:
None

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
650019	Mir Auxillary Sensor Unit (MASU)	1
846668	MASU Experiment Support Module	1
846669	MASU Distribution Box	1
846670	MASU Accelerometer Sensor Heads	9
846671	MASU Data Disks with Pouch	8
846673	MASU Accelerometer Sensor Cables	10

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	1	0	MiSDE experiment familiarization

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 650013 **Exp. ID:** MiSDE **Russian ID:** MiSDE

Invest. Title: Mir Structural Dynamics Experiment (MiSDE) **Prime** ☒ **Contingent** ☐

US PI: Kim, Hyoung-Man **Russian PI:** Mezhin, Vyacheslav

1. Session ID: ISS:DYN:P:14

2. Session: MiSDE Operations and Video Ops **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 240

Scheduled Days: L- 60

4. Session Scenario:

The crewmember will be given a review of the MiSDE scientific objectives and continue with a functional description of the hardware components. The crewmember will perform the on-board procedures with the training hardware for the Mir Auxillary Sensor Unit (MASU) set-up, Experiment Support Module (ESM) activation, time sychronization with the MIPS, disk operation, and MASU deactivation activities. The crewmember will also be instructed in video and still camera operations for the experiment as well as off-nominal/troubleshooting activities.

5. Session Constraints:

None

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
650019	Mir Auxillary Sensor Unit (MASU)	1
846668	MASU Experiment Support Module	1
846669	MASU Distribution Box	1
846670	MASU Accelerometer Sensor Heads	9
846671	MASU Data Disks with Pouch	8
846673	MASU Accelerometer Sensor Cables	10

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
240	0	0	1	0	MiSDE hardware nominal and off-nominal operations and video operations training

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 650013 **Exp. ID:** MiSDE **Russian ID:** MiSDE

Invest. Title: Mir Structural Dynamics Experiment (MiSDE)

Prime ☑
Contingent ☐

US PI: Kim, Hyoung-Man **Russian PI:** Mezhin, Vyacheslav

1. Session ID: ISS:DYN:I:11

Session Type: Inflight

2. Session: MiSDE 4a - Mir Thruster Firing Data Collection (Shuttle/Mir Mated)

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: FD 138

4. Session Scenario:

The crewmember will connect the power cable to the ESM and the PUP, and connect the ESM databus cable to the MIPS. The crewmember will then activate the ESM, update time with the MIPS, insert a data stowage disk, check for proper interfaces, perform a self diagnostic test (at least 5 minutes after activation).

The crewmember will check and turn on as appropriate the Mir Structural Dynamics Measurement System (Russian System).

The crewmember will set up the SAMS at the designated location, if the SAMS is not being used.

Five minutes before a thruster firing, the crewmember will start recording data via turn on of the MASU ESM and SAMS. Ten minutes after a thruster firing, the crewmember will stop recording data by turning off the ESM and SAMS.

At the completion of data takes, the crewmember will backup data disk on a matching backup disk and remove the data disk from the ESM. The SAMS data disk with the MASU data shall be removed from the SAMS. The crewmember will turn off the ESM power, disconnect all MASU cables and stow them. The SAMS unit will also be turned off. Data disks will be stowed.

5. Session Constraints:

1. This session should be scheduled to take place when the Mir space station is performing attitude control while docked.
2. At least 24 hours prior to the beginning of this session, a visual inspection of the acceleration sensor heads and all cable connections shall be performed to ensure proper and reliable attachment to the Mir structure.
3. Set up and use of the SAMS, if not being used by another experiment
4. Use of Mir Structural Dynamics Measurement System (Russian), if possible.
5. MASU instruments and the SAMS must remain set up throughout the docked phase.
6. It is desirable to have the SAMS 100 hz sensor head installed at the BTS Priroda location.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160008	Space Acceleration Measurement System (SAMS)	1
650019	Mir Auxillary Sensor Unit (MASU)	1
820273	SAMS Optical Disk	1
820433	MIPS-2C Controller	1
846668	MASU Experiment Support Module	1
846669	MASU Distribution Box	1
846670	MASU Accelerometer Sensor Heads	9
846671	MASU Data Disks with Pouch	1
846673	MASU Accelerometer Sensor Cables	10

854862	MIPS Serial cable	1
854863	PUP Power Cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Structural Dynamics Measurement System (Russian) check/turn on
5	5	1	1	0	MASU ESM turn on for Mir thruster firing data recording
10	10	1	1	0	SAMS turn on for Mir thruster firing data recording after installation of SAMS disk containing MASU data
25	25	1	1	0	Backup MASU ESM data disk and stow disk
5	5	1	1	0	MASU ESM turn off after Mir thruster firing data recording
5	5	1	1	0	SAMS turn off after Mir thruster firing data recording

8. Data Processing:

1. Mir thruster firing input commands should be recorded.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 650013 **Exp. ID:** MiSDE **Russian ID:** MiSDE

Invest. Title: Mir Structural Dynamics Experiment (MiSDE) **Prime** ☒ **Contingent** ☐

US PI: Kim, Hyoung-Man **Russian PI:** Mezhin, Vyacheslav

1. Session ID: ISS:DYN:I:12

2. Session: MiSDE E5 - Shuttle Thruster Firing Data Collection (Shuttle/Mir Mated) **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 55 **Session Time (mins):** 55

Scheduled Days: FD 138

4. Session Scenario:

The crewmember will connect accelerometer cables to the EMS via the DB, connect the power cable to the ESM and the PUP, and connect the ESM databus cable to the MIPS. The crewmember will then activate the ESM, update time with the MIPS, insert a data stowage disk, check for proper interfaces, perform a self diagnostic test (at least 5 minutes after activation).

The crewmember will check and turn on as appropriate the Mir Structural Dynamics Measurement System (Russian System).

The crewmember will set up the SAMS at the designated location, if the SAMS is not being used by another experiment.

Five minutes before a thruster firing, the crewmember will start recording data via turn on of the MASU ESM and SAMS. Ten minutes after a thruster firing, the crewmember will stop recording data by turning off the ESM and SAMS.

At the completion of data takes, the crewmember will backup data disk on a matching backup disk and remove the data disk from the ESM. The SAMS data disk with the MASU data shall be removed from the SAMS. The crewmember will turn off the ESM power. The SAMS unit will also be turned off. Data disks will be stowed.

5. Session Constraints:

1. This session should be scheduled to take place when the Shuttle is performing attitude control while docked.
2. At least 24 hours prior to the beginning of this session, a visual inspection of the acceleration sensor heads and all cable connections shall be performed to ensure proper and reliable attachment to the Mir structure.
3. Set up and use of the SAMS, if not being used by another experiment.
4. MASU instuments and the SAMS must remain set up during the docked phase.
5. Use of Mir Structural Dynamics Measurement System (Russian), if possible.
6. It is desirable to have the SAMS 100 hz sensor head installed at the BTS Priroda location.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160008	Space Acceleration Measurement System (SAMS)	1
650019	Mir Auxillary Sensor Unit (MASU)	1
820273	SAMS Optical Disk	1
820433	MIPS-2C Controller	1
846668	MASU Experiment Support Module	1
846669	MASU Distribution Box	1
846670	MASU Accelerometer Sensor Heads	9
846671	MASU Data Disks with Pouch	1
846673	MASU Accelerometer Sensor Cables	10
854862	MIPS Serial cable	1

854863 PUP Power Cable 1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Structural Dynamics Measurement System (Russian) check/turn on
5	5	1	1	0	MASU ESM turn on for Shuttle thruster firing data recording
5	5	1	1	0	SAMS turn on for Shuttle thruster firing data recording after installation of SAMS disk containing MASU data.
25	25	1	1	0	Backup MASU ESM data disk and stow
5	5	1	1	0	MASU ESM turn off after Shuttle thruster firing data recording
5	5	1	1	0	SAMS turn off after Shuttle thruster firing data recording

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 650013 **Exp. ID:** MiSDE **Russian ID:** MiSDE

Invest. Title: Mir Structural Dynamics Experiment (MiSDE)

Prime ☒
Contingent ☐

US PI: Kim, Hyoung-Man **Russian PI:** Mezhin, Vyacheslav

1. Session ID: ISS:DYN:I:13

Session Type: Inflight

2. Session: MiSDE 2a - Ambient Noise Data Collection: Day-to-Night Transition (Shuttle/Mir Mated)

3. Session Timeline: **Crewtime Usage (mins):** 80 **Session Time (mins):** 80

Scheduled Days: FD 133

4. Session Scenario:

The crewmember will connect the power cable to the ESM and the PUP, and connect the ESM databus cable to the MIPS. The crewmember will then activate the ESM, update time with the MIPS, insert a data stowage disk, check for proper interfaces, perform a self diagnostic test (at least 5 minutes after activation).

The crewmember will check and turn on as appropriate the Mir Structural Dynamics Measurement System (Russian System).

The crewmember will set up the SAMS at the designated location, if the SAMS is not being used by another experiment.

Five minutes before day-to-night orbit transition, the crewmember will start recording data via turn on of the ESM and SAMS. Ten minutes after day-to-night transition, the crewmember will stop recording data by turning off the ESM and SAMS.

At the completion of data takes, the crewmember will backup data disk on a matching backup disk and remove the data disk from the ESM. The SAMS data disk with the MASU data shall be removed from the SAMS. The crewmember will turn off the ESM power. The SAMS unit will also be turned off. Data disks will be stowed.

5. Session Constraints:

1. This session must occur during the docked phase.
2. At least 24 hours prior to the beginning of this session, a visual inspection of the acceleration sensor heads and all cable connections shall be performed to ensure proper and reliable attachment to the Mir structure.
3. Set up and use of the SAMS, if possible.
4. Use of Mir Structural Dynamics Measurement System (Russian), if possible.
5. MiSDE instuments must remain set up during the docked phase.
6. No ergometer or treadmill activity should occur during this session.
7. It is desirable to have the SAMS 100 hz sensor head installed at the BTS Priroda location.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160008	Space Acceleration Measurement System (SAMS)	1
650019	Mir Auxillary Sensor Unit (MASU)	1
820273	SAMS Optical Disk	1
820433	MIPS-2C Controller	1
846668	MASU Experiment Support Module	1
846669	MASU Distribution Box	1
846670	MASU Accelerometer Sensor Heads	9
846671	MASU Data Disks with Pouch	1
846673	MASU Accelerometer Sensor Cables	10

854862	MIPS Serial cable	1
854863	PUP Power Cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Structural Dynamics Measurement System (Russian) check/turn on
5	5	1	1	0	MASU turn on for day-to-night transition recording
10	10	1	1	0	SAMS turn on for day-to-night transition recording after installation of SAMS disk containing MASU data
5	5	1	1	0	MASU ESM turn off after day-to-night transition recording
5	5	1	1	0	SAMS turn off after day-to-night transition recording
5	5	1	1	0	MASU ESM turn on for night-to-day transition recording
5	5	1	1	0	SAMS turn on for night-to-day transition recording
25	25	1	1	0	Backup MASU ESM data disk and stow
5	5	1	1	0	MASU ESM turn off after night-to-day transition recording
5	5	1	1	0	SAMS turn off after night-to-day transition recording

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 650013 **Exp. ID:** MiSDE **Russian ID:** MiSDE

Invest. Title: Mir Structural Dynamics Experiment (MiSDE)

Prime ☑
Contingent ☐

US PI: Kim, Hyoung-Man **Russian PI:** Mezhin, Vyacheslav

1. Session ID: ISS:DYN:I:14

Session Type: Inflight

2. Session: MiSDE 2c - Ambient Noise Data Collection: Quiescent Period (Shuttle/Mir Mated)

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: FD 133

4. Session Scenario:

The crewmember will connect the power cable to the ESM and the PUP, and connect the ESM databus cable to the MIPS. The crewmember will then activate the ESM, update time with the MIPS, insert a data stowage disk, check for proper interfaces, perform a self diagnostic test (at least 5 minutes after activation).

The crewmember will check and turn on as appropriate the Mir Structural Dynamics Measurement System (Russian System).

The crewmember will set up the SAMS at the designated location, if the SAMS is not being used.

Five minutes before quiescent period, the crewmember will start recording data via turn on of the MASU ESM and SAMS. Quiescent period is defined as no treadmill or ergometer activity. The crewmember will record data for ten minutes then stop recording data by turning off the ESM and SAMS.

At the completion of data takes, the crewmember will backup data disk on a matching backup disk and remove the data disk from the ESM. The SAMS data disk with the MASU data shall be removed from the SAMS. The crewmember will turn off the ESM power. The SAMS unit will also be turned off. Data disks will be stowed.

5. Session Constraints:

1. This session must occur during the docked phase.
2. At least 24 hours prior to the beginning of this session, a visual inspection of the acceleration sensor heads and all cable connections shall be performed to ensure proper and reliable attachment to the Mir structure.
3. Set up and use of the SAMS, if not being used by another experiment.
4. No treadmill or ergometer use during this session.
5. MASU instruments must remain set up during the docked phase.
6. Use of Mir Structural Dynamics Measurement System (Russian), if possible.
7. It is desirable to have the SAMS 100 hz sensor head installed at the BTS Priroda location.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160008	Space Acceleration Measurement System (SAMS)	1
650019	Mir Auxillary Sensor Unit (MASU)	1
820273	SAMS Optical Disk	1
820433	MIPS-2C Controller	1
846668	MASU Experiment Support Module	1
846669	MASU Distribution Box	1
846670	MASU Accelerometer Sensor Heads	9
846671	MASU Data Disks with Pouch	1
846673	MASU Accelerometer Sensor Cables	10
854862	MIPS Serial cable	1

854863 PUP Power Cable 1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Structural Dynamics Measurement System (Russian) check/turn on
5	5	1	1	0	MASU ESM turn on for data take
10	10	1	1	0	SAMS turn on for data take, after installation of SAMS disk containing MASU data.
25	25	1	1	0	Backup MASU ESM data disk and stow disk
5	5	1	1	0	MASU ESM turn off after data recording
5	5	1	1	0	SAMS turn off after data recording

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 650013 **Exp. ID:** MiSDE **Russian ID:** MiSDE

Invest. Title: Mir Structural Dynamics Experiment (MiSDE)

Prime ☒
Contingent ☐

US PI: Kim, Hyoung-Man **Russian PI:** Mezhin, Vyacheslav

1. Session ID: ISS:DYN:I:15

Session Type: Inflight

2. Session: MiSDE 2d - Ambient Noise Data Collection: Non - Quiescent Period (Shuttle/Mir Mated)

3. Session Timeline: **Crewtime Usage (mins):** 70 **Session Time (mins):** 70

Scheduled Days: FD 133

4. Session Scenario:

The crewmember will connect the power cable to the ESM and the PUP, and connect the ESM databus cable to the MIPS. The crewmember will then activate the ESM, update time with the MIPS, insert a data stowage disk, check for proper interfaces, perform a self diagnostic test (at least 5 minutes after activation).

The crewmember will check and turn on as appropriate the Mir Structural Dynamics Measurement System (Russian System).

The crewmember will set up the SAMS at the designated location, if the SAMS is not being used.

Five minutes before quiescent period, the crewmember will start recording data via turn on of the MASU ESM and SAMS. A nonquiescent period is defined as no treadmill or ergometer activity. The crewmember will record data for ten minutes then stop recording data by turning off the ESM and SAMS.

At the completion of data takes, the crewmember will backup data disk on a matching backup disk and remove the data disk from the ESM. The SAMS data disk with the MASU data shall be removed from the SAMS. The crewmember will turn off the ESM power. The SAMS unit will also be turned off. Data disks will be stowed.

5. Session Constraints:

1. Setup and use of the SAMS, if not being used by another experiment.
2. At least 24 hours prior to the beginning of this session, a visual inspection of the acceleration sensor heads and all cable connections shall be performed to ensure proper and reliable attachment to the Mir structure.
3. This session must occur during the docked phase.
4. Use of Mir Structural Dynamics Measurement System (Russian), if possible.
5. MASU instruments must remain set up during the docked phase.
6. It is desirable to have the SAMS 100 hz sensor head installed at the BTS Priroda location.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
114	Treadmill	1
150023	Cycle Ergometer	1
160008	Space Acceleration Measurement System (SAMS)	1
650019	Mir Auxillary Sensor Unit (MASU)	1
820273	SAMS Optical Disk	1
820433	MIPS-2C Controller	1
846668	MASU Experiment Support Module	1
846669	MASU Distribution Box	1
846670	MASU Accelerometer Sensor Heads	9
846671	MASU Data Disks with Pouch	1
846673	MASU Accelerometer Sensor Cables	10

854862	MIPS Serial cable	1
854863	PUP Power Cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Structural Dynamics Measurement System (Russian) check/turn on
5	5	1	1	0	MASU ESM turn on for data take
10	10	1	1	0	SAMS turn on for data take after installation of SAMS disk containing MASU data
10	10	1	1	0	Crewmember exercise on treadmill or ergometer
25	25	1	1	0	Backup MASU ESM data disk and stow disk
5	5	1	1	0	MASU ESM turn off after data recording
5	5	1	1	0	SAMS turn off after data recording

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 650013 **Exp. ID:** MiSDE **Russian ID:** MiSDE

Invest. Title: Mir Structural Dynamics Experiment (MiSDE)

Prime ☒
Contingent ☐

US PI: Kim, Hyoung-Man **Russian PI:** Mezhin, Vyacheslav

1. Session ID: ISS:DYN:I:16

Session Type: Inflight

2. Session: MiSDE 3a - IVA Data Collection (Shuttle/Mir Mated)

3. Session Timeline: **Crewtime Usage (mins):** 110 **Session Time (mins):** 110

Scheduled Days: FD 132

4. Session Scenario:

The crewmember will connect the power cable to the ESM and the PUP, and connect the ESM databus cable to the MIPS. The crewmember will then activate the ESM, update time with the MIPS, insert a data stowage disk, check for proper interfaces, perform a self diagnostic test (at least 5 minutes after activation).

The crewmember will check and turn on as appropriate the Mir Structural Dynamics Measurement System (Russian System).

The crewmember will set up the SAMS at the designated location, if the SAMS is not being used.

The crewmember will set up the Enhanced Dynamic Load Sensor (EDLS) hardware at the predetermined location.

The crewmember sets up the video recorder to record this session activity.

The crewmember will start recording data via turn on of the MASU ESM, SAMS, and the EDLS experiment support module. The crewmember performs push-off, hand-hold, and foot loop sensor activities with the EDLS hardware. A second crewmember records first crewmember's activities with the video recorder. The crewmember will record data for 20 minutes then stop recording data by turning off the MASU ESM, SAMS and the EDLS experiment support module. The crewmember will stop video recording the other crewmember's activities.

At the completion of data takes, the crewmember will backup data disk on a matching backup disk and remove the data disk from the ESM. The SAMS data disk with the MASU data shall be removed from the SAMS. The MASU data disk is also to be removed from the EDLS experiment support module. The crewmember will turn off the ESM power. The SAMS unit will also be turned off. Data disks will be stowed.

5. Session Constraints:

1. Set up and use of the SAMS, if not being used by another experiment.
2. At least 24 hours prior to the beginning of this session, a visual inspection of the acceleration sensor heads and all cable connections shall be performed to ensure proper and reliable attachment to the Mir structure.
3. Set up and use of the Enhanced Dynamic Load Sensor hardware.
4. This session must be performed during the docked phase.
5. Use of Mir Structural Dynamics Measurement System (Russian), if possible.
6. MASU instruments must remain set up during the docked phase.
7. It is desirable to have the SAMS 100 hz sensor head installed at the BTS Priroda location.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160008	Space Acceleration Measurement System (SAMS)	1

390043	Camcorder System (NASA)	1
650010	EDLS Experiment Support Module (ESM)	1
650019	Mir Auxillary Sensor Unit (MASU)	1
820273	SAMS Optical Disk	1
820286	EDLS Force Sensor 1 - Handhold and Adjoining Cable	1
820291	EDLS Force Sensor 2 - Foot Restraint and Adjoining Cable	2
820292	EDLS Force Sensor 3 - Touch Pad and Adjoining Cable	1
820433	MIPS-2C Controller	1
820465	ESM Power Cable	1
840255	8mm Video Tape	1
846653	EDLS Worm Disk Pouch	1
846668	MASU Experiment Support Module	1
846669	MASU Distribution Box	1
846670	MASU Accelerometer Sensor Heads	9
846671	MASU Data Disks with Pouch	1
846673	MASU Accelerometer Sensor Cables	10
854862	MIPS Serial cable	1
854863	PUP Power Cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	SAMS turn on for data take after installation of SAMS disk containing MASU data.
5	5	1	1	0	MASU ESM turn on for data take
10	10	1	1	0	Camcorder set up and turn on
20	20	1	1	0	EDLS ESM turn on and force sensor hand hold, touch pad, and foot sensor activities
25	25	1	1	0	Backup MASU ESM data disk and stow disk
5	5	1	1	0	MASU ESM turn off after data recording
5	5	1	1	0	SAMS turn off after data recording
5	5	1	1	0	EDLS experiment support module turn off after completion of force sensor activities
10	10	1	1	0	Turn off video camcorder; remove tape and stow with MASU disk; stow camcorder
15	15	1	1	0	Change out EDLS experiment support module data disk and stow with MASU disk; stow EDLS equipment

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 650013 **Exp. ID:** MiSDE **Russian ID:** MiSDE

Invest. Title: Mir Structural Dynamics Experiment (MiSDE)

Prime ☒
Contingent ☐

US PI: Kim, Hyoung-Man **Russian PI:** Mezhin, Vyacheslav

1. Session ID: ISS:DYN:I:37

Session Type: Inflight

2. Session: MiSDE Equipment Visual Inspection

3. Session Timeline: **Crewtime Usage (mins):** 40 **Session Time (mins):** 40

Scheduled Days: FD 12, 13, 14, 74, 84, 94, 109, 120, 124, 132, 137

4. Session Scenario:

At least 24 hours prior to the beginning of this session, a visual inspection of the acceleration sensor heads and all cable connections shall be performed to ensure proper and reliable attachment to the Mir structure.

5. Session Constraints:

1. This session is to be started 24 hrs prior to All MiSDE sessions.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
650019	Mir Auxillary Sensor Unit (MASU)	1
846668	MASU Experiment Support Module	1
846669	MASU Distribution Box	1
846670	MASU Accelerometer Sensor Heads	9
846671	MASU Data Disks with Pouch	1
846673	MASU Accelerometer Sensor Cables	10

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
40	40	1	1	0	MiSDE instruments attachment check

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 650013 **Exp. ID:** MiSDE **Russian ID:** MiSDE

Invest. Title: Mir Structural Dynamics Experiment (MiSDE) **Prime** ☒ **Contingent** ☐

US PI: Kim, Hyoung-Man **Russian PI:** Mezhin, Vyacheslav

1. Session ID: ISS:DYN:I:38

2. Session: MiSDE Docking - Shuttle Docking Event Data Collection **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 75 **Session Time (mins):** 75

Scheduled Days: FD 138

4. Session Scenario:

This session is for the Shuttle/Mir mated configuration. At least 60 minutes before Shuttle docking, the crewmember starts preparing and checking the MASU, the SAMS, and the Mir Structural Dynamics Measurement System (Russian). At least five minutes before docking, the crewmember turns on theMASU experiment support module (ESM) and the SAMS. Ten minutes after docking, the crewmember stops the ESM and SAMS. The crewmember records Mir IMU and thruster firing input commands during docking if available.

5. Session Constraints:

1. This session is to be started just prior to (could be the night/day before) Shuttle docking day.
2. At least 24 hours prior to the beginning of this session, a visual inspection of the acceleration sensor heads and all cable connections shall be performed to ensure proper and reliable attachment to the Mir structure.
3. If possible, collect SAMS data with MiSDE data
4. MASU instruments and the SAMS must remain set up throughout the docked phase.
5. Use of Mir Structural Dynamics Measurement System (Russian) if possible.
6. It is desirable to have the SAMS 100 hz sensor head installed at the BTS Priroda location.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160008	Space Acceleration Measurement System (SAMS)	1
650019	Mir Auxillary Sensor Unit (MASU)	1
820273	SAMS Optical Disk	1
820433	MIPS-2C Controller	1
846668	MASU Experiment Support Module	1
846669	MASU Distribution Box	1
846670	MASU Accelerometer Sensor Heads	9
846671	MASU Data Disks with Pouch	1
846673	MASU Accelerometer Sensor Cables	10
854862	MIPS Serial cable	1
854863	PUP Power Cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Structural Dynamics Measurement System (Russian) check/turn on
20	20	1	1	0	SAMS set up and installation of SAMS disk containing MASU data
5	5	1	1	0	MASU ESM turn on for docking event recording
5	5	1	1	0	SAMS turn on for docking event recording
5	5	1	1	0	Backup MASU ESM data disk and stow disk
5	5	1	1	0	MASU ESM turn off after docking event recording
25	25	1	1	0	SAMS turn off after docking event recording

8. Data Processing:

1. Thruster firing input commands should be recorded.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 650013 **Exp. ID:** MiSDE **Russian ID:** MiSDE

Invest. Title: Mir Structural Dynamics Experiment (MiSDE) **Prime** ☒ **Contingent** ☐

US PI: Kim, Hyoung-Man **Russian PI:** Mezhin, Vyacheslav

1. Session ID: ISS:DYN:I:5

2. Session: MiSDE 2b - Ambient Noise Data Collection: Day-to-Night Transition (Mir Alone) **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 95 **Session Time (mins):** 95

Scheduled Days: FD 13

4. Session Scenario:

The crewmember will connect the power cable to the MASU ESM and the PUP, and connect the MASU ESM databus cable to the MIPS. The crewmember will then activate the MASU ESM, update time with the MIPS, insert a data stowage disk, check for proper interfaces, perform a self diagnostic test (at least 5 minutes after activation).

The crewmember will check and turn on as appropriate the Mir Structural Dynamics Measurement System (Russian System).

The crewmember will set up the SAMS at the designated location, if the SAMS is not being used.

Five minutes before day-to-night orbit transition, the crewmember will start recording data via turn on of the MASU ESM and SAMS. Ten minutes after day-to-night transition, the crewmember will stop recording data by turning off the ESM and SAMS.

At the completion of data takes, the crewmember will backup data disk on a matching backup disk and remove the data disk from the ESM. The SAMS data disk with the MASU data shall be removed from the SAMS. The crewmember will turn off the ESM power. The SAMS unit will also be turned off. Data disks will be stowed.

5. Session Constraints:

1. Set up and use of the SAMS, if not being used by another experiment.
2. At least 24 hours prior to the beginning of this session, a visual inspection of the acceleration sensor heads and all cable connections shall be performed to ensure proper and reliable attachment to the Mir structure.
3. Use of Mir Structural Dynamics Measurement System (Russian), if possible.
4. No ergometer or treadmill activity should occur during this session.
5. It is desirable to have the SAMS 100 hz sensor head installed at the BTS Priroda location.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160008	Space Acceleration Measurement System (SAMS)	1
650019	Mir Auxillary Sensor Unit (MASU)	1
820273	SAMS Optical Disk	1
820433	MIPS-2C Controller	1
846668	MASU Experiment Support Module	1
846669	MASU Distribution Box	1
846670	MASU Accelerometer Sensor Heads	9
846671	MASU Data Disks with Pouch	1
846673	MASU Accelerometer Sensor Cables	10
854862	MIPS Serial cable	1

854863 PUP Power Cable 1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Structural Dynamics Measurement System (Russian) check/turn on
20	20	1	1	0	SAMS set up
5	5	1	1	0	MASU ESM turn on for day-to-night transition recording
5	5	1	1	0	SAMS turn on for day-to-night transition recording
5	5	1	1	0	MASU ESM turn off after day-to-night transition recording
5	5	1	1	0	SAMS turn off after day-to-night transition recording
5	5	1	1	0	MASU ESM turn on for night-to-day transition recording
5	5	1	1	0	SAMS turn on for night-to-day transition recording
25	25	1	1	0	Backup ESM Data disk and stow disk
5	5	1	1	0	MASU ESM turn off after night-to-day transition recording
5	5	1	1	0	SAMS turn off after night-to-day transition recording

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 650013 **Exp. ID:** MiSDE **Russian ID:** MiSDE

Invest. Title: Mir Structural Dynamics Experiment (MiSDE) **Prime** ☒ **Contingent** ☐

US PI: Kim, Hyoung-Man **Russian PI:** Mezhin, Vyacheslav

1. Session ID: ISS:DYN:I:6 **Session Type:** Inflight

2. Session: MiSDE 2e - Ambient Noise Data Collection: Queiscent Period (Mir Alone)

3. Session Timeline: **Crewtime Usage (mins):** 80 **Session Time (mins):** 80

Scheduled Days: FD 14

4. Session Scenario:

The crewmember will connect the power cable to the MASU ESM and the PUP, and connect the MASU ESM databus cable to the MIPS. The crewmember will then activate the MASU ESM, update time with the MIPS, insert a data stowage disk, check for proper interfaces, perform a self diagnostic test (at least 5 minutes after activation).

The crewmember will check and turn on as appropriate the Mir Structural Dynamics Measurement System (Russian System).

The crewmember will set up the SAMS at the designated location, if the SAMS is not being used.

Five minutes before quiescent period, the crewmember will start recording data via turn on of the MASU ESM and SAMS. Quiescent period is defined as no treadmill or ergometer activity. The crewmember will record data for ten minutes then stop recording data by turning off the MASU ESM and SAMS.

At the completion of data takes, the crewmember will backup data disk on a matching backup disk and remove the data disk from the ESM. The SAMS data disk with the MASU data shall be removed from the SAMS. The crewmember will turn off the MASU ESM power. The SAMS unit will also be turned off. Data disks will be stowed.

5. Session Constraints:

1. Setup and use of the SAMS, if possible.
2. At least 24 hours prior to the beginning of this session, a visual inspection of the acceleration sensor heads and all cable connections shall be performed to ensure proper and reliable attachment to the Mir structure.
3. No treadmill or ergometer use during this session.
4. Use of Mir Structural Dynamics Measurement System (Russian), if possible.
5. It is desirable to have the SAMS 100 hz sensor head installed at the BTS Priroda location.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160008	Space Acceleration Measurement System (SAMS)	1
650019	Mir Auxillary Sensor Unit (MASU)	1
820273	SAMS Optical Disk	1
820433	MIPS-2C Controller	1
846668	MASU Experiment Support Module	1
846669	MASU Distribution Box	1
846670	MASU Accelerometer Sensor Heads	9
846671	MASU Data Disks with Pouch	1
846673	MASU Accelerometer Sensor Cables	10
854862	MIPS Serial cable	1
854863	PUP Power Cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Structural Dynamics Measurement System (Russian) check/turn on
20	20	1	1	0	SAMS set up
5	5	1	1	0	MASU ESM turn on for data take
10	10	1	1	0	SAMS turn on for data take after installation of SAMS disk containing MASU data
5	5	1	1	0	Backup MASU ESM data disk and stow disk
5	5	1	1	0	MASU ESM turn off after data recording
25	25	1	1	0	SAMS turn off after data recording

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 650013 **Exp. ID:** MiSDE **Russian ID:** MiSDE

Invest. Title: Mir Structural Dynamics Experiment (MiSDE) **Prime** ☑ **Contingent** ☐

US PI: Kim, Hyoung-Man **Russian PI:** Mezhin, Vyacheslav

1. Session ID: ISS:DYN:I:7

2. Session: MiSDE 2f - Ambient Noise Data Collection: Non-Quiescent Period (Mir Alone) **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 90 **Session Time (mins):** 90

Scheduled Days: FD 15

4. Session Scenario:

The crewmember will connect the power cable to the ESM and the PUP, and connect the ESM databus cable to the MIPS. The crewmember will then activate the ESM, update time with the MIPS, insert a data stowage disk, check for proper interfaces, perform a self diagnostic test (at least 5 minutes after activation).

The crewmember will check and turn on as appropriate the Mir Structural Dynamics Measurement System (Russian System).

The crewmember will set up the SAMS at the designated location, if the SAMS is not being used.

Five minutes before quiescent period, the crewmember will start recording data via turn on of the MASU ESM and SAMS. A nonquiescent period is defined as treadmill or ergometer activity. The crewmember will record data for ten minutes then stop recording data by turning off the ESM and SAMS.

At the completion of data takes, the crewmember will backup data disk on a matching backup disk and remove the data disk from the ESM. The SAMS data disk with the MASU data shall be removed from the SAMS. The crewmember will turn off the ESM power. The SAMS unit will also be turned off. Data disks will be stowed.

5. Session Constraints:

1. Set up and use of the SAMS, if not being used by another experiment.
2. At least 24 hours prior to the beginning of this session, a visual inspection of the acceleration sensor heads and all cable connections shall be performed to ensure proper and reliable attachment to the Mir structure.
3. Use of Mir Structural Dynamics Measurement System (Russian), if possible.
4. It is desirable to have the SAMS 100 hz sensor head installed at the BTS Priroda location.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
114	Treadmill	1
150023	Cycle Ergometer	1
160008	Space Acceleration Measurement System (SAMS)	1
650019	Mir Auxillary Sensor Unit (MASU)	1
820273	SAMS Optical Disk	1
820433	MIPS-2C Controller	1
846668	MASU Experiment Support Module	1
846669	MASU Distribution Box	1
846670	MASU Accelerometer Sensor Heads	9
846671	MASU Data Disks with Pouch	1
846673	MASU Accelerometer Sensor Cables	10
854862	MIPS Serial cable	1
854863	PUP Power Cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Structural Dynamics Measurement System (Russian) check/turn on
20	20	1	1	0	SAMS set up
5	5	1	1	0	MASU ESM turn on for data take
10	10	1	1	0	SAMS turn on for data take after installation of SAMS disk containing MASU data
10	10	1	1	0	Crewmember exercise on treadmill or ergometer
25	25	1	1	0	Backup MASU ESM data disk and stow disk
5	5	1	1	0	MASU ESM turn off after data recording
5	5	1	1	0	SAMS turn off after data recording

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 650013 **Exp. ID:** MiSDE **Russian ID:** MiSDE

Invest. Title: Mir Structural Dynamics Experiment (MiSDE) **Prime** ☒ **Contingent** ☐

US PI: Kim, Hyoung-Man **Russian PI:** Mezhin, Vyacheslav

1. Session ID: ISS:DYN:I:8

2. Session: MiSDE 3b - IVA Data Collection (Mir Alone) **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 170 **Session Time (mins):** 170

Scheduled Days: FD 75, 85, 95

4. Session Scenario:

The crewmember will connect the power cable to the MASU ESM and the PUP, and connect the MASU ESM databus cable to the MIPS. The crewmember will then activate the MASU ESM, update time with the MIPS, insert a data stowage disk, check for proper interfaces, perform a self diagnostic test (at least 5 minutes after activation).

The crewmember will check and turn on as appropriate the Mir Structural Dynamics Measurement System (Russian System).

The crewmember will set up the SAMS at the designated location, if the SAMS is not being used.

The crewmember will set up the Enhanced Dynamic Load Sensor (EDLS) hardware at the predetermined location.

The crewmember sets up the video recorder to record this session activity.

The crewmember will start recording data via turn on of the MASU ESM, SAMS, and the EDLS experiment support module. The crewmember performs push-off, hand-hold, and foot loop sensor activities with the EDLS hardware. A second crewmember records first crewmember's activities with the video recorder. The crewmember will record data for 20 minutes then stop recording data by turning off the MASU ESM, SAMS and the EDLS experiment support module. The crewmember will stop video recording the other crewmember's activities.

At the completion of data takes, the crewmember will backup data disk on a matching backup disk and remove the data disk from the ESM. The SAMS data disk with the MASU data shall be removed from the SAMS. The MASU data disk is also to be removed from the EDLS experiment support module. The crewmember will turn off the ESM power. The SAMS unit will also be turned off. Data disks will be stowed.

5. Session Constraints:

1. Set up and use of the SAMS if it is not being used by another experiment
2. At least 24 hours prior to the beginning of this session, a visual inspection of the acceleration sensor heads and all cable connections shall be performed to ensure proper and reliable attachment to the Mir structure.
3. Set up and use of the Enhanced Dynamic Load Sensor hardware.
4. Use of Mir Structual Dynamics Measurement System (Russian), if possible.
5. It is desirable to have the SAMS 100 hz sensor head installed at the BTS Priroda location.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160008	Space Acceleration Measurement System (SAMS)	1
390043	Camcorder System (NASA)	1
650010	EDLS Experiment Support Module (ESM)	1

650019	Mir Auxillary Sensor Unit (MASU)	1
820273	SAMS Optical Disk	1
820286	EDLS Force Sensor 1 - Handhold and Adjoining Cable	1
820291	EDLS Force Sensor 2 - Foot Restraint and Adjoining Cable	2
820292	EDLS Force Sensor 3 - Touch Pad and Adjoining Cable	1
820433	MIPS-2C Controller	1
820465	ESM Power Cable	1
840255	8mm Video Tape	1
846668	MASU Experiment Support Module	1
846669	MASU Distribution Box	1
846670	MASU Accelerometer Sensor Heads	9
846671	MASU Data Disks with Pouch	1
846673	MASU Accelerometer Sensor Cables	10
854862	MIPS Serial cable	1
854863	PUP Power Cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Structural Dynamics Measurement System (Russian) check/turn on
20	20	1	1	0	SAMS set up
30	30	1	1	0	EDLS force sensors set up and experiment support module turn on
10	10	1	1	0	SAMS turn on for data take after installation of SAMS disk containg MiSDE data
5	5	1	1	0	MASU ESM turn on for data take
10	10	1	1	0	Camcorder set up and turn on
20	20	1	1	0	EDLS force sensor hand hold, touch pad, and foot sensor activities
25	25	1	1	0	Backup MASU ESM data disk and stow disk
5	5	1	1	0	MASU ESM turn off after data recording
5	5	1	1	0	SAMS turn off after data recording
5	5	1	1	0	EDLS experiment support module turn off after completion of force sensor activities
10	10	1	1	0	Turn off video camcorder; remove tape and stow with MASU disk; stow camcorder
15	15	1	1	0	Change out EDLS experiment support module data disk and stow with MASU disk

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 650013 **Exp. ID:** MiSDE **Russian ID:** MiSDE

Invest. Title: Mir Structural Dynamics Experiment (MiSDE)

Prime ☒
Contingent ☐

US PI: Kim, Hyoung-Man **Russian PI:** Mezhin, Vyacheslav

1. Session ID: ISS:DYN:I:9

Session Type: Inflight

2. Session: MiSDE 4b - Mir Thruster Firing Data Collection (Mir Alone)

3. Session Timeline: **Crewtime Usage (mins):** 90 **Session Time (mins):** 90

Scheduled Days: FD 95, 110, 125

4. Session Scenario:

The crewmember will connect the power cable to the ESM and the PUP, and connect the ESM databus cable to the MIPS. The crewmember will then activate the ESM, update time with the MIPS, insert a data stowage disk, check for proper interfaces, perform a self diagnostic test (at least 5 minutes after activation).

The crewmember will check and turn on as appropriate the Mir Structural Dynamics Measurement System (Russian System).

The crewmember will set up the SAMS at the designated location, if the SAMS is not being used.

Five minutes before day-to-night orbit transition, the crewmember will start recording data via turn on of the MASU ESM and SAMS. Ten minutes after day-to-night transition, the crewmember will stop recording data by turning off the ESM and SAMS.

Five minutes before a thruster firing, the crewmember will start recording data via turn on of the MASU ESM and SAMS. Ten minutes after a thruster firing, the crewmember will stop recording data by turning off the ESM and SAMS.

At the completion of data takes, the crewmember will backup data disk on a matching backup disk and remove the data disk from the ESM. The SAMS data disk with the MiSDE data shall be removed from the SAMS. The crewmember will turn off the ESM power. The SAMS unit will also be turned off. Data disks will be stowed.

5. Session Constraints:

1. Set up and use of the SAMS if not being used by another experiment.
2. At least 24 hours prior to the beginning of this session, a visual inspection of the acceleration sensor heads and all cable connections shall be performed to ensure proper and reliable attachment to the Mir structure.
3. Use of Mir Structural Dynamics Measurement System (Russian), if possible.
4. It is desirable to have the SAMS 100 hz sensor head installed at the BTS Priroda location.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160008	Space Acceleration Measurement System (SAMS)	1
650019	Mir Auxillary Sensor Unit (MASU)	1
820273	SAMS Optical Disk	1
820433	MIPS-2C Controller	1
846668	MASU Experiment Support Module	1
846669	MASU Distribution Box	1
846670	MASU Accelerometer Sensor Heads	9
846671	MASU Data Disks with Pouch	1
846673	MASU Accelerometer Sensor Cables	10
854863	PUP Power Cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Structural Dynamics Measurement System (Russian) check/turn on
20	20	1	1	0	SAMS set up
5	5	1	1	0	MASU ESM turn on for thruster firing recording
10	10	1	1	0	SAMS turn on for thruster firing recording after installation of SAMS disk containing MASU data
10	10	1	1	0	Record thruster firing for 10 minutes
25	25	1	1	0	Backup MASU ESM data disk and stow disk
5	5	1	1	0	MASU ESM turn off after thruster firing recording
5	5	1	1	0	SAMS turn off after thruster firing recording

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 650013 **Exp. ID:** MiSDE **Russian ID:** MiSDE

Invest. Title: Mir Structural Dynamics Experiment (MiSDE) **Prime** ☑ **Contingent** ☐

US PI: Kim, Hyoung-Man **Russian PI:** Mezhin, Vyacheslav

1. Session ID: ISS:LOG:I:16

2. Session: MASU Used Data Disks and Video Transport to Shuttle from Mir **Session Type:** Down Item

3. Session Timeline: **Crewtime Usage (mins):** 20 **Session Time (mins):** 20

Scheduled Days: FD 6

4. Session Scenario:

The crewmember will unstow used MASU data disks, video tapes, 35 mm film, and transport them to the Shuttle for return.

5. Session Constraints:

1. Session must be performed during docked phase.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
846671	MASU Data Disks with Pouch	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	20	1	1	0	Unstow used MASU data disks and video tapes; transport to Shuttle and stow

8. Data Processing:

None

Investigation ID: 890601 **Experiment ID:** RME 1320 **Russian ID:** RME

Investigation Title: Radiation Monitoring Equipment - III

US Investigators: Golightly, Mike; Afinidad, Francis

Russian Investigators: Petrov, Vladislav

Other Investigators:

Payload Category: ISS **Sub-Cat.:** ENV **Subjects Requested:**

Description: Two Radiation Monitoring Equipment - III units will be flown and operated simultaneously onboard Mir. This will allow for a first time measurement of the "East-West Effect" radiation influence. The ability to study the East-West Effect will provide much needed information on the magnitude of the east-west radiation ratio. Knowing this, empirical corrections can be made to the dose projection for crew and the equipment inside the International Space Station (ISS). Current dose projections are based on "isotropic" models which assume that the flux of particles is the same regardless of the arrival direction. However, from previous Shuttle missions it has been discovered that the dose difference between the local will allow researchers to quantify how much reduction in radiation exposure will be experienced by astronauts by having them spend more time (like sleep periods) on the local east side of the ISS compared to the local west side.

Science Objectives: This is a technology evaluation and has the following goal:

1. Study the exposure to ionizing radiation on humans in space and to measure the shielding provided in various locations inside the Mir space station.

Functional Objectives: This evaluation will be performed in 3 phases on the Mir space station:

1. Two Radiation Monitoring Experiment units will be placed on opposite sides within a Mir module for about 48 hours to passively collect radiation data.

2. The two units will be placed side by side within the module and collect data for about 12 hours before the initial 48 hour data collection period.

3. The two units will be located at two additional locations within the module for the remainder of the Shuttle/Mir docked period collecting radiation data.

Sample Transfer Rqd: No **Hardware Transfer Rqd:** Yes

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	Mir 25	12/12/97	☒	☒
6	NASA 6	9/18/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒
7	Mir 26	5/30/98	☒	☒
7	NASA 7	1/15/98	☒	☒
7	STS 89 (SM-08)	1/15/98	☒	☒
7	STS 91 (SM-09)	5/29/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
ES	SHR	Flight	852162	Nikon F4 Camera (STS)
OPS	SHR		852167	35 mm film (frames)
ISS	ENV	Flight	854803	Radiation Monitoring Equipment - III Main Module Unit #1
ISS	ENV	Flight	854804	Radiation Monitoring Equipment - III Main Module Unit #2
ISS	ENV	Flight	854805	Radiation Monitoring Equipment - III Memory Module
ISS	ENV	Flight	854806	Radiation Monitoring Equipment - III Mir Attachment Hardware

Mission: NASA 5 **Invest. ID:** 890601 **Exp. ID:** RME 1320 **Russian ID:** RME

Invest. Title: Radiation Monitoring Equipment - III

Prime ☒
Contingent ☐

US PI: Golightly, Mike; Afinidad, Francis **Russian PI:** Petrov, Vladislav

1. Session ID: ISS:ENV:P:10

2. Session: Radiation Monitoring Equipment Refresher Training

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: L- 60

4. Session Scenario:

This training will include a refresher course on the description of the hardware, demonstration of the transient parameters and how to enter these parameters, in particular the MET; how to activate the equipment and how to read the RAD/REM screen. The crewmember will be trained on where and how to attach the radiation monitoring units in the Mir module. Also included in the training will be a brief discussion of the contingency operations and an introduction to the various error messages that could apear.

5. Session Constraints:

1. None

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854803	Radiation Monitoring Equipment - III Main Module Unit #1	1
854804	Radiation Monitoring Equipment - III Main Module Unit #2	1
854805	Radiation Monitoring Equipment - III Memory Module	1
854820	Radiation Monitoring Equipment - Training Mir Attachment Hardware	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	0	0	1	0	Hands on training

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890601 **Exp. ID:** RME 1320 **Russian ID:** RME

Invest. Title: Radiation Monitoring Equipment - III

Prime ☑
Contingent ☐

US PI: Golightly, Mike; Afinidad, Francis **Russian PI:** Petrov, Vladislav

1. Session ID: ISS:ENV:P:11

Session Type: Training

2. Session: Radiation Monitoring Equipment Operations Training

3. Session Timeline: **Crewtime Usage (mins):** 90 **Session Time (mins):** 90

Scheduled Days: L- 120

4. Session Scenario:

This training will include a short description of the hardware, demonstration of the transient parameters, in particular the MET; how to activate the equipment and how to read the RAD/REM screen. The crewmember will be trained on where and how to attach the radiation monitoring units in the Mir module. Also included in the training will be a brief discussion of the contingency operations and an introduction to the various error messages that could be displayed on the monitor unit screen and how to correct these errors.

5. Session Constraints:

1. None

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854803	Radiation Monitoring Equipment - III Main Module Unit #1	1
854804	Radiation Monitoring Equipment - III Main Module Unit #2	1
854805	Radiation Monitoring Equipment - III Memory Module	1
854820	Radiation Monitoring Equipment - Training Mir Attachment Hardware	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	0	0	1	0	Familiarization Briefing
60	0	0	1	0	Hands on training

8. Data Processing:

1. N/A for preflight sessions.

Mission: STS 84 (SM-06) **Invest. ID:** 890601 **Exp. ID:** RME 1320 **Russian ID:** RME

Invest. Title: Radiation Monitoring Equipment - III

Prime ☒
Contingent ☐

US PI: Golightly, Mike; Afinidad, Francis **Russian PI:** Petrov, Vladislav

1. Session ID: ISS:ENV:I:33

Session Type: Inflight

2. Session: Monitoring Equipment Deployment and Activation (Mir Location A)

3. Session Timeline: **Crewtime Usage (mins):** 23 **Session Time (mins):** 23

Scheduled Days: FD 3

4. Session Scenario:

Both monitoring units will be activated using the toggle switches located on the top of the units. The preset transient parameters will be verified and the correct MET will be entered on Units #1 and #2. The "start" buttons must be pushed simultaneously. The units will be activated in the predetermined, side-by-side location in the TBD Mir module for 12 hours. MCC-H to be notified of the deployment. The crewmember will take 35 mm photographs of the units after installation in this location.

5. Session Constraints:

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
852162	Nikon F4 Camera (STS)	1
852167	35 mm film (frames)	8
854803	Radiation Monitoring Equipment - III Main Module Unit #1	1
854804	Radiation Monitoring Equipment - III Main Module Unit #2	1
854805	Radiation Monitoring Equipment - III Memory Module	2
854806	Radiation Monitoring Equipment - III Mir Attachment Hardware	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Activate both units using the toggle switches on top of both units.
5	5	1	1	0	Verify the transient parameters
5	5	1	1	0	Enter the MET on Units #1 and #2
5	5	1	1	0	Depress the start button on both units
3	3	1	1	0	Attach both units to the predetermined co-location for approximately 12 hours. Inform MCC-H of the deployment.

8. Data Processing:

1. No data processing required
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: STS 84 (SM-06) **Invest. ID:** 890601 **Exp. ID:** RME 1320 **Russian ID:** RME

Invest. Title: Radiation Monitoring Equipment - III

Prime ☒
Contingent ☐

US PI: Golightly, Mike; Afinidad, Francis **Russian PI:** Petrov, Vladislav

1. Session ID: ISS:ENV:I:34

Session Type: Inflight

2. Session: Units #1 and #2 Location Change (Mir Location C)

3. Session Timeline: **Crewtime Usage (mins):** 28 **Session Time (mins):** 28

Scheduled Days: FD 5

4. Session Scenario:

After 48 hours of operation in opposing positions within the Mir space station module, the radiation monitoring units will be moved to TBD separate locations within the TBD Mir module. The two units will remain in this configuration for approximately 30 hours. The crewmember will take 35 mm photographs of the units after installation in this location. It is requested that the MCC-H be notified of the deployed location.

5. Session Constraints:

1. After every 38 hours of operation of the units there will need to be a memory module changeout

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
852162	Nikon F4 Camera (STS)	1
852167	35 mm film (frames)	8
854803	Radiation Monitoring Equipment - III Main Module Unit #1	1
854804	Radiation Monitoring Equipment - III Main Module Unit #2	1
854805	Radiation Monitoring Equipment - III Memory Module	2
854806	Radiation Monitoring Equipment - III Mir Attachment Hardware	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Retrieve Units #1 and #2 from deployed locations
3	3	1	1	0	Record MET and RAD/REM
5	5	1	1	0	Deploy in pre-determined locations within the Mir module. Inform MCC-H of the deployment.
10	10	1	1	0	Photograph units in new location.

8. Data Processing:

1. No data processing required
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: STS 84 (SM-06) **Invest. ID:** 890601 **Exp. ID:** RME 1320 **Russian ID:** RME

Invest. Title: Radiation Monitoring Equipment - III

Prime ☒
Contingent ☐

US PI: Golightly, Mike; Afinidad, Francis **Russian PI:** Petrov, Vladislav

1. Session ID: ISS:ENV:I:35

2. Session: Memory Module Changeout

Session Type: Inflight

3. Session Timeline: **Crewtime Usage (mins):** 29 **Session Time (mins):** 29

Scheduled Days: FD 4, 5, 6

4. Session Scenario:

After approximately 38 hours of operation, the detachable Memory Modules will need to be changed. These modules contain the batteries which when activated, power the entire system. This procedure involves retrieving a fresh memory module, deactivating the Main Module, recording the MET & RAD/REM, snapping out the used memory module, marking it as "USED", and inserting a fresh memory module. The unit is then reactivated to current deployment location. The MCC-H is to be notified of the memory module change out.

5. Session Constraints:

1. There are no Mir space station special conditions.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854803	Radiation Monitoring Equipment - III Main Module Unit #1	1
854804	Radiation Monitoring Equipment - III Main Module Unit #2	1
854805	Radiation Monitoring Equipment - III Memory Module	4

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Retrieve new memory module from Shuttle and transport to Mir
5	5	1	1	0	Deactivate the main module
1	1	1	1	0	Record MET and RAD/REM
2	2	1	1	0	Detach old memory module - mark as "USED"
2	2	1	1	0	Attach new memory module
2	2	1	1	0	Reactivate main module and return to current operating location. Inform MCC-H of the memory module change out
12	12	1	1	0	Transport used memory modules to the Shuttle and stow

8. Data Processing:

1. No data processing required
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: STS 84 (SM-06) **Invest. ID:** 890601 **Exp. ID:** RME 1320 **Russian ID:** RME

Invest. Title: Radiation Monitoring Equipment - III

Prime ☒
Contingent ☐

US PI: Golightly, Mike; Afinidad, Francis **Russian PI:** Petrov, Vladislav

1. Session ID: ISS:ENV:I:37

Session Type: Inflight

2. Session: Units #1 and 2 Location Change (Mir Location B)

3. Session Timeline: **Crewtime Usage (mins):** 23 **Session Time (mins):** 23

Scheduled Days: FD 3

4. Session Scenario:

After the initial 12 hours of operation in the side-by-side configuration, the two radiation monitoring units will be moved to opposite locations within the TBD Mir module for approximately 48 hours of operation. The crewmember will take 35 mm photographs of the units after installation in this location. The MCC-H will be informed of the units new locations.

5. Session Constraints:

1. After every 38 hours of operation of the units there will need to be a memory module changeout per MCC call.
2. Radiation Monitoring Equipment units should be located on opposite sides of each other in the Mir module in a direction perpendicular to the space station's Velocity Vector as local horizontal.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
852162	Nikon F4 Camera (STS)	1
852167	35 mm film (frames)	8
854803	Radiation Monitoring Equipment - III Main Module Unit #1	1
854804	Radiation Monitoring Equipment - III Main Module Unit #2	1
854805	Radiation Monitoring Equipment - III Memory Module	2
854806	Radiation Monitoring Equipment - III Mir Attachment Hardware	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Retrieve Units #1 and #2 from deployed locations
3	3	1	1	0	Record MET and RAD/REM
5	5	1	1	0	Attach units in the pre-determined location within the Mir module. Inform MCC-H of the new location.
10	10	1	1	0	Photograph units in new location

8. Data Processing:

1. No data processing required
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: STS 84 (SM-06) **Invest. ID:** 890601 **Exp. ID:** RME 1320 **Russian ID:** RME

Invest. Title: Radiation Monitoring Equipment - III

Prime ☒
Contingent ☐

US PI: Golightly, Mike; Afinidad, Francis **Russian PI:** Petrov, Vladislav

1. Session ID: ISS:ENV:I:38

2. Session: Units #1 and 2 Location Change (Mir Location D)

Session Type: Inflight

3. Session Timeline: **Crewtime Usage (mins):** 28 **Session Time (mins):** 28

Scheduled Days: FD 7

4. Session Scenario:

After 30 hours of operation in Mir Location C, the radiation monitoring units will be moved to TBD (Location D). The two units will remain in this location for the balance of the Shuttle/Mir docked time. The crewmember will take 35 mm photographs of the units after installation in this location. The MCC-H will be notified of the deployed location.

5. Session Constraints:

1. After every 38 hours of operation of the units there will need to be a memory module changeout

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
852162	Nikon F4 Camera (STS)	1
852167	35 mm film (frames)	8
854803	Radiation Monitoring Equipment - III Main Module Unit #1	1
854804	Radiation Monitoring Equipment - III Main Module Unit #2	1
854805	Radiation Monitoring Equipment - III Memory Module	2
854806	Radiation Monitoring Equipment - III Mir Attachment Hardware	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Retrieve Units #1 and #2 from deployed locations
3	3	1	1	0	Record MET and RAD/REM
5	5	1	1	0	Deploy in pre-determined locations within the Mir module. Inform MCC-H of the deployment.
10	10	1	1	0	Photograph units in new location.

8. Data Processing:

1. No data processing required
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: STS 84 (SM-06) **Invest. ID:** 890601 **Exp. ID:** RME 1320 **Russian ID:** RME

Invest. Title: Radiation Monitoring Equipment - III

Prime ☑
Contingent ☐

US PI: Golightly, Mike; Afinidad, Francis **Russian PI:** Petrov, Vladislav

1. Session ID: ISS:ENV:I:47

Session Type: Inflight

2. Session: Transfer Equipment Units to Mir

3. Session Timeline: **Crewtime Usage (mins):** 13 **Session Time (mins):** 13

Scheduled Days: FD 3

4. Session Scenario:

Prior to transferring to Mir, the Radiation Monitoring Equipment Units #1 and #2 will be removed from its locker. The two Main Modules and two memory modules (attached to the Main Modules) will be placed in a temporary stowage bag along with the Mir attachment hardware and transferred to Mir.

5. Session Constraints:

1. There are no Mir space station special conditions.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854803	Radiation Monitoring Equipment - III Main Module Unit #1	1
854804	Radiation Monitoring Equipment - III Main Module Unit #2	1
854805	Radiation Monitoring Equipment - III Memory Module	2
854806	Radiation Monitoring Equipment - III Mir Attachment Hardware	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Destow Unit #1 and #2 from middeck locker
3	3	1	1	0	Stow unit #1 and #2 inside the temporary stowage bag
5	5	1	1	0	Transport bag to Mir

8. Data Processing:

1. No data processing required
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: STS 84 (SM-06) **Invest. ID:** 890601 **Exp. ID:** RME 1320 **Russian ID:** RME

Invest. Title: Radiation Monitoring Equipment - III

Prime ☒
Contingent ☐

US PI: Golightly, Mike; Afinidad, Francis **Russian PI:** Petrov, Vladislav

1. Session ID: ISS:LOG:I:21

2. Session: Radiation Monitoring Equipment Transfer to Shuttle

Session Type: Inflight

3. Session Timeline: **Crewtime Usage (mins):** 17 **Session Time (mins):** 17

Scheduled Days: FD 7

4. Session Scenario:

The crewmember will detach radiation monitoring units from their Mir module location "D" and transport the units to the shuttle. All the radiation monitoring equipment will be returned to the middeck locker, with the two main units continuing to operate. The MCC-H will be notified of the transfer of equipment and subsequent stowage in the locker.

5. Session Constraints:

1. There are no Mir space station special conditions.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854803	Radiation Monitoring Equipment - III Main Module Unit #1	1
854804	Radiation Monitoring Equipment - III Main Module Unit #2	1
854805	Radiation Monitoring Equipment - III Memory Module	2
854806	Radiation Monitoring Equipment - III Mir Attachment Hardware	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
2	2	1	1	0	Retrieve all Radiatin Monitoring Equipment from Mir module location
2	2	1	1	0	Record MET & RAD/REM
10	10	1	1	0	Transfer all equipment to Shuttle
3	3	1	1	0	Stow all equipment in the middeck locker. Inform MCC-H of the transfer.

8. Data Processing:

1. No data processing is required.
2. Air to ground voice communication may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 890601 **Exp. ID:** RME 1320 **Russian ID:** RME

Invest. Title: Radiation Monitoring Equipment - III

Prime ☑
Contingent ☐

US PI: Golightly, Mike; Afinidad, Francis **Russian PI:** Petrov, Vladislav

1. Session ID: ISS:ENV:I:33

Session Type: Inflight

2. Session: Monitoring Equipment Deployment and Activation (Mir Location A)

3. Session Timeline: **Crewtime Usage (mins):** 23 **Session Time (mins):** 23

Scheduled Days: FD 3

4. Session Scenario:

Both monitoring units will be activated using the toggle switches located on the top of the units. The preset transient parameters will be verified and the correct MET will be entered on Units #1 and #2. The "start" buttons must be pushed simultaneously. The units will be activated in the predetermined, side-by-side location in the TBD Mir module for 12 hours. MCC-H to be notified of the deployment. The crewmember will take 35 mm photographs of the units after installation in this location.

5. Session Constraints:

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
852162	Nikon F4 Camera (STS)	1
852167	35 mm film (frames)	8
854803	Radiation Monitoring Equipment - III Main Module Unit #1	1
854804	Radiation Monitoring Equipment - III Main Module Unit #2	1
854805	Radiation Monitoring Equipment - III Memory Module	2
854806	Radiation Monitoring Equipment - III Mir Attachment Hardware	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Activate both units using the toggle switches on top of both units.
5	5	1	1	0	Verify the transient parameters
5	5	1	1	0	Enter the MET on Units #1 and #2
5	5	1	1	0	Depress the start button on both units
3	3	1	1	0	Attach both units to the predetermined co-location for approximately 12 hours. Inform MCC-H of the deployment.

8. Data Processing:

1. No data processing required
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 890601 **Exp. ID:** RME 1320 **Russian ID:** RME

Invest. Title: Radiation Monitoring Equipment - III

Prime ☒
Contingent ☐

US PI: Golightly, Mike; Afinidad, Francis **Russian PI:** Petrov, Vladislav

1. Session ID: ISS:ENV:I:34

2. Session: Units #1 and #2 Location Change (Mir Location C)

Session Type: Inflight

3. Session Timeline: **Crewtime Usage (mins):** 28 **Session Time (mins):** 28

Scheduled Days: FD 5

4. Session Scenario:

After 48 hours of operation in opposing positions within the Mir space station module, the radiation monitoring units will be moved to TBD separate locations within the TBD Mir module. The two units will remain in this configuration for approximately 30 hours. The crewmember will take 35 mm photographs of the units after installation in this location. It is requested that the MCC-H be notified of the deployed location.

5. Session Constraints:

1. After every 38 hours of operation of the units there will need to be a memory module changeout

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
852162	Nikon F4 Camera (STS)	1
852167	35 mm film (frames)	8
854803	Radiation Monitoring Equipment - III Main Module Unit #1	1
854804	Radiation Monitoring Equipment - III Main Module Unit #2	1
854805	Radiation Monitoring Equipment - III Memory Module	2
854806	Radiation Monitoring Equipment - III Mir Attachment Hardware	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Retrieve Units #1 and #2 from deployed locations
3	3	1	1	0	Record MET and RAD/REM
5	5	1	1	0	Deploy in pre-determined locations within the Mir module. Inform MCC-H of the deployment.
10	10	1	1	0	Photograph units in new location.

8. Data Processing:

1. No data processing required
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 890601 **Exp. ID:** RME 1320 **Russian ID:** RME

Invest. Title: Radiation Monitoring Equipment - III

Prime ☑
Contingent ☐

US PI: Golightly, Mike; Afinidad, Francis **Russian PI:** Petrov, Vladislav

1. Session ID: ISS:ENV:I:35

Session Type: Inflight

2. Session: Memory Module Changeout

3. Session Timeline: **Crewtime Usage (mins):** 29 **Session Time (mins):** 29

Scheduled Days: FD 4, 5, 6

4. Session Scenario:

After approximately 38 hours of operation, the detachable Memory Modules will need to be changed. These modules contain the batteries which when activated, power the entire system. This procedure involves retrieving a fresh memory module, deactivating the Main Module, recording the MET & RAD/REM, snapping out the used memory module, marking it as "USED", and inserting a fresh memory module. The unit is then reactivated to current deployment location. The MCC-H is to be notified of the memory module change out.

5. Session Constraints:

1. There are no Mir space station special conditions.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854803	Radiation Monitoring Equipment - III Main Module Unit #1	1
854804	Radiation Monitoring Equipment - III Main Module Unit #2	1
854805	Radiation Monitoring Equipment - III Memory Module	4

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Retrieve new memory module from Shuttle and transport to Mir
5	5	1	1	0	Deactivate the main module
1	1	1	1	0	Record MET and RAD/REM
2	2	1	1	0	Detach old memory module - mark as "USED"
2	2	1	1	0	Attach new memory module
2	2	1	1	0	Reactivate main module and return to current operating location. Inform MCC-H of the memory module change out
12	12	1	1	0	Transport used memory modules to the Shuttle and stow

8. Data Processing:

1. No data processing required
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 890601 **Exp. ID:** RME 1320 **Russian ID:** RME

Invest. Title: Radiation Monitoring Equipment - III **Prime** ☒ **Contingent** ☐

US PI: Golightly, Mike; Afinidad, Francis **Russian PI:** Petrov, Vladislav

1. Session ID: ISS:ENV:I:37

2. Session: Units #1 and 2 Location Change (Mir Location B) **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 23 **Session Time (mins):** 23

Scheduled Days: FD 3

4. Session Scenario:

After the initial 12 hours of operation in the side-by-side configuration, the two radiation monitoring units will be moved to opposite locations within the TBD Mir module for approximately 48 hours of operation. The crewmember will take 35 mm photographs of the units after installation in this location. The MCC-H will be informed of the units new locations.

5. Session Constraints:

1. After every 38 hours of operation of the units there will need to be a memory module changeout per MCC call.
2. Radiation Monitoring Equipment units should be located on opposite sides of each other in the Mir module in a direction perpendicular to the space station's Velocity Vector as local horizontal.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
852162	Nikon F4 Camera (STS)	1
852167	35 mm film (frames)	8
854803	Radiation Monitoring Equipment - III Main Module Unit #1	1
854804	Radiation Monitoring Equipment - III Main Module Unit #2	1
854805	Radiation Monitoring Equipment - III Memory Module	2
854806	Radiation Monitoring Equipment - III Mir Attachment Hardware	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Retrieve Units #1 and #2 from deployed locations
3	3	1	1	0	Record MET and RAD/REM
5	5	1	1	0	Attach units in the pre-determined location within the Mir module. Inform MCC-H of the new location.
10	10	1	1	0	Photograph units in new location

8. Data Processing:

1. No data processing required
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 890601 **Exp. ID:** RME 1320 **Russian ID:** RME

Invest. Title: Radiation Monitoring Equipment - III

Prime ☒
Contingent ☐

US PI: Golightly, Mike; Afinidad, Francis **Russian PI:** Petrov, Vladislav

1. Session ID: ISS:ENV:I:38

Session Type: Inflight

2. Session: Units #1 and 2 Location Change (Mir Location D)

3. Session Timeline: **Crewtime Usage (mins):** 28 **Session Time (mins):** 28

Scheduled Days: FD 7

4. Session Scenario:

After 30 hours of operation in Mir Location C, the radiation monitoring units will be moved to TBD (Location D). The two units will remain in this location for the balance of the Shuttle/Mir docked time. The crewmember will take 35 mm photographs of the units after installation in this location. The MCC-H will be notified of the deployed location.

5. Session Constraints:

1. After every 38 hours of operation of the units there will need to be a memory module changeout

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
852162	Nikon F4 Camera (STS)	1
852167	35 mm film (frames)	8
854803	Radiation Monitoring Equipment - III Main Module Unit #1	1
854804	Radiation Monitoring Equipment - III Main Module Unit #2	1
854805	Radiation Monitoring Equipment - III Memory Module	2
854806	Radiation Monitoring Equipment - III Mir Attachment Hardware	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Retrieve Units #1 and #2 from deployed locations
3	3	1	1	0	Record MET and RAD/REM
5	5	1	1	0	Deploy in pre-determined locations within the Mir module. Inform MCC-H of the deployment.
10	10	1	1	0	Photograph units in new location.

8. Data Processing:

1. No data processing required
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 890601 **Exp. ID:** RME 1320 **Russian ID:** RME

Invest. Title: Radiation Monitoring Equipment - III

Prime ☒
Contingent ☐

US PI: Golightly, Mike; Afinidad, Francis **Russian PI:** Petrov, Vladislav

1. Session ID: ISS:ENV:I:47

2. Session: Transfer Equipment Units to Mir

Session Type: Inflight

3. Session Timeline: **Crewtime Usage (mins):** 13 **Session Time (mins):** 13

Scheduled Days: FD 3

4. Session Scenario:

Prior to transferring to Mir, the Radiation Monitoring Equipment Units #1 and #2 will be removed from its locker. The two Main Modules and two memory modules (attached to the Main Modules) will be placed in a temporary stowage bag along with the Mir attachment hardware and transferred to Mir.

5. Session Constraints:

1. There are no Mir space station special conditions.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854803	Radiation Monitoring Equipment - III Main Module Unit #1	1
854804	Radiation Monitoring Equipment - III Main Module Unit #2	1
854805	Radiation Monitoring Equipment - III Memory Module	2
854806	Radiation Monitoring Equipment - III Mir Attachment Hardware	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Destow Unit #1 and #2 from middeck locker
3	3	1	1	0	Stow unit #1 and #2 inside the temporary stowage bag
5	5	1	1	0	Transport bag to Mir

8. Data Processing:

1. No data processing required
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 890601 **Exp. ID:** RME 1320 **Russian ID:** RME

Invest. Title: Radiation Monitoring Equipment - III

Prime ☑
Contingent ☐

US PI: Golightly, Mike; Afinidad, Francis **Russian PI:** Petrov, Vladislav

1. Session ID: ISS:LOG:I:21

Session Type: Inflight

2. Session: Radiation Monitoring Equipment Transfer to Shuttle

3. Session Timeline: **Crewtime Usage (mins):** 17 **Session Time (mins):** 17

Scheduled Days: FD 7

4. Session Scenario:

The crewmember will detach radiation monitoring units from their Mir module location "D" and transport the units to the shuttle. All the radiation monitoring equipment will be returned to the middeck locker, with the two main units continuing to operate. The MCC-H will be notified of the transfer of equipment and subsequent stowage in the locker.

5. Session Constraints:

1. There are no Mir space station special conditions.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854803	Radiation Monitoring Equipment - III Main Module Unit #1	1
854804	Radiation Monitoring Equipment - III Main Module Unit #2	1
854805	Radiation Monitoring Equipment - III Memory Module	2
854806	Radiation Monitoring Equipment - III Mir Attachment Hardware	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
2	2	1	1	0	Retrieve all Radiatin Monitoring Equipment from Mir module location
2	2	1	1	0	Record MET & RAD/REM
10	10	1	1	0	Transfer all equipment to Shuttle
3	3	1	1	0	Stow all equipment in the middeck locker. Inform MCC-H of the transfer.

8. Data Processing:

1. No data processing is required.
2. Air to ground voice communication may be required in the event of a contingency situation.

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Investigation ID: 890621 **Experiment ID:** **Russian ID:** CREAM

Investigation Title: Cosmic Radiation and Effects Activation Monitor (CREAM)

US Investigators: Truscott, Peter

Russian Investigators: Petrov, Vladislav

Other Investigators: Golightly, Michael

Payload Category: ISS **Sub-Cat.:** ENV **Subjects Requested:**

Description: The Mir modules, and later the International Space Station, represent opportunities to explore new radiation environments in order to obtain data on different shielding levels and the effects of radiation on larger spacecraft. The Cosmic Radiation and Effects Activation Monitor (CREAM) measures the Linear Energy Transfer (LET) effects within silicon and provides information relevant to single event upsets on avionics equipment.

Science Objectives: The CREAM experiment has the following goals:

1. To monitor the energy disposition spectra in silicon due to primary and secondary radiation as a function of time, orbital location, and shielding.
2. To obtain collateral data on mission integrated dose, particle influences, and induced radioactivity.
3. To improve and test space environment and radiation shielding codes used to predict single event upset rates in electronics and background rates in sensors.

Functional Objectives:
1. Transfer to Mir after docking
2. Deployment
3. Activation in different Mir Modules
4. Deactivation
5. Transfer to Shuttle prior to undocking

Sample Transfer Rqd: Yes **Hardware Transfer Rqd:** Yes

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
6	STS 86 (SM-07)	9/18/97	☒	☒
7	STS 89 (SM-08)	1/15/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
ISS	ENV	Flight	855057	Passive Dosimetry Foil Package
ISS	ENV	Flight	855058	Passive Crystal Scintillation Canister
ISS	ENV	Flight	855059	Active Monitor
ISS	ENV	Flight	855060	DC Power Cable
OH			855343	DC Power Cable
ISS	ENV	Flight	855574	Passive Neutron Spectrometer

Mission: STS 86 (SM-07) **Invest. ID:** 890621 **Exp. ID:** **Russian ID:** CREAM

Invest. Title: Cosmic Radiation and Effects Activation Monitor (CREAM) **Prime** ☑ **Contingent** ☐

US PI: Truscott, Peter **Russian PI:** Petrov, Vladislav

1. Session ID: ISS:ENV:P:19

2. Session: CREAM Training: Fam and Hands-On **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 0 **Session Time (mins):** 120

Scheduled Days: L- 90

4. Session Scenario:

A familiarization briefing and a hands-on operations training session will be conducted. The familiarization briefing will describe the science objectives and the experiment components. The hands-on training will describe the deployment locations, the Active Monitor activation/deactivation, on-orbit operations, and contingency operations.

5. Session Constraints:

1. None

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
855055	Passive Dosimetry Foil Package Mockup	1
855056	Passive Neutron Spectrometer Mockup	1
855059	Active Monitor	1
855060	DC Power Cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	0	0	Familiarization training
60	0	0	0	0	Hands-on operations training

8. Data Processing:

1. N/A for preflight sessions.

Mission: STS 86 (SM-07) **Invest. ID:** 890621 **Exp. ID:** **Russian ID:** CREAM

Invest. Title: Cosmic Radiation and Effects Activation Monitor (CREAM) **Prime** ☑ **Contingent** ☐

US PI: Truscott, Peter **Russian PI:** Petrov, Vladislav

1. Session ID: ISS:ENV:I:43

Session Type: Inflight

2. Session: CREAM Deployment & Active Monitor Activation at Location #1

3. Session Timeline: **Crewtime Usage (mins):** 15 **Session Time (mins):** 15

Scheduled Days: FD 3

4. Session Scenario:

Upon arrival in Mir, remove power cable from transfer bag and connect to connector TBD of the Power Utilzation Panel (PUP) and the Active Monitor. Install Active Monitor on Velcro at Location #1. Turn Active Monitor ON, check status light ON, Record MET. The Active Monitor will remain at this location for approximately 24 hours.

Remove four foil packs from the transfer bag. Deploy the foil packs at the TBD locations, record MET. Mark station number on each foil pack decal. One foil pack, the spectrometer and the scintillation canister will remain in the transfer bag for the duration of the deployed timeline. Stow transfer bag at the TBD location. It is requested that the MCC-H be notified of component deployment.

5. Session Constraints:

1. The CREAM Active Monitor requires 6 Watts of power during the time the monitor is operating.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
855057	Passive Dosimetry Foil Package	4
855059	Active Monitor	1
855343	DC Power Cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Remove power cable from transfer bag and connect to PUP and to the Acitve Monitor
2	2	1	1	0	Deploy Active Monitor to Location #1 and activate unit
5	5	1	1	0	Remove four foil packs from transfer bag and deploy them to TBD locations. Mark location on each foil pack and record MET.
3	3	1	1	0	Stow the transfer bag containing the Neutron Spectrometer, Scintillation Canister, and one foil pack in TBD location.

8. Data Processing:

1. No data processing required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 890621 **Exp. ID:** **Russian ID:** CREAM

Invest. Title: Cosmic Radiation and Effects Activation Monitor (CREAM)

Prime ☑
Contingent ☐

US PI: Truscott, Peter **Russian PI:** Petrov, Vladislav

1. Session ID: ISS:ENV:I:44

Session Type: Inflight

2. Session: CREAM Active Monitor Move to Location #2

3. Session Timeline: **Crewtime Usage (mins):** 5 **Session Time (mins):** 5

Scheduled Days: FD 4

4. Session Scenario:

After approximately 24 hours of operation at Location #1, the Active Monitor will be moved to Location #2. The MET of the Active Monitor move must be recorded in the log and it is requested that the MCC-H be notified of the move.

5. Session Constraints:

1. The CREAM Active Monitor requires 6 Watts of power during the time the monitor is operating.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
855059	Active Monitor	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Move Active Monitor from Location #1 to Location #2. Record MET and notify MCC-H.

8. Data Processing:

1. No data processing required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 890621 **Exp. ID:** **Russian ID:** CREAM

Invest. Title: Cosmic Radiation and Effects Activation Monitor (CREAM)

Prime ☒
Contingent ☐

US PI: Truscott, Peter **Russian PI:** Petrov, Vladislav

1. Session ID: ISS:ENV:I:45

Session Type: Inflight

2. Session: CREAM Active Monitor Move to Location #3

3. Session Timeline: **Crewtime Usage (mins):** 5 **Session Time (mins):** 5

Scheduled Days: FD 6

4. Session Scenario:

After approximately 48 hours of operation at Location #2, the CREAM Active Monitor will be moved to Location #3. The MET of the move must be recorded in the log and it is requested that the MCC-H be notified of the move.

5. Session Constraints:

1. The CREAM Active Monitor requires 6 Watts of power during the time the monitor is operating.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
855059	Active Monitor	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Move Active Monitor from Location #2 to Location #3. Record MET and notify MCC-H.

8. Data Processing:

1. No data processing required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 890621 **Exp. ID:** **Russian ID:** CREAM

Invest. Title: Cosmic Radiation and Effects Activation Monitor (CREAM) **Prime** ☒ **Contingent** ☐

US PI: Truscott, Peter **Russian PI:** Petrov, Vladislav

1. Session ID: ISS:LOG:I:20

Session Type: Inflight

2. Session: CREAM Deactivation and Return to Shuttle

3. Session Timeline: **Crewtime Usage (mins):** 20 **Session Time (mins):** 20

Scheduled Days: FD 7

4. Session Scenario:

Prior to Shuttle undocking it will be neccessary to retrieve Active Monitor from Location #3 and deactivate the unit. Then retrieve the CREAM foil packs from their deployed locations and stow in the transfer bag. All CREAM components shall then be returned to a Shuttle locker.

5. Session Constraints:

1. None.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
855057	Passive Dosimetry Foil Package	5
855058	Passive Crystal Scintillation Canister	1
855059	Active Monitor	1
855060	DC Power Cable	1
855574	Passive Neutron Spectrometer	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
3	3	1	1	0	Retrieve Active Monitor form Location #3, deactivate the unit, and record MET.
2	2	1	1	0	Disconnect DC power cale from Active Monitor and from PUP. Stow Active Monitor and cable in transfer bag.
5	5	1	1	0	Remove four foil packs from deployed locations, record MET, and stow in transfer bag.
10	10	1	1	0	Record MET, stow in transfer bag. Transfer CREAM components to the Shuttle and stow

8. Data Processing:

1. No data processing required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Table of Contents

Life Support Risk Mitigation (LSRM)

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Investigation ID: 650015 **Experiment ID:** Mir (CHeCS 5) **Russian ID:** WQM

Investigation Title: Water Quality Monitor (WQM)

US Investigators: Sauer, Richard

Russian Investigators: Sinyak, Y. and Protasov, N.

Other Investigators:

Payload Category: LSR **Sub-Cat.:** CHS **Subjects Requested:** 0

Description: The Water Quality Monitor (WQM) consists of one instrument with associated supplies which measures total organic, total inorganic, and total carbons, conductivity and pH of samples. The WQM will fly up/down on STS-81 for testing on Shuttle. The WQM will be launched on STS-84 and transferred to Mir, then left on board Mir for NASA 5 and NASA 6. Archived water samples will be returned to earth for confirmation of on-orbit analysis results.

Science Objectives:

Functional Objectives:

Sample Transfer Rqd: Yes **Hardware Transfer Rqd:** Yes

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
3	NASA 3	9/16/96	☐	☒
4	STS 81 (SM-05)	1/16/97	☒	☒
5	Mir 24	6/24/97	☒	☒
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	Mir 25	12/12/97	☒	☒
6	NASA 6	9/18/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒
7	STS 89 (SM-08)	1/15/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
OPS	SHR	Flight	390043	Camcorder System (NASA)
SHR	SHR	Flight	840255	8mm Video Tape
HLS	SHR	Flight	846684	Thermo Electric Holding Facility (TEHOF)
ES	EO	Flight	847724	Nikon F3 Camera
ES	EO	Flight	847725	Nikon F4 Camera (Russian)
RME	CHS	Flight	848861	Total Organic Carbon (TOC) Analyzer
RME	CHS	Flight	848862	TOC Water Sampling Kit
RME	CHS	Flight	848863	TOC Stowage Kit
ISS	CHS	Flight	848864	TOC Water Sample Bag
ISS	CHS	Flight	848865	TOC RAM Card Assembly
ISS	CHS	Flight	848866	TOC Resupply Kit
MG	SHR		852166	8 mm Video Tape (minutes)
OPS	SHR		852167	35 mm film (frames)

Mission: Mir 24 **Invest. ID:** 650015 **Exp. ID:** Mir (CHeCS **Russian ID:** WQM

Invest. Title: Water Quality Monitor (WQM)

Prime ☒
Contingent ☐

US PI: Sauer, Richard **Russian PI:** Sinyak, Y. and Protasov, N.

1. Session ID: LSR:CHS:P:2

2. Session: Training for Inflight Total Organic Carbon Analysis of Water Samples

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 120

Scheduled Days: L- 90, 270

4. Session Scenario:

The crew will learn to set-up and operate the Total Organic Carbon Analyzer for performing on-orbit analyses of ground-prepared test samples and Mir water samples. Training for replacement of the TOC RAM Card Assembly, TOC waste container, and mixing of reagent will also be performed. The crew will also learn to install the Mir adapters, assemble the sampling hardware, and collect Mir water samples.

5. Session Constraints:

1. Preflight performance days have been estimated.
2. Train primary and alternate crewmembers
3. All sessions to be performed in U.S.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848858	Prototype TOC Analyzer	1
848859	TOC Water Sampling Kit	1
848860	TOC Stowage Kit	1
848865	TOC RAM Card Assembly	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	2	0	TOC Analyzer set-up/operation and water sample collection training session

8. Data Processing:

1. N/A for preflight sessions

Mission: NASA 5 **Invest. ID:** 650015 **Exp. ID:** Mir (CHeCS **Russian ID:** WQM

Invest. Title: Water Quality Monitor (WQM)

Prime ☑
Contingent ☐

US PI: Sauer, Richard **Russian PI:** Sinyak, Y. and Protasov, N.

1. Session ID: LSR:CHS:P:1

2. Session: Training for Inflight Total Organic Carbon Analysis of Water Samples

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: L- 90, 270

4. Session Scenario:

The crew will learn to set-up and operate the Total Organic Carbon Analyzer for performing on-orbit analyses of ground-prepared test samples and Mir water samples. Training for replacement of the TOC RAM Card Assembly, TOC waste container, and mixing of reagent will also be performed. The crew will also learn to install the Mir adapters, assemble the sampling hardware, and collect Mir water samples.

5. Session Constraints:

1. Preflight performance days have been estimated.
2. Train primary and back-up crewmembers
3. At least one session to be performed in U.S.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848858	Prototype TOC Analyzer	1
848859	TOC Water Sampling Kit	1
848860	TOC Stowage Kit	1
848865	TOC RAM Card Assembly	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	1	0	TOC Analyzer set-up/operation and water sample collection training session

8. Data Processing:

1. N/A for preflight sessions

Mission: STS 84 (SM-06) **Invest. ID:** 650015 **Exp. ID:** Mir (CHeCS **Russian ID:** WQM

Invest. Title: Water Quality Monitor (WQM) **Prime** ☒ **Contingent** ☐

US PI: Sauer, Richard **Russian PI:** Sinyak, Y. and Protasov, N.

1. Session ID: LSR:LOG:I:2

2. Session: Transfer Session - Water Quality Monitor Experiment **Session Type:** Up Item

3. Session Timeline: **Crewtime Usage (mins):** 20 **Session Time (mins):** 20

Scheduled Days: FD 4

4. Session Scenario:

The Water Quality Monitor experiment hardware is transferred from Shuttle to Mir and stowed for use during the NASA 5 and NASA 6 missions.

5. Session Constraints:

1. Hardware should be transferred to Mir as early as possible during STS 84 docked phase
2. It is desirable that the upgoing NASA long-duration astronaut perform this session
3. Exact performance day has been estimated

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848861	Total Organic Carbon (TOC) Analyzer	1
848862	TOC Water Sampling Kit	1
848863	TOC Stowage Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	20	1	1	0	Transfer Water Quality Monitor experiment hardware and stow

8. Data Processing:

1. No data downlink required
2. Air-to-ground communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 650015 **Exp. ID:** Mir (CHeCS **Russian ID:** WQM

Invest. Title: Water Quality Monitor (WQM)

Prime ☒
Contingent ☐

US PI: Sauer, Richard **Russian PI:** Sinyak, Y. and Protasov, N.

1. Session ID: LSR:CHS:I:13

Session Type: Inflight

2. Session: Reagent Mixing for TOC Analyzer

3. Session Timeline: **Crewtime Usage (mins):** 40 **Session Time (mins):** 30

Scheduled Days: FD 60

4. Session Scenario:

A fresh batch of reagent is mixed for the TOC Analyzer once the shelf life of the old batch of reagent has been exceeded.

5. Session Constraints:

1. To be performed approximately every 90 days.
2. Video of Reagent mixing is required for this first time activity on Mir.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
840255	8mm Video Tape	10
848861	Total Organic Carbon (TOC) Analyzer	1
848863	TOC Stowage Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Unstow TOC Stowage Kit and TOC Analyzer. Unstow Camcorder
5	5	1	2	0	Remove Lexan cover. Mix fresh batch of reagent. Replace cover and perform video.
5	5	1	2	0	Remove logbook from kit. Log activity in log book. Restow logbook in kit. Perform Video.
5	5	1	1	0	Restow kit and analyzer. Advise MCC upon completion.
5	5	1	1	0	Stow camcorder.

8. Data Processing:

1. No data downlink required.
2. Air-to-ground communication upon completion of activity and in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 650015 **Exp. ID:** Mir (CHeCS **Russian ID:** WQM

Invest. Title: Water Quality Monitor (WQM) **Prime** ☑ **Contingent** ☐

US PI: Sauer, Richard **Russian PI:** Sinyak, Y. and Protasov, N.

1. Session ID: LSR:CHS:I:21

2. Session: Mir Potable Water Collection and Inflight TOC Analysis **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 135 **Session Time (mins):** 195

Scheduled Days: FD 6, 129

4. Session Scenario:

Water samples are collected from the Mir galley hot and cold taps and from the SVO-ZV system (backup water supply) tap and analyzed inflight on Mir using the TOC Analyzer. Duplicate samples are also collected to return for post-mission comparative analysis. The TOC waste container is also replaced.

5. Session Constraints:

1. Undocked phase sessions to be conducted both mid-mission and as close as possible to Shuttle docking.
2. Docked phase session to be conducted as late as possible, but completed no later than 36 hours prior to undocking.
3. It is desirable for the upgoing NASA long-duration astronaut to perform the docked phase session.
4. Time allotted for each session includes two unattended 30 minute periods during sample analysis.
5. TOC water samples are to be stowed in shuttle for return. Preferred locations are: Freezer (acceptable), Refrigerator (highly desired), ambient (only if other two are not available).
6. Two photos are required for TOCA results display upon completion of each water sample analysis.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
846684	Thermo Electric Holding Facility (TEHOF)	1
847724	Nikon F3 Camera	1
848861	Total Organic Carbon (TOC) Analyzer	1
848862	TOC Water Sampling Kit	1
848863	TOC Stowage Kit	1
848864	TOC Water Sample Bag	3
852167	35 mm film (frames)	6

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Turn on galley heater. Unstow TOC stowage kit/power-up TOC Analyzer. Unstow Camera.
5	5	1	1	0	Unstow TOC Water Sampling Kit and install Potable Water Sample (SVO-ZV) at SVO-ZV system tap.
5	5	1	1	0	Attach waste bag to SVO-ZV system tap, collect 50 mL of water. Dispose waste bag with flush water.
10	10	1	1	0	At SVO-ZV tap, collect 25 mL of water in TOC water sample syringe and 200 ml in TOC water sample bag, Mark MET/location on sample bag.
5	5	1	1	0	Remove sampler, stow TOC water sample bag on Mir.
5	5	1	1	0	Attach filled sample syringe to TOC Analyzer, initiate analysis.
5	5	1	1	0	Install Potable Water Samplers (Hot/Cold) at galley hot and cold water taps.
10	10	1	1	0	Collect hot water: 50 mL in waste bag, 200 mL in sample bag, then 25 mL in sample syringe. Mark MET/location on sample bag. Dispose waste bag.
10	10	1	1	0	Collect cold water: 25 ml in sample syringe, 200 mL in sample bag. Mark MET/location on sample bag.

10	10	1	1	0	Remove samplers, stow sample bags in freezer and sampling kit on Mir.
5	5	1	1	0	Check TOC Analyzer, verify analysis is completed/no errors. Log sample MET/location & analysis results. Remove and stow sample syringe.
5	5	1	1	0	Photograph 2 frames of TOCA results display upon completion of analysis.
5	5	1	1	0	Attach hot water sample syringe to analyzer, set acid flowrate at control panel, and initiate analysis.
30	30	1	0	0	Break - Allow 30 min. for analysis.
5	5	1	1	0	Check analyzer to verify analysis completed/no errors. Log sample MET/location and analysis results. Remove and stow sample syringe
5	5	1	1	0	Photograph 2 frames of TOCA results display upon completion of analysis.
5	5	1	1	0	Attach cold water sample syringe to analyzer, and initiate analysis.
30	30	1	0	0	Break - Allow 30 min. for analysis.
5	5	1	1	0	Check analyzer to verify analysis completed/no errors. Log sample MET/location and analysis results. Remove and stow sample syringe
5	5	1	1	0	Photograph 2 frames of TOCS results display upon completion of analysis.
5	5	1	1	0	Unstow TOC Stowage Kit
5	5	1	1	0	Retrieve new TOC waste container from Kit, and replace waste container in TOC analyzer. Stow old container in kit.
10	10	1	1	0	Power-down/restow TOC Analyzerand TOC Stowage kit. Advise MCC of results.

8. Data Processing:

1. No data downlink required. Analysis results are logged and reported to MCC by air-to-ground communication at end of each session.
2. Air-to-ground communication may also be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 650015 **Exp. ID:** Mir (CHeCS **Russian ID:** WQM

Invest. Title: Water Quality Monitor (WQM) **Prime** ☑ **Contingent** ☐

US PI: Sauer, Richard **Russian PI:** Sinyak, Y. and Protasov, N.

1. Session ID: LSR:CHS:I:23

2. Session: Mir Potable Water Collection and Inflight TOC Analysis (Video Session) **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 150 **Session Time (mins):** 200

Scheduled Days: FD 75

4. Session Scenario:

Water samples are collected from the Mir galley hot and cold taps and from the SVO-ZV system (backup water supply) tap and analyzed inflight on Mir using the TOC Analyzer. Duplicate samples are also collected to return for post-mission comparative analysis. The TOC waste container is also replaced.

5. Session Constraints:

1. Undocked phase sessions to be conducted both mid-mission and as close as possible to Shuttle docking.
2. Docked phase session to be conducted as late as possible, but completed no later than 36 hours prior to undocking.
3. It is desirable for the upgoing NASA long-duration astronaut to perform the docked phase session.
4. Time allotted for each session includes two unattended 30 minute periods during sample analysis.
5. TOC water samples are to be stowed in shuttle for return. Preferred locations are: Freezer (acceptable), Refrigerator (highly desired), ambient (only if other two are not available).
6. Two photos are required for TOCA results display upon completion of each water sample analysis.
7. Video required of waste container reqplacement activity for first undocked session (FD 75).

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
846684	Thermo Electric Holding Facility (TEHOF)	1
847724	Nikon F3 Camera	1
848861	Total Organic Carbon (TOC) Analyzer	1
848862	TOC Water Sampling Kit	1
848863	TOC Stowage Kit	1
848864	TOC Water Sample Bag	3
852166	8 mm Video Tape (minutes)	10
852167	35 mm film (frames)	6

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Turn on galley heater. Unstow TOC stowage kit/power-up TOC Analyzer. Unstow Camera.
5	5	1	1	0	Unstow TOC Water Sampling Kit and install Potable Water Sample (SVO-ZV) at SVO-ZV system tap.
5	5	1	1	0	Attach waste bag to SVO-ZV system tap, collect 50 mL of water. Dispose waste bag with flush water.
10	10	1	1	0	At SVO-ZV tap, collect 25 mL of water in TOC water sample syringe and 200 ml in TOC water sample bag, Mark MET/location on sample bag.
5	5	1	1	0	Remove sampler, stow TOC water sample bag on Mir.
5	5	1	1	0	Attach filled sample syringe to TOC Analyzer, initiate analysis.
5	5	1	1	0	Install Potable Water Samplers (Hot/Cold) at galley hot and cold water taps.

10	10	1	1	0	Collect hot water: 50 mL in waste bag, 200 mL in sample bag, then 25 mL in sample syringe. Mark MET/location on sample bag. Dispose waste bag.
10	10	1	1	0	Collect cold water: 25 ml in sample syringe, 200 mL in sample bag. Mark MET/location on sample bag.
10	10	1	1	0	Remove samplers, stow sample bags in freezer and sampling kit on Mir.
5	5	1	1	0	Check TOC Analyzer, verify analysis is completed/no errors. Log sample MET/location & analysis results. Remove and stow sample syringe.
5	5	1	1	0	Photograph 2 frames of TOCA results display upon completion of analysis.
5	5	1	1	0	Attach hot water sample syringe to analyzer, set acid flowrate at control panel, and initiate analysis.
30	30	1	0	0	Break - Allow 30 min. for analysis.
5	5	1	1	0	Check analyzer to verify analysis completed/no errors. Log sample MET/location and analysis results. Remove and stow sample syringe
5	5	1	1	0	Photograph 2 frames of TOCA results display upon completion of analysis.
5	5	1	1	0	Attach cold water sample syringe to analyzer, and initiate analysis.
30	30	1	0	0	Break - Allow 30 min. for analysis.
5	5	1	1	0	Check analyzer to verify analysis completed/no errors. Log sample MET/location and analysis results. Remove and stow sample syringe
5	5	1	1	0	Photograph 2 frames of TOCS results display upon completion of analysis.
5	5	1	1	0	Unstow camcorder.
5	5	1	2	0	Unstow TOC Stowage Kit and perform video.
5	5	1	2	0	Retrieve new TOC waste container from Kit, and replace waste container in TOC analyzer. Stow old container in kit. Perform video of this step.
10	10	1	1	0	Power-down/restow TOC Analyzerand TOC Stowage kit. Advise MCC of results. Stow camcorder and camera.

8. Data Processing:

1. No data downlink required. Analysis results are logged and reported to MCC by air-to-ground communication at end of each session.
2. Air-to-ground communication may also be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 650015 **Exp. ID:** Mir (CHeCS **Russian ID:** WQM

Invest. Title: Water Quality Monitor (WQM) **Prime** ☒ **Contingent** ☐

US PI: Sauer, Richard **Russian PI:** Sinyak, Y. and Protasov, N.

1. Session ID: LSR:CHS:I:8

2. Session: Inflight TOC Analysis of Ground-Prepared Test Samples on Mir **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 65 **Session Time (mins):** 125

Scheduled Days: FD 5, 35, 70, 105, 125

4. Session Scenario:

Ground-prepared TOC test samples are analyzed inflight on Mir

5. Session Constraints:

1. Sessions may be conducted +/- 3 days from scheduled days.
2. Time allotted for each session includes two unattended 30 minute periods during test sample analysis
3. Upgoing NASA long duration astronaut shall perform docked phase session.
4. Two photos are required for TOCA results display upon completion of each test sample analysis.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
847725	Nikon F4 Camera (Russian)	1
848861	Total Organic Carbon (TOC) Analyzer	1
848863	TOC Stowage Kit	1
852167	35 mm film (frames)	4

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow camera.
5	5	1	1	0	Unstow TOC Stowage Kit.
5	5	1	1	0	Unstow and power-up TOC Analyzer.
5	5	1	1	0	Attach TOC test sample syringe to analyzer, and initiate analysis.
30	30	1	0	0	Break - Allow 30 min. for analysis
5	5	1	1	0	After 30 min., verify analysis completed/no errors. Log sample syringe number and analysis resutls. Remove syringe and stow.
5	5	1	1	0	Photograph 2 frames of TOCA results display upon completion of analysis.
5	5	1	1	0	Attach another test sample syringe to analyzer, and initiate analysis.
30	30	1	0	0	Break - Allow 30 min. for analysis.
5	5	1	1	0	After 30 min., verify analysis completed/no errors. Log sample syringe number and analysis results. Remove syringe and stow.
5	5	1	1	0	Photograph 2 frames of TOCA results display upon completion of analysis.
5	5	1	1	0	Restow TOC Stowage Kit.
10	10	1	1	0	Power down/restow analyzer on Mir. Advise MCC of results.
5	5	1	1	0	Stow camera.

8. Data Processing:

1. No data downlink required
2. Air-to-ground communication may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 650015 **Exp. ID:** Mir (CHeCS **Russian ID:** WQM

Invest. Title: Water Quality Monitor (WQM)

Prime ☒
Contingent ☐

US PI: Sauer, Richard **Russian PI:** Sinyak, Y. and Protasov, N.

1. Session ID: LSR:LOG:I:3

Session Type: Down Item

2. Session: Transfer Session - Water Quality Monitor experiment TOC RAM Data Card and Mir water samples from Mir to Shuttle

3. Session Timeline: **Crewtime Usage (mins):** 15 **Session Time (mins):** 15

Scheduled Days: FD 6

4. Session Scenario:
Water samples are transferred to the Shuttle freezer for return (Order of preferene: Freezer, refrigerator, ambient). TOC RAM Card Assembly is transferred from Mir to Shuttle.

5. Session Constraints:
1. Transfer should be done late during the Shuttle docked phase immediately after Mir water sample collection and inflight TOC analyses have been completed.
2. To be performed immediately after replacement of the TOC RAM Card Assembly (Session LSR:CHS:I:4)
3. To be performed by NASA 5 astronaut.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848864	TOC Water Sample Bag	8
848865	TOC RAM Card Assembly	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	1	0	Transfer Water Quality Monitor experiment Mir water samples to Shuttle freezer and TOC RAM Card Assembly from Mir to Shuttle and stowed for return

8. Data Processing:
1. No data downlink required
2. Air-to-ground communication may be required in the event of a contingency situation.

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Investigation ID: 890036 **Experiment ID:** LIFSUP-VRA **Russian ID:** VRA

Investigation Title: Volatile Removal Assembly (VRA)

US Investigators: Holder, Donald

Russian Investigators: N/A

Other Investigators: TBD

Payload Category: LSR **Sub-Cat.:** TD **Subjects Requested:**

Description: The VRA flight experiment is an International Space Station risk mitigation experiment. The VRA is a catalytic oxidation-based water treatment process to be used for the recovery of water from wastewater aboard the U.S. segment of the ISS. Central to the VRA is a catalytic oxidation reactor in which trace organic contaminants are reacted with oxygen in the presence of a cold catalyst. The oxidation reaction takes place at approximately 275 degrees F. Heat exchangers provide energy recovery between the reactor's influent and effluent streams. A membrane-based phase separator removes excess oxygen and by-product carbon dioxide from the reactor effluent. Ionic by-products are removed by an ion exchange polishing bed. Oxygen is delivered to the reactor from an oxygen storage tank provided with the experiment. The VRA flight experiment includes a full-scale VRA reactor interfaced to flight support accessories such as tanks, pumps, valves, and plumbing required for its stand-alone operation. A controller, with a Payload General Support Computer (PGSC) interface, is also included.

Science Objectives: The VRA flight experiment will be conducted to assess the operability and performance of the VRA process in microgravity. On-line data will be collected during normal steady-state operation. Water samples collected by the crew will be analyzed on the ground to supplement on-orbit data.

Functional Objectives:
1. VRA Activation
2. VRA Water Sample Collection and Sight Glass Observation
3. VRA De-activation

Sample Transfer Rqd: Yes **Hardware Transfer Rqd:** Yes

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
5	STS 84 (SM-06)	5/15/97	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
ES	EO	Training	840380	Payload General Support Computer (PGSC)
ISS	TD	Flight	848825	Volatile Removal Assembly (VRA)
ISS	TD	Flight	848826	VRA Sample Containers
OPS		Flight	848847	Refrigerator (SPACEHAB)

Mission: STS 84 (SM-06) **Invest. ID:** 890036 **Exp. ID:** LIFSUP-VR **Russian ID:** VRA

Invest. Title: Volatile Removal Assembly (VRA) **Prime** ☑ **Contingent** ☐

US PI: Holder, Donald **Russian PI:** N/A

1. Session ID: LSR:TD:I:15

2. Session: Activate Chemical Marker Test **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 1 **Session Time (mins):** 1

Scheduled Days: FD 5

4. Session Scenario:

Activate Chemical Marker Test by opening chemical marker handvalve and turning chemical marker activation switch to "on" position.

5. Session Constraints:

1. Chemical Marker Test should be performed approximately one hour before experiment shutdown.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
1	1	1	1	0	Open chemical marker handvalve and turn chemical marker activation switch to "on" position

8. Data Processing:

1. Data downlink is required to confirm correct VRA experiment operations.
2. Air-to-ground voice communication will be required to note that the chemical marker test has been activated.

Mission: STS 84 (SM-06) **Invest. ID:** 890036 **Exp. ID:** LIFSUP-VR **Russian ID:** VRA

Invest. Title: Volatile Removal Assembly (VRA)

Prime ☑
Contingent ☐

US PI: Holder, Donald **Russian PI:** N/A

1. Session ID: LSR:TD:I:4

Session Type: Inflight

2. Session: VRA Activation

3. Session Timeline: **Crewtime Usage (mins):** 20 **Session Time (mins):** 20

Scheduled Days: FD 2

4. Session Scenario:

Unstow the Payload General Support Computer (PGSC) and connect to VRA flight experiment. Activate experiment by turning power switch on, initiating automated test sequence via PGSC, allow VRA to heat for 60 minutes prior to performing a visual confirmation of correct experiment startup via observation of data displayed on PGSC screen, and open the oxygen valve.

5. Session Constraints:

None.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840380	Payload General Support Computer (PGSC)	1
848825	Volatile Removal Assembly (VRA)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Un-stow PGSC and connect to VRA flight experiment
5	5	1	1	0	Activate experiment by turning power switch on
2	2	1	1	0	Initiate automated test sequence using the PGSC
0	0	1	0	0	BREAK for maximum of 4 hours
3	3	1	1	0	Observe PGSC data display screen, open oxygen valve, confirm correct experiment startup
5	5	1	1	0	Disconnect PGSC from VRA and stow

8. Data Processing:

1. Data downlink is required to confirm correct VRA experiment activation.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: STS 84 (SM-06) **Invest. ID:** 890036 **Exp. ID:** LIFSUP-VR **Russian ID:** VRA

Invest. Title: Volatile Removal Assembly (VRA)

Prime ☒
Contingent ☐

US PI: Holder, Donald **Russian PI:** N/A

1. Session ID: LSR:TD:I:5

2. Session: VRA Water Sample Collection and Sight Glass Observation

Session Type: Inflight

3. Session Timeline: **Crewtime Usage (mins):** 75 **Session Time (mins):** 975

Scheduled Days: FD 2, 3, 4, 5

4. Session Scenario:

Observe air/water separator effluent sight-glass to see if bubbles are present. Record observations. Water samples are collected from two sample ports in series, starting with the ion exchange bed influent and working up-stream to the reactor influent.

5. Session Constraints:

1. This session is to be conducted three times per flight day and must be conducted while the VRA is in Process Mode.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848825	Volatile Removal Assembly (VRA)	1
848826	VRA Sample Containers	12
848847	Refrigerator (SPACEHAB)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	1. Observe sight glass and record observations in crewmember logbook
5	5	1	1	0	2. Un-stow water sample containers
1	1	1	1	0	3. Flush/purge ion exchange bed influent sample ports and attach sample containers to sample ports
3	3	1	1	0	4. Open sample valves and collect 40 ml samples in series, beginning with ion exchange bed effluent and working upstream to VRA influent
1	1	1	1	0	5. Close sample valves, remove sample containers
5	5	1	1	0	6. Repeat steps 3-5 for reactor influent sample port
5	5	1	1	0	7. Label and stow sample containers in refrigerator
450	450	1	0	0	BREAK (crewmembers can participate in other Shuttle operations
25	25	1	1	0	8. Repeat above steps 1-6
450	450	1	0	0	BREAK (crewmembers can participate in other Shuttle operations)
25	25	1	1	0	9. Repeat above steps 1-6

8. Data Processing:

1. Data downlink is required to confirm correct VRA experiment operation.
2. Air-to-ground voice communication will be required to note that the samples are collected and to convey sightglass observations.
3. Sight glass observations recorded in crewmember logbook.

Mission: STS 84 (SM-06) **Invest. ID:** 890036 **Exp. ID:** LIFSUP-VR **Russian ID:** VRA

Invest. Title: Volatile Removal Assembly (VRA)

Prime ☒
Contingent ☐

US PI: Holder, Donald **Russian PI:** N/A

1. Session ID: LSR:TD:I:6

Session Type: Inflight

2. Session: VRA De-activation

3. Session Timeline: **Crewtime Usage (mins):** 20 **Session Time (mins):** 20

Scheduled Days: FD 5

4. Session Scenario:

Un-stow the Payload General Support Computer (PGSC) and connect to VRA flight experiment. De-activate experiment by initiating automated shutdown sequence via PGSC, visual confirmation of correct experiment shutdown via observation of data displayed on PGSC screen, and turning power switch off.

5. Session Constraints:

None

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840380	Payload General Support Computer (PGSC)	1
848825	Volatile Removal Assembly (VRA)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Un-stow PGSC and connect to VRA flight experiment
5	5	1	1	0	Deactivate VRA by closing oxygen valve and initiating automated shutdown sequence via PGSC
5	5	1	1	0	Confirm visually correct experiment shutdown via data displayed on PGSC and turn off power switch
5	5	1	1	0	Disconnect PGSC from VRA and stow

8. Data Processing:

1. Data downlink is required to confirm correct VRA experiment deactivation.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

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Investigation ID: 750029 **Experiment ID:** MIM **Russian ID:** MIM Facility

Investigation Title: Microgravity Isolation Mount (MIM) Facility Operations

US Investigators: Trygvasson, Bjarni

Russian Investigators: N/A

Other Investigators: N/A

Payload Category: MG **Sub-Cat.:** FAC **Subjects Requested:** 0

Description: This operation includes the sessions necessary to set up the MIM facility, prepare it for experiment operations, and deactivate it after experiment ops are complete.

Science Objectives: See MIM investigation entries.

Functional Objectives: See sessions.

Sample Transfer Rqd: No **Hardware Transfer Rqd:** No

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
2	Mir 21	2/21/96	☒	☒
2	NASA 2	3/22/96	☒	☒
3	Mir 22	8/17/96	☒	☒
3	NASA 3	9/16/96	☒	☒
4	Mir 23	2/2/97	☒	☒
4	NASA 4	1/16/97	☒	☒
5	Mir 24	6/24/97	☒	☒
5	NASA 5	5/15/97	☒	☒
6	Mir 25	12/12/97	☒	☒
6	NASA 6	9/18/97	☒	☒
7	Mir 26	5/30/98	☒	☒
7	NASA 7	1/15/98	☒	☒
7	STS 89 (SM-08)	1/15/98	☒	☒
7	STS 91 (SM-09)	5/29/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
MG	FAC	Flight	160007	Microgravity Isolation Mount System (MIM)

Mission: Mir 24 **Invest. ID:** 750029 **Exp. ID:** MIM **Russian ID:** MIM Faci

Invest. Title: Microgravity Isolation Mount (MIM) Facility Operations

Prime ☒
Contingent ☐

US PI: Trygvasson, Bjarni **Russian PI:** N/A

1. Session ID: MG:FAC:P:1

2. Session: MIM Science Background, Operating Principles, and Hardware Overview

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: L- 97

4. Session Scenario:

An overview of MIM science objectives and background is covered. MIM operating principles, mechanical systems design, power configuration, and electronic and software systems are introduced. Data storage and archiving are also covered.

5. Session Constraints:

1. Session will take place in the classroom.
2. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840393	Microgravity Isolation Mount (MIM) Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
180	180	1	1	0	Classroom instruction

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: Mir 24 **Invest. ID:** 750029 **Exp. ID:** MIM **Russian ID:** MIM Faci

Invest. Title: Microgravity Isolation Mount (MIM) Facility Operations

Prime ☒
Contingent ☐

US PI: Trygvasson, Bjarni **Russian PI:** N/A

1. Session ID: MG:FAC:P:3

Session Type: Training

2. Session: MIM Nominal Operations

3. Session Timeline: **Crewtime Usage (mins):** 390 **Session Time (mins):** 390

Scheduled Days: L- 94, 95

4. Session Scenario:

MIM activation, operating modes, power configurations and consumptions are practiced and reviewed. MIM disk cleaning, data recording, downlink, and data transfer to MIPS as well as deactivation, and stowage are also covered.

5. Session Constraints:

1. Session to be conducted with the training hardware.
2. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840393	Microgravity Isolation Mount (MIM) Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
390	390	1	1	0	Hands-on training

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: Mir 24 **Invest. ID:** 750029 **Exp. ID:** MIM **Russian ID:** MIM Faci

Invest. Title: Microgravity Isolation Mount (MIM) Facility Operations

Prime ☒
Contingent ☐

US PI: Trygvasson, Bjarni **Russian PI:** N/A

1. Session ID: MG:FAC:P:4

2. Session: MIM Contingency Operations

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 285 **Session Time (mins):** 285

Scheduled Days: L- 90, 93

4. Session Scenario:

MIM power configurations, loading of default configuration files, and software reload procedures are practiced & reviewed. Direct experiment ops using the MIM RS-232 and DOS operations on the MIM are also covered.

5. Session Constraints:

1. Session to be conducted using the training hardware.
2. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840393	Microgravity Isolation Mount (MIM) Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
285	285	1	1	0	Hands-on training

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: Mir 24 **Invest. ID:** 750029 **Exp. ID:** MIM **Russian ID:** MIM Faci

Invest. Title: Microgravity Isolation Mount (MIM) Facility Operations

Prime ☒
Contingent ☐

US PI: Trygvasson, Bjarni **Russian PI:** N/A

1. Session ID: MG:FAC:P:6

Session Type: Training

2. Session: MIM Malfunction Procedures

3. Session Timeline: **Crewtime Usage (mins):** 300 **Session Time (mins):** 300

Scheduled Days: L- 89

4. Session Scenario:

MIM power diagnostics and soft spring installation are demonstrated. Auxilliary control unit, hard disk drive, and fan replacement are practiced and reviewed.

5. Session Constraints:

1. Session to be conducted using the training hardware.
2. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840393	Microgravity Isolation Mount (MIM) Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
300	300	1	1	0	Hands-on training

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: Mir 24 **Invest. ID:** 750029 **Exp. ID:** MIM **Russian ID:** MIM Faci

Invest. Title: Microgravity Isolation Mount (MIM) Facility Operations **Prime** ☒ **Contingent** ☐

US PI: Trygvasson, Bjarni **Russian PI:** N/A

1. Session ID: MG:FAC:P:7

2. Session: MIM Proficiency Training **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: L- 60

4. Session Scenario:

Crew proficiency and familiarity with specific MIM experiment operations is developed. MIM facility ops are combined with MIM experiment ops.

5. Session Constraints:

1. Session to be conducted using the training hardware.
2. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840393	Microgravity Isolation Mount (MIM) Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
180	180	1	1	0	Hands-on training

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 750029 **Exp. ID:** MIM **Russian ID:** MIM Faci

Invest. Title: Microgravity Isolation Mount (MIM) Facility Operations

Prime ☒
Contingent ☐

US PI: Trygvasson, Bjarni **Russian PI:** N/A

1. Session ID: MG:FAC:P:1

Session Type: Training

2. Session: MIM Science Background, Operating Principles, and Hardware Overview

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: L- 97

4. Session Scenario:

An overview of MIM science objectives and background is covered. MIM operating principles, mechanical systems design, power configuration, and electronic and software systems are introduced. Data storage and archiving are also covered.

5. Session Constraints:

1. Session will take place in the classroom.
2. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840393	Microgravity Isolation Mount (MIM) Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
180	180	1	1	0	Classroom instruction

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 750029 **Exp. ID:** MIM **Russian ID:** MIM Faci

Invest. Title: Microgravity Isolation Mount (MIM) Facility Operations **Prime** ☒ **Contingent** ☐

US PI: Trygvasson, Bjarni **Russian PI:** N/A

1. Session ID: MG:FAC:P:3

2. Session: MIM Nominal Operations **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 390 **Session Time (mins):** 390

Scheduled Days: L- 94, 95

4. Session Scenario:

MIM activation, operating modes, power configurations and consumptions are practiced and reviewed. MIM disk cleaning, data recording, downlink, and data transfer to MIPS as well as deactivation, and stowage are also covered.

5. Session Constraints:

1. Session to be conducted with the training hardware.
2. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840393	Microgravity Isolation Mount (MIM) Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
390	390	1	1	0	Hands-on training

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 750029 **Exp. ID:** MIM **Russian ID:** MIM Faci

Invest. Title: Microgravity Isolation Mount (MIM) Facility Operations

Prime ☒
Contingent ☐

US PI: Trygvasson, Bjarni **Russian PI:** N/A

1. Session ID: MG:FAC:P:4

Session Type: Training

2. Session: MIM Contingency Operations

3. Session Timeline: **Crewtime Usage (mins):** 285 **Session Time (mins):** 285

Scheduled Days: L- 90, 93

4. Session Scenario:
MIM power configurations, loading of default configuration files, and software reload procedures are practiced & reviewed. Direct experiment ops using the MIM RS-232 and DOS operations on the MIM are also covered.

5. Session Constraints:
1. Session to be conducted using the training hardware.
2. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840393	Microgravity Isolation Mount (MIM) Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
285	285	1	1	0	Hands-on training

8. Data Processing:
1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 750029 **Exp. ID:** MIM **Russian ID:** MIM Faci

Invest. Title: Microgravity Isolation Mount (MIM) Facility Operations **Prime** ☒ **Contingent** ☐

US PI: Trygvasson, Bjarni **Russian PI:** N/A

1. Session ID: MG:FAC:P:6

2. Session: MIM Malfunction Procedures **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 300 **Session Time (mins):** 300

Scheduled Days: L- 89

4. Session Scenario:

MIM power diagnostics and soft spring installation are demonstrated. Auxilliary control unit, hard disk drive, and fan replacement are practiced and reviewed.

5. Session Constraints:

1. Session to be conducted using the training hardware.
2. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840393	Microgravity Isolation Mount (MIM) Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
300	300	1	1	0	Hands-on training

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 750029 **Exp. ID:** MIM **Russian ID:** MIM Faci

Invest. Title: Microgravity Isolation Mount (MIM) Facility Operations

Prime ☒
Contingent ☐

US PI: Trygvasson, Bjarni **Russian PI:** N/A

1. Session ID: MG:FAC:P:7

Session Type: Training

2. Session: MIM Proficiency Training

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: L- 60

4. Session Scenario:

Crew proficiency and familiarity with specific MIM experiment operations is developed. MIM facility ops are combined with MIM experiment ops.

5. Session Constraints:

1. Session to be conducted using the training hardware.
2. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840393	Microgravity Isolation Mount (MIM) Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
180	180	1	1	0	Hands-on training

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 750029 **Exp. ID:** MIM **Russian ID:** MIM Faci

Invest. Title: Microgravity Isolation Mount (MIM) Facility Operations **Prime** ☒ **Contingent** ☐

US PI: Trygvasson, Bjarni **Russian PI:** N/A

1. Session ID: MG:FAC:I:36

Session Type: Inflight

2. Session: MIM Health and Status Check

3. Session Timeline: **Crewtime Usage (mins):** 20 **Session Time (mins):** 20

Scheduled Days: FD 69, 99, 129

4. Session Scenario:

The MIM is powered up and a health status check is performed.

5. Session Constraints:

1. If MIM is being used for experiment operations during the scheduled flight day, this session does not have to be performed.
2. This session may be performed +/- 2 days from scheduled days.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160007	Microgravity Isolation Mount System (MIM)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	20	1	1	0	Perform MIM health and status check.

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency.

Investigation ID: 750030 **Experiment ID:** MGBX **Russian ID:** Glovebox Facility

Investigation Title: Microgravity Glovebox (MGBX) Facility Operations

US Investigators: Reiss, Don

Russian Investigators: N/A

Other Investigators: N/A

Payload Category: MG **Sub-Cat.:** FAC **Subjects Requested:** 0

Description: The MGBX facility provides a clean and sealed work cabinet for the preparation and performance of experiments within the laboratory environment of the Priroda module. Experiments are inserted into the unit and manipulated by gloved crewmembers. The MGBX will be used to prevent experiment materials from entering the module atmosphere and to provide basic services to experiments that will be provided by independent investigators. The basic services supplied by the MGBX Facility to the experimenters are: electrical power, lighting, data recording, viewing (by crew), video recording, cooling, small item(s) stowage, airlock passthrough, air circulation, filtering, and gas sensing. The MGBX provides the capability to perform a variety of experiments including but not limited to fluid experiments, material experiments, and other experiments and demonstrations.

The MGBX is capable of keeping the MGBX work area at a negative pressure with reference to the ambient atmosphere. The air flowing through the work area will be suitably filtered before it is returned to the crew work environment. Additionally, the MGBX provides suitable internal instrumentation to monitor temperature, pressure, humidity and gases as appropriate.

Science Objectives:
1. To provide a level of containment by providing a physical barrier between the MGBX working area and the ambient environment
2. To maintain a negative pressure within the working area during normal operations
3. To provide a working area in which to perform experiments with a window for viewing the experiments.
4. To store data on orbit to support experiment correlation with environmental status during operation of the experiments.

Functional Objectives:
1. Set-up, activate, and check out the facility
2. Use the facility in conjunction with normal experiment operations

Sample Transfer Rqd: No **Hardware Transfer Rqd:** Yes

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
2	Mir 21	2/21/96	☒	☒
2	NASA 2	3/22/96	☒	☒
2	STS 76 (SM-03)	3/22/96	☒	☒
3	Mir 22	8/17/96	☒	☒
3	NASA 3	9/16/96	☒	☒
3	STS 79 (SM-04)	9/16/96	☒	☒
4	Mir 23	2/2/97	☒	☒
4	NASA 4	1/16/97	☒	☒
4	STS 81 (SM-05)	1/16/97	☒	☒
5	Mir 24	6/24/97	☒	☒
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	Mir 25	12/12/97	☒	☒
6	NASA 6	9/18/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒
7	Mir 26	5/30/98	☒	☒
7	NASA 7	1/15/98	☒	☒
7	STS 89 (SM-08)	1/15/98	☒	☒
7	STS 91 (SM-09)	5/29/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
MG	FAC	Flight	160006	Microgravity Glovebox System
MG	FAC	Flight	820251	Microgravity Glovebox System Stowage

Mission: Mir 24 **Invest. ID:** 750030 **Exp. ID:** MGBX **Russian ID:** Glovebox

Invest. Title: Microgravity Glovebox (MGBX) Facility Operations

Prime ☒
Contingent ☐

US PI: Reiss, Don **Russian PI:** N/A

1. Session ID: MG:FAC:P:44

2. Session: MGBX Overview and Operations Familiarization

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 240

4. Session Scenario:

Session consists of a general discussion of science background and objectives, MGBX experiment timeline, equipment operation and malfunction procedures, and hardware descriptions. MGBX system and equipment components are described (including hardware illustrations/pictures) along with nominal facility ops from initial on-orbit acitivites to system deactivation. Upon completion of the session, the crewmember will be familiar with MGBX operating procedures, the hardware components and their functions, and the operation of the MGBX. The crewmember will also be familiar with equipment malfunction procedures.

5. Session Constraints:

1. Session will take place in the classroom.
2. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840396	Microgravity Glovebox (MGBX) Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	60	1	1	0	Classroom instruction

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: Mir 24 **Invest. ID:** 750030 **Exp. ID:** MGBX **Russian ID:** Glovebox

Invest. Title: Microgravity Glovebox (MGBX) Facility Operations

Prime ☑
Contingent ☐

US PI: Reiss, Don **Russian PI:** N/A

1. Session ID: MG:FAC:P:45

2. Session: MGBX Proficiency

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: L- 130

4. Session Scenario:

Crewmember will perform hands-on MGBX nominal, contingency, and malfunction procedures and have the opportunity to reinforce the knowledge gained from earlier training sessions. Upon completion of this training, the crewmember will be familiar with all aspects of the MGBX and its operation and will be able to describe all nominal and off-nominal functions. The crewmember will be able to recognize all MGBX malfunctions and apply the appropriate malfunction procedure for each situation.

5. Session Constraints:

1. Crewmember may request additional proficiency training.
2. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840396	Microgravity Glovebox (MGBX) Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	120	1	1	0	Hands-on training

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: Mir 24 **Invest. ID:** 750030 **Exp. ID:** MGBX **Russian ID:** Glovebox

Invest. Title: Microgravity Glovebox (MGBX) Facility Operations

Prime ☑
Contingent ☐

US PI: Reiss, Don **Russian PI:** N/A

1. Session ID: MG:FAC:P:48

2. Session: MGBX Equipment Nominal and Malfunction Operations

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: L- 240

4. Session Scenario:

Equipment operations is reviewed and any questions concerning operations clarified. Crewmember will perform a complete set of nominal and malfunction procedures and have the opportunity to review off-nominal operations. Upon completion of the session, the crewmember will be able to describe all nominal and off-nominal operation functions associated with the MGBX. The crewmember will be able to recognize all MGBX malfunctions and apply the appropriate malfunction procedure for each situation.

5. Session Constraints:

1. Session to be conducted with the training hardware.
2. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840396	Microgravity Glovebox (MGBX) Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
180	180	1	1	0	Hands-on training

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 750030 **Exp. ID:** MGBX **Russian ID:** Glovebox

Invest. Title: Microgravity Glovebox (MGBX) Facility Operations

Prime ☒
Contingent ☐

US PI: Reiss, Don **Russian PI:** N/A

1. Session ID: MG:FAC:P:44

2. Session: MGBX Overview and Operations Familiarization

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 240

4. Session Scenario:

Session consists of a general discussion of science background and objectives, MGBX experiment timeline, equipment operation and malfunction procedures, and hardware descriptions. MGBX system and equipment components are described (including hardware illustrations/pictures) along with nominal facility ops from initial on-orbit acitivites to system deactivation. Upon completion of the session, the crewmember will be familiar with MGBX operating procedures, the hardware components and their functions, and the operation of the MGBX. The crewmember will also be familiar with equipment malfunction procedures.

5. Session Constraints:

1. Session will take place in the classroom.
2. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840396	Microgravity Glovebox (MGBX) Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	60	1	1	0	Classroom instruction

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 750030 **Exp. ID:** MGBX **Russian ID:** Glovebox

Invest. Title: Microgravity Glovebox (MGBX) Facility Operations **Prime** ☑ **Contingent** ☐

US PI: Reiss, Don **Russian PI:** N/A

1. Session ID: MG:FAC:P:46

2. Session: MGBX Proficiency **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: L- 130

4. Session Scenario:

Crewmember will perform hands-on MGBX nominal, contingency, and malfunction procedures and have the opportunity to reinforce the knowledge gained from earlier training sessions. Upon completion of this training, the crewmember will be familiar with all aspects of the MGBX and its operation and will be able to describe all nominal and off-nominal functions. The crewmember will be able to recognize all MGBX malfunctions and apply the appropriate malfunction procedure for each situation.

5. Session Constraints:

1. Crewmember may request additional proficiency training.
2. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840396	Microgravity Glovebox (MGBX) Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
180	180	1	1	0	Hands-on training

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 750030 **Exp. ID:** MGBX **Russian ID:** Glovebox

Invest. Title: Microgravity Glovebox (MGBX) Facility Operations

Prime ☒
Contingent ☐

US PI: Reiss, Don **Russian PI:** N/A

1. Session ID: MG:FAC:P:49

Session Type: Training

2. Session: MGBX Equipment Nominal and Malfunction Operations

3. Session Timeline: **Crewtime Usage (mins):** 300 **Session Time (mins):** 300

Scheduled Days: L- 240

4. Session Scenario:

Equipment operations is reviewed and any questions concerning operations clarified. Crewmember will perform a complete set of nominal and malfunction procedures and have the opportunity to review off-nominal operations. Upon completion of the session, the crewmember will be able to describe all nominal and off-nominal operation functions associated with the MGBX. The crewmember will be able to recognize all MGBX malfunctions and apply the appropriate malfunction procedure for each situation.

5. Session Constraints:

1. Session to be conducted with the training hardware.
2. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840396	Microgravity Glovebox (MGBX) Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
300	300	1	1	0	Hands-on training

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: STS 84 (SM-06) **Invest. ID:** 750030 **Exp. ID:** MGBX **Russian ID:** Glovebox

Invest. Title: Microgravity Glovebox (MGBX) Facility Operations **Prime** ☒ **Contingent** ☐

US PI: Reiss, Don **Russian PI:** N/A

1. Session ID: MG:LOG:I:46

Session Type: Up Item

2. Session: MGBX Stowage Transfer from Shuttle to Mir

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 4

4. Session Scenario:

MGBX facility maintenance resupply items transferred from the Shuttle to the Mir.

5. Session Constraints:

1. None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820251	Microgravity Glovebox System Stowage	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	30	1	1	0	Transfer MGBX stowage items from Shuttle to Mir

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 750030 **Exp. ID:** MGBX **Russian ID:** Glovebox

Invest. Title: Microgravity Glovebox (MGBX) Facility Operations

Prime ☒
Contingent ☐

US PI: Reiss, Don **Russian PI:** N/A

1. Session ID: MG:FAC:I:9

Session Type: Inflight

2. Session: MGBX Facility Checkout and Conditioning

3. Session Timeline: **Crewtime Usage (mins):** 100 **Session Time (mins):** 100

Scheduled Days: FD 14

4. Session Scenario:
The Glovebox facility is activated, checked out for proper function, and prepared for experiment operations.

5. Session Constraints:
1. This session should be scheduled once per mission to verify that the MGBX facility is operating properly.
2. This session must be performed prior to MGBX experiment operations.
3. This session should be performed as early as possible in the mission.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160006	Microgravity Glovebox System	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	30	1	1	0	MGBX set-up and activation
20	20	1	1	0	Perform functional check procedures
20	20	1	1	0	Perform MGBX conditioning procedures
30	30	1	1	0	Deactivate MGBX and stow equipment

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

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Investigation ID: 750031 **Experiment ID:** BTS **Russian ID:** BTS Facility

Investigation Title: Biotechnology System (BTS) Facility Operations

US Investigators: Gonda, Steve

Russian Investigators: N/A

Other Investigators: N/A

Payload Category: MG **Sub-Cat.:** FAC **Subjects Requested:** 0

Description: These operations are the activities required to set up, activate, verify functionality, and maintain the Biotechnology System facility.

Science Objectives: See BTS investigation entries.

Functional Objectives: See sessions.

Sample Transfer Rqd: No **Hardware Transfer Rqd:** Yes

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
2	Mir 21	2/21/96	☒	☒
2	NASA 2	3/22/96	☒	☒
2	Progress M30	12/18/95	☒	☒
2	STS 76 (SM-03)	3/22/96	☒	☒
3	Mir 22	8/17/96	☒	☒
3	NASA 3	9/16/96	☒	☒
3	STS 79 (SM-04)	9/16/96	☒	☒
4	STS 81 (SM-05)	1/16/97	☒	☒
5	Mir 24	6/24/97	☒	☒
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	Mir 25	12/12/97	☒	☒
6	NASA 6	9/18/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒
7	Mir 26	5/30/98	☒	☒
7	NASA 7	1/15/98	☒	☒
7	STS 89 (SM-08)	1/15/98	☒	☒
7	STS 91 (SM-09)	5/29/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
MG	BT	Flight	160004	Biotechnology System (BTS)
OPS	SHR	Flight	840003	Mir Interface to Payload Systems-2 (MIPS)
MG	BT	Flight	846716	BTS Logbook

Mission: Mir 24 **Invest. ID:** 750031 **Exp. ID:** BTS **Russian ID:** BTS Facil

Invest. Title: Biotechnology System (BTS) Facility Operations

Prime ☒
Contingent ☐

US PI: Gonda, Steve **Russian PI:** N/A

1. Session ID: MG:FAC:P:19

2. Session: BTS Overview and Operations Familiarization

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 104

4. Session Scenario:

Session consists of a general discussion of science background and objectives, BTS experiment timeline, equipment operation and malfunction procedures, and hardware descriptions. BTS system and equipment components are described (including hardware illustrations/pictures) along with nominal facility ops from initial on-orbit acitivites to system deactivation. Upon completion of the session, the crewmember will be familiar with BTS operating procedures, the hardware components and their functions, and the operation of the BTS. The crewmember will also be familiar with equipment malfunction procedures.

5. Session Constraints:

1. Session takes place in the classroom.
2. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840402	Biotechnology System (BTS) Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	60	1	1	0	Classroom instruction

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: Mir 24 **Invest. ID:** 750031 **Exp. ID:** BTS **Russian ID:** BTS Facil

Invest. Title: Biotechnology System (BTS) Facility Operations

Prime ☒
Contingent ☐

US PI: Gonda, Steve **Russian PI:** N/A

1. Session ID: MG:FAC:P:20

Session Type: Training

2. Session: BTS Equipment Nominal Operations

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: L- 102

4. Session Scenario:

Equipment operations is reviewed and any questions concerning operations clarified. Crewmember will perform a complete set of nominal and malfunction procedures and have the opportunity to review off-nominal operations. Upon completion of the session, the crewmember will be able to describe all nominal and off-nominal operation functions associated with the BTS. The crewmember will be able to recognize all BTS malfunctions and apply the appropriate malfunction procedure for each situation.

5. Session Constraints:

1. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840402	Biotechnology System (BTS) Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
180	180	1	1	0	Hands-on training on procedures

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: Mir 24 **Invest. ID:** 750031 **Exp. ID:** BTS **Russian ID:** BTS Facil

Invest. Title: Biotechnology System (BTS) Facility Operations

Prime ☒
Contingent ☐

US PI: Gonda, Steve **Russian PI:** N/A

1. Session ID: MG:FAC:P:21

2. Session: BTS Proficiency/Off-Nominal Procedures

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 240

Scheduled Days: L- 100

4. Session Scenario:

Crewmember will perform hands-on BTS nominal, contingency, and malfunction procedures and have the opportunity to reinforce the knowledge gained from earlier training sessions. Upon completion of this training, the crewmember will be familiar with all aspects of the BTS and its operation and will be able to describe all nominal and off-nominal functions. The crewmember will be able to recognize all BTS malfunctions and apply the appropriate malfunction procedure for each situation.

5. Session Constraints:

1. Crewmember may request additional proficiency training.
2. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840402	Biotechnology System (BTS) Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
240	240	1	1	0	Hands-on training

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 750031 **Exp. ID:** BTS **Russian ID:** BTS Facil

Invest. Title: Biotechnology System (BTS) Facility Operations

Prime ☒
Contingent ☐

US PI: Gonda, Steve **Russian PI:** N/A

1. Session ID: MG:FAC:P:19

2. Session: BTS Overview and Operations Familiarization

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 104

4. Session Scenario:

Session consists of a general discussion of science background and objectives, BTS experiment timeline, equipment operation and malfunction procedures, and hardware descriptions. BTS system and equipment components are described (including hardware illustrations/pictures) along with nominal facility ops from initial on-orbit acitivites to system deactivation. Upon completion of the session, the crewmember will be familiar with BTS operating procedures, the hardware components and their functions, and the operation of the BTS. The crewmember will also be familiar with equipment malfunction procedures.

5. Session Constraints:

1. Session takes place in the classroom.
2. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840402	Biotechnology System (BTS) Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	60	1	1	0	Classroom instruction

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 750031 **Exp. ID:** BTS **Russian ID:** BTS Facil

Invest. Title: Biotechnology System (BTS) Facility Operations

Prime ☒
Contingent ☐

US PI: Gonda, Steve **Russian PI:** N/A

1. Session ID: MG:FAC:P:20

Session Type: Training

2. Session: BTS Equipment Nominal Operations

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: L- 102

4. Session Scenario:

Equipment operations is reviewed and any questions concerning operations clarified. Crewmember will perform a complete set of nominal and malfunction procedures and have the opportunity to review off-nominal operations. Upon completion of the session, the crewmember will be able to describe all nominal and off-nominal operation functions associated with the BTS. The crewmember will be able to recognize all BTS malfunctions and apply the appropriate malfunction procedure for each situation.

5. Session Constraints:

1. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840402	Biotechnology System (BTS) Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
180	180	1	1	0	Hands-on training on procedures

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 750031 **Exp. ID:** BTS **Russian ID:** BTS Facil

Invest. Title: Biotechnology System (BTS) Facility Operations

Prime ☑
Contingent ☐

US PI: Gonda, Steve **Russian PI:** N/A

1. Session ID: MG:FAC:P:21

Session Type: Training

2. Session: BTS Proficiency/Off-Nominal Procedures

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 240

Scheduled Days: L- 100

4. Session Scenario:

Crewmember will perform hands-on BTS nominal, contingency, and malfunction procedures and have the opportunity to reinforce the knowledge gained from earlier training sessions. Upon completion of this training, the crewmember will be familiar with all aspects of the BTS and its operation and will be able to describe all nominal and off-nominal functions. The crewmember will be able to recognize all BTS malfunctions and apply the appropriate malfunction procedure for each situation.

5. Session Constraints:

1. Crewmember may request additional proficiency training.
2. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840402	Biotechnology System (BTS) Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
240	240	1	1	0	Hands-on training

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 750031 **Exp. ID:** BTS **Russian ID:** BTS Facil

Invest. Title: Biotechnology System (BTS) Facility Operations **Prime** ☒ **Contingent** ☐

US PI: Gonda, Steve **Russian PI:** N/A

1. Session ID: MG:FAC:I:38

Session Type: Inflight

2. Session: BTS Facility Functional Tests-EEC1, ECC2, & GSM

3. Session Timeline: **Crewtime Usage (mins):** 175 **Session Time (mins):** 175

Scheduled Days: FD 105

4. Session Scenario:

Reconfiguration of cables and functional testing of ECC1, ECC2, and GSM.

5. Session Constraints:

1. Test must be completed and information recorded on test data logsheet and logsheets must be returned on the next shuttle mission.
2. Session should be performed after last culture module has been removed and prior to the BEM/BSTC-M Engineering Evaluation Initiation session.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160004	Biotechnology System (BTS)	1
840003	Mir Interface to Payload Systems-2 (MIPS)	1
846716	BTS Logbook	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	1	0	Disconnect BEM/BSTC-M and connect ECC2
30	30	1	1	0	Perform GSM Functional Test
55	55	1	1	0	Perform ECC2 Functional Test
40	40	1	1	0	Perform ECC1 Functional Test
20	20	1	1	0	Downlink Data
15	15	1	1	0	Disconnect ECC1 and reconnect BEM/BSTC-M

8. Data Processing:

1. Data downlink at first available opportunity.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Investigation ID: 750032 **Experiment ID:** APCF **Russian ID:** APCF

Investigation Title: Advanced Protein Crystalization Facility (APCF)

US Investigators: TBD

Russian Investigators: N/A

Other Investigators: TBD

Payload Category: MG **Sub-Cat.:** BT **Subjects Requested:** 0

Description: These activities are required to install, activate, check out, deactivate, or otherwise provide for the operation of the Advanced Protein Crystallization Facility.

Science Objectives: To grow large, well-ordered crystals of many different types of proteins and viruses for analysis and characterization in ground laboratories.

Functional Objectives:

Sample Transfer Rqd: No **Hardware Transfer Rqd:** No

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
5	STS 84 (SM-06)	5/15/97	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
MG	BT	Flight	848783	Advanced Protein Crystallization Facility (APCF)

Mission: STS 84 (SM-06) **Invest. ID:** 750032 **Exp. ID:** APCF **Russian ID:** APCF

Invest. Title: Advanced Protein Crystalization Facility (APCF)

Prime ☒
Contingent ☐

US PI: TBD **Russian PI:** N/A

1. Session ID: MG:BT:I:19

2. Session: APCF Experiment Operations

Session Type: Inflight

3. Session Timeline: **Crewtime Usage (mins):** 0 **Session Time (mins):** 1440

Scheduled Days: FD 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

4. Session Scenario:
APCF operations are automated.

5. Session Constraints:
1. None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848783	Advanced Protein Crystallization Facility (APCF)	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
1440	1440	1	0	0	Automated APCF experiment operations.

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of contingency operations.

Investigation ID: 750033 **Experiment ID:** PCG-GN2 **Russian ID:** PCG-Dewar

Investigation Title: Protein Crystal Growth (PCG) GN2 Dewar

US Investigators: McPherson, Alex

Russian Investigators: TBD

Other Investigators: Koszelak, Stan

Payload Category: MG **Sub-Cat.:** BT **Subjects Requested:** 0

Description: The purpose of this investigation is to grow protein crystals by using the flash frozen batch and liquid-liquid method. Proteins can be rapidly mixed with all other chemical components necessary and flash frozen, well before any crystal nuclei can be expected to form. This can be done months in advance of the mission so long as the samples are maintained frozen. The GN2 freezer/dewar is needed to maintain the samples frozen from the time of space vehicle loading to achievement of orbit. Activation depends solely on the samples defrosting. Frozen samples are transported to the Mir station by STS and allowed to thaw naturally at which time the diffusion and crystal growth begin passively. A comparison of different growth methods and equilibration times will be studied by varying the aspect ratio of the tubes and capillaries.

These experiments are particularly ideal for the long duration Mir mission. They are entirely passive and require virtually no crew attention. Launch preparation is minimal because the samples are prepared well ahead of time. Experiments will be carried out in sealed volumes of liquid that will cushion and protect crystals on return, and can be flown in large numbers. This experiment will also allow screening of a greater variety of macromolecules and viruses, and to optimize the results by expanding the number of trials for each.

Science Objectives:
1. To obtain protein, virus, and nucleic acid crystals of sufficient size that their quality and other crystallographic properties may be evaluated and compared with corresponding crystals grown on earth.
2. To evaluate the effectiveness of the batch technique and the liquid-liquid diffusion technique for growth of protein and virus crystals in space for a long duration.
3. To compare crystals grown using these two methods to those grown using dialysis and vapor diffusion techniques.
4. To demonstrate that very large arrays of samples can be efficiently crystallized by a simple technique in simple hardware.
5. To compare results obtained from long duration flash frozen methods with equivalent experiments of limited duration, such as those that may be conducted on the Shuttle.
6. To compare different growth methods and equilibration times by varying the aspect ratio of chambers.

Functional Objectives:
1. The GN2 Dewar is loaded with protein samples, charged with liquid nitrogen, transported to orbit, transferred to a location for long-term quiet residence, allowed to thaw passively and perform passive growth of crystals.

Sample Transfer Rqd: No **Hardware Transfer Rqd:** Yes

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
2	Mir 20	9/3/95	☒	☒
2	Mir 21	2/21/96	☒	☒
2	NASA 2	3/22/96	☒	☒
2	STS 74 (SM-02)	11/12/95	☒	☒
2	STS 76 (SM-03)	3/22/96	☒	☒
3	Mir 22	8/17/96	☒	☒
3	NASA 3	9/16/96	☒	☒
3	STS 79 (SM-04)	9/16/96	☒	☒
4	Mir 23	2/2/97	☒	☒
4	NASA 4	1/16/97	☒	☒
4	STS 81 (SM-05)	1/16/97	☒	☒
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	Mir 25	12/12/97	☒	☒
6	NASA 6	9/18/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒
7	NASA 7	1/15/98	☒	☒
7	STS 89 (SM-08)	1/15/98	☒	☒
7	STS 91 (SM-09)	5/29/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
MG	BT	Flight	150112	GN2 Freezer/Dewer Experiment Assembly

MG	BT	Flight	150112	
ES	SHR	Flight	810236	Nikon F3 Camera System

Mission: STS 84 (SM-06) **Invest. ID:** 750033 **Exp. ID:** PCG-GN2 **Russian ID:** PCG-Dew

Invest. Title: Protein Crystal Growth (PCG) GN2 Dewar

Prime ☒
Contingent ☐

US PI: McPherson, Alex **Russian PI:** TBD

1. Session ID: MG:LOG:I:109

Session Type: Up Item

2. Session: PCG GN2 Dewar Transfer from Shuttle to the Mir Module

3. Session Timeline: **Crewtime Usage (mins):** 50 **Session Time (mins):** 50

Scheduled Days: FD 4

4. Session Scenario:
PCG GN2 Dewar is transferred from the Shuttle to Mir.

5. Session Constraints:
1. Session should be performed in conjunction with "PCG GN2 Dewar Transfer from Mir Module to Shuttle."
2. A photograph of the mounted Dewar at its mounted location is required.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150112	GN2 Freezer/Dewer Experiment Assembly	1
810236	Nikon F3 Camera System	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	30	1	1	0	Retrieve GN2 Dewar from Shuttle stowage, transfer to Mir and stow for passive experiment operations.
20	20	1	1	0	Remove camera from stowage, photograph Dewar, and return camera to stowage.

8. Data Processing:
1. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 750033 **Exp. ID:** PCG-GN2 **Russian ID:** PCG-Dew

Invest. Title: Protein Crystal Growth (PCG) GN2 Dewar

Prime ☑
Contingent ☐

US PI: McPherson, Alex **Russian PI:** TBD

1. Session ID: MG:LOG:I:105

Session Type: Down Item

2. Session: PCG GN2 Dewar Transfer from Mir Module to Shuttle

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 4

4. Session Scenario:
PCG GN2 Dewar is transferred from Mir location to the Shuttle.

5. Session Constraints:
1. Session should be performed in conjunction with "PCG GN2 Dewar Transfer from Shuttle to Mir."

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150112	GN2 Freezer/Dewer Experiment Assembly	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	30	1	1	0	Retrieve GN2 Dewar from Mir location, transfer to Shuttle, and stow.

8. Data Processing:
1. Air-to-ground voice communication may be required in the event of a contingency situation.

Investigation ID: 890034 **Experiment ID:** MGM **Russian ID:** MGM

Investigation Title: Mechanics of Granular Materials (MGM)

US Investigators: Sture, Stein

Russian Investigators: N/A

Other Investigators: Costes, Nicholas C.

Payload Category: MG **Sub-Cat.:** MTS **Subjects Requested:** 0

Description: The MGM investigation entails a test series on granular materials in dry and fully saturated states.

Science Objectives: Develop a quantitative scientific understanding of the constitutive behavior of cohesionless granular materials in the dry and saturated states at very low confining pressures/effective stresses. In the absence of a gravitational potential, assess the influence of solid-solid and solid-fluid interactions on the mechanical behavior of granular materials under various drainage conditions, when such materials are subjected to very low confining pressures/effective stresses. Study the influence of effective stress state and mode of loading as well as bulk elastic and inelastic properties on the mechanical behavior, including dilatancy, of cohesionless granular materials under very low confining pressures/effective stresses. Study the extent to which gravity-induced stress and material inhomogeneities control the mechanical behavior of cohesionless granular materials under very low confining pressures/effective stresses. Study limiting combinations of speciman size/effective stress (confining pressure) at which tests performed in a terrestrial (1-g) gravity environment yield meaningful information on the constitutive behavior and stability of cohesionless granular materials under very low confining pressures/effective stresses. Study whether the true maximum porosity (or void ratio) cohesionless granular materials under very low confining pressures/effective stresses tends to approach the maximum porosity at which the material can deform indefinitely without changes in its internal stress state and volumetric strain, while at the same time a majority of the particles maintain contact with one another.

Functional Objectives: Granular materials, in particular, geologic deposits in their in-situ state are either dry, partially saturated, or completely saturated. In such states, the interactions between solid particles and interstitial liquids, which in turn are functions of external loading and drainage conditions during loading, can result in many catastophic events from an engineering point of view which may involve the loss of life, prorperty, and natural resources (e.g. landslides, soil liquefaction caused by earthquakes or wave action, dam failures, land erosion, etc.). The MGM investigation will entail a series of tests on granular materials in dry and fully saturated states.

Sample Transfer Rqd: No **Hardware Transfer Rqd:** No

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
3	STS 79 (SM-04)	9/16/96	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
MG	ENV	Flight	820273	SAMS Optical Disk
MG	MTS	Flight	848779	Mechanics of Granular Materials (MGM) Flight Unit
MG	ENV	Flight	848785	Space Acceleration Measurement System (SAMS) for Spacehab
			855578	MGM Stowage
			855581	Test Cells

Mission: STS 84 (SM-06) **Invest. ID:** 890034 **Exp. ID:** MGM **Russian ID:** MGM

Invest. Title: Mechanics of Granular Materials (MGM)

Prime ☒
Contingent ☐

US PI: Sture, Stein **Russian PI:** N/A

1. Session ID: MG:LOG:I:110

Session Type: Up Item

2. Session: MGM: SAMS Spacehab

3. Session Timeline: **Crewtime Usage (mins):** 0 **Session Time (mins):** 0

Scheduled Days: FD 4

4. Session Scenario:

5. Session Constraints:

1. SAMS for Spacehab is required for MGM experiment operations.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820273	SAMS Optical Disk	1
848785	Space Acceleration Measurement System (SAMS) for Spacehab	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
0	0	1	0	0	No crew activity required

8. Data Processing:

1. No data downlink is required
2. Air to ground voice communication may be required in the event of a contingency situation.

Mission: STS 84 (SM-06) **Invest. ID:** 890034 **Exp. ID:** MGM **Russian ID:** MGM

Invest. Title: Mechanics of Granular Materials (MGM)

Prime ☑
Contingent ☐

US PI: Sture, Stein **Russian PI:** N/A

1. Session ID: MG:MTS:I:1

Session Type: Inflight

2. Session: MGM Experiment Operations

3. Session Timeline: **Crewtime Usage (mins):** 170 **Session Time (mins):** 530

Scheduled Days: FD 6

4. Session Scenario:

Locate and set-up MGM equipment. Remove, inspect, and set-up test cell. Make electrical connections. Perform system initialization, self test, and experiment operations. Shutdown MGM subsystems and stow all equipment.

5. Session Constraints:

1. Individual test runs may be performed independently.
2. Crew breaks between test runs acceptable.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848779	Mechanics of Granular Materials (MGM) Flight Unit	1
848785	Space Acceleration Measurement System (SAMS) for Spacehab	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	20	1	1	0	Locate and set-up equipment.
10	10	1	1	0	Remove, inspect, and set-up test cell#1. Load video tape and data card.
10	10	1	1	0	Make electrical connections.
10	10	1	1	0	Initialize MGM.
20	20	1	1	0	Attach SAMS sensor head. Activate SAMS in Spacehab.
20	20	1	1	0	Perform MGM self test.
120	120	1	0	0	Perform MGM test operation with test cell#1 including collection of video and data.
10	10	1	1	0	Restow test cell #1, video tape, and data card.
10	10	1	1	0	Unstow MGM test cell#2, set-up test cell#2. Load video tape and data card.
120	120	1	0	0	Perform MGM test operation with test cell#2 including collection of video and data.
10	10	1	1	0	Restow test cell #2, video tape, and data card.
10	10	1	1	0	Unstow MGM test cell#3, set-up test cell#3. Load video tape and data card.
120	120	1	0	0	Perform MGM test operation with test cell#3 including collection of video and data.
10	10	1	1	0	Deactivate SAMS in Spacehab.
10	10	1	1	0	Shutdown MGM.
20	20	1	1	0	Stow all MGM equipment.

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of contingency operations.

Mission: STS 86 (SM-07) **Invest. ID:** 890034 **Exp. ID:** MGM **Russian ID:** MGM

Invest. Title: Mechanics of Granular Materials (MGM)

Prime ☒
Contingent ☐

US PI: Sture, Stein **Russian PI:** N/A

1. Session ID: MG:MTS:I:39

Session Type: Inflight

2. Session: MGM Experiment Operations

3. Session Timeline: **Crewtime Usage (mins):** 170 **Session Time (mins):** 530

Scheduled Days: FD 5, 6

4. Session Scenario:

Locate and set-up MGM equipment. Remove, inspect, and set-up test cell. Make electrical connections. Perform system initialization, self test, and experiment operations. Shutdown MGM subsystems and stow all equipment.

5. Session Constraints:

1. Individual test runs may be performed independently.
2. Crew breaks between test runs acceptable.
3. This is a sortie mission.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820273	SAMS Optical Disk	11
848779	Mechanics of Granular Materials (MGM) Flight Unit	1
848785	Space Acceleration Measurement System (SAMS) for Spacehab	1
855578	MGM Stowage	1
855581	Test Cells	6

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	20	1	1	0	Locate and set-up equipment.
10	10	1	1	0	Remove, inspect, and set-up first test cell. Load video tape and data card.
10	10	1	1	0	Make electrical connections.
10	10	1	1	0	Initialize MGM.
20	20	1	1	0	Attach SAMS sensor head. Activate SAMS in Spacehab.
20	20	1	1	0	Perform MGM self test.
120	120	1	0	0	Perform MGM test operation with first test cell including collection of video and data.
10	10	1	1	0	Restow first test cell, video tape, and data card.
10	10	1	1	0	Unstow MGM second test cell, set-up second test cell. Load video tape and data card.
120	120	1	0	0	Perform MGM test operation with second test cell including collection of video and data.
10	10	1	1	0	Restow second test cell , video tape, and data card.
10	10	1	1	0	Unstow MGM third test cell, set-up third test cell. Load video tape and data card.
120	120	1	0	0	Perform MGM third test operation with third test cell including collection of video and data.
10	10	1	1	0	Deactivate SAMS in Spacehab.
10	10	1	1	0	Shutdown MGM.
20	20	1	1	0	Stow all MGM equipment.

8. Data Processing:

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of contingency operations.

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Investigation ID: 890043 **Experiment ID:** QUELD **Russian ID:** QUELD

Investigation Title: QUELD Furnace Experiment - MIM

US Investigators: Smith, Reginald

Russian Investigators: TBD

Other Investigators: TBD

Payload Category: MG **Sub-Cat.:** MTS **Subjects Requested:** 0

Description: The QUELD unit is a fixed furnace facility that provides an experimental method of measuring the diffusion coefficients (D) in some metallic binary systems under conditions of microgravity. Accurate diffusion coefficients are of considerable importance in modelling the diffusion process on Earth, since even in systems having other mass transport, there are always boundary layers in which diffusion is dominant. During the course of this experiment, diffusian couples of selected systems will be place in graphite crucibles, each contained in a separate stainless steel tube (called a "capsule"). The capsule is rapidly heated to a constant temperature and held there for a given period of time. At the end of this period, the capsule is ejected into an aluminum chill block and quenched to room temperature. Upon return to Earth, the sample will be analyzed by the appropriate techniques to determine the solute concentration profile, thus allowing the caluclation of D. The QUELD unit will be operated in conjunction with the Microgravity Isolation Mount (MIM). It is hoped that the MIM will isolate the QUELD from acceleration and vibration forces that may disturb the fluid phases of its liquid specimens.

Science Objectives:
1. To measure the diffusion coefficients in some metallic binary systems under conditions of microgravity.
2. To provide further data and increase the understanding of the diffusion problem and of the experimental data pertaining thereto.

Functional Objectives:
1. Unstow and mount the QUELD onto the MIM
2. Monitor experiment operations
3. Dis-mount and stow the QUELD and deactive the MIM

Sample Transfer Rqd: Yes **Hardware Transfer Rqd:** Yes

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
2	Mir 21	2/21/96	☒	☒
2	NASA 2	3/22/96	☒	☒
2	STS 76 (SM-03)	3/22/96	☒	☒
3	Mir 22	8/17/96	☒	☒
3	NASA 3	9/16/96	☒	☒
3	STS 79 (SM-04)	9/16/96	☒	☒
4	Mir 23	2/2/97	☒	☒
4	NASA 4	1/16/97	☒	☒
4	STS 81 (SM-05)	1/16/97	☒	☒
5	Mir 24	6/24/97	☒	☒
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	Mir 25	12/12/97	☒	☒
6	NASA 6	9/18/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒
7	Mir 26	5/30/98	☒	☒
7	NASA 7	1/15/98	☒	☒
7	STS 89 (SM-08)	1/15/98	☒	☒
7	STS 91 (SM-09)	5/29/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
MG	FAC	Flight	160007	Microgravity Isolation Mount System (MIM)
OPS	SHR	Flight	840003	Mir Interface to Payload Systems-2 (MIPS)
MG	MTS	Flight	840250	QUELD II Furnace Assembly
OPS		Flight	846720	MIPS2 Optical Disks
MG	MTS	Flight	854829	QUELD Sample Case C
MG	MTS	Flight	854830	QUELD Sample Case D
MG	MTS	Flight	854831	QUELD Tool Kit

Mission: Mir 24 **Invest. ID:** 890043 **Exp. ID:** QUELD **Russian ID:** QUELD

Invest. Title: QUELD Furnace Experiment - MIM

Prime ☒
Contingent ☐

US PI: Smith, Reginald **Russian PI:** TBD

1. Session ID: MG:MTS:P:10

Session Type: Training

2. Session: QUELD Proficiency Training-Mir Crew

3. Session Timeline: **Crewtime Usage (mins):** 360 **Session Time (mins):** 180

Scheduled Days: L- 60

4. Session Scenario:

Session will begin with a short review of equipment operations and to answer any questions. The majority of the session will be conducted using the QUELD training unit, giving the crew members the opportunity to accomplish a complete set of procedures using the QUELD nominal operating procedures. Upon completion of this session, the crew members will be able to describe and perform all nominal operation functions associated with the QUELD, including sample loading, experiment initiation and experiment termination.

5. Session Constraints:

1. Session used to train the prime crew.
2. Crew can request additional proficiency training.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840393	Microgravity Isolation Mount (MIM) Training Unit	1
840394	QUELD Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	2	0	Experiment mock run
60	0	0	2	0	Contingency training

8. Data Processing:

N/A for preflight sessions

Mission: Mir 24 **Invest. ID:** 890043 **Exp. ID:** QUELD **Russian ID:** QUELD

Invest. Title: QUELD Furnace Experiment - MIM

Prime ☒
Contingent ☐

US PI: Smith, Reginald **Russian PI:** TBD

1. Session ID: MG:MTS:P:12

Session Type: Training

2. Session: QUELD Malfunction Operations-Mir Crew

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 90

Scheduled Days: L- 120, 240

4. Session Scenario:

Session will utilize the QUELD Training Unit and will begin with answers to questions from the crew members concerning any areas that are not clear. Any changes or modifications to equipment and/or procedures since the last training sesion will also be discussed. The remainder of the session will be spent with the QUELD Training Unit in accomplishing hands-on QUELD Malfunction procedures training. Upon completion of Lesson 6, the crew members will be aware of the type of equipment malfunctions that may occur on the QUELD and be able to describe all malfunction operations associated with the QUELD.

5. Session Constraints:

1. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840393	Microgravity Isolation Mount (MIM) Training Unit	1
840394	QUELD Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	0	0	2	0	Response and errors
30	0	0	2	0	Contingency with MIM
30	0	0	2	0	Hardware failures

8. Data Processing:

1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 890043 **Exp. ID:** QUELD **Russian ID:** QUELD

Invest. Title: QUELD Furnace Experiment - MIM

Prime ☒
Contingent ☐

US PI: Smith, Reginald **Russian PI:** TBD

1. Session ID: MG:MTS:P:5

2. Session: QUELD Nominal and Malfunction Operations Procedures Training

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 300 **Session Time (mins):** 300

Scheduled Days: L- 82

4. Session Scenario:

Session will begin with a short review of equipment operations and to answer any questions. The majority of the session will be conducted using the QUELD training unit, giving the crew members the opportunity to accomplish a complete set of procedures using the QUELD nominal operating procedures. Upon completion, the crew members will be able to describe and perform all nominal operation functions associated with the QUELD, including samples loading, experiment initiation and experiment termination.

5. Session Constraints:

1. Session used to train the Mir crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840393	Microgravity Isolation Mount (MIM) Training Unit	1
840394	QUELD Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	60	1	1	0	Set-up/installation
10	10	1	1	0	Loading of samples
60	60	1	1	0	Running of samples. Downloading data to MIM.
80	80	1	1	0	Set-up of MIM including MIM "modes" (configuration files)
45	45	1	1	0	Error codes familiarization and malfunction elimination
45	45	1	1	0	QUELD termination process

8. Data Processing:

1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 890043 **Exp. ID:** QUELD **Russian ID:** QUELD

Invest. Title: QUELD Furnace Experiment - MIM

Prime ☒
Contingent ☐

US PI: Smith, Reginald **Russian PI:** TBD

1. Session ID: MG:MTS:P:6

Session Type: Training

2. Session: QUELD Overview and Operations-Mir Crew

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 60

Scheduled Days: L- 120

4. Session Scenario:

Session consists of a general discussion of science background and objectives, QUELD operating principals, and description of QUELD hardware systems and components (mechanical, electronics, and software and I/O data), a description of QUELD controls, description of QUELD/MIM interface. Upon completion, the crew members will be familiar with QUELD operating procedures, the hardware components and their functions. The crew members will also have a general understanding of the scientific objectives of the payload.

5. Session Constraints:

1. Session to be conducted in the classroom
2. Session used to train the prime crew

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840393	Microgravity Isolation Mount (MIM) Training Unit	1
840394	QUELD Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	0	0	2	0	Science overview
15	0	0	2	0	QUELD physical aspects
15	0	0	2	0	Types of QUELD experiments
15	0	0	2	0	QUELD use of the MIM

8. Data Processing:

1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 890043 **Exp. ID:** QUELD **Russian ID:** QUELD

Invest. Title: QUELD Furnace Experiment - MIM

Prime ☒
Contingent ☐

US PI: Smith, Reginald **Russian PI:** TBD

1. Session ID: MG:MTS:P:7

Session Type: Training

2. Session: QUELD Nominal Operations Procedures Training-Mir Crew

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 90

Scheduled Days: L- 120, 240

4. Session Scenario:

Session will begin with a short review of equipment operations and to answer any questions. The majority of the session will be conducted using the QUELD training unit, giving the crew members the opportunity to accomplish a complete set of procedures using the QUELD nominal operating procedures. Upon completion, the crew members will be able to describe and perform all nominal operation functions associated with the QUELD, including samples loading, experiment initiation and experiment termination.

5. Session Constraints:

1. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840393	Microgravity Isolation Mount (MIM) Training Unit	1
840394	QUELD Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	0	0	2	0	Set-up/installation
15	0	0	2	0	Loading of samples
15	0	0	2	0	Running of samples. Downloading data to MIM.
15	0	0	2	0	Set-up of MIM including MIM "modes" (configuration files)
15	0	0	2	0	Error codes familiarization
15	0	0	2	0	QUELD termination process

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890043 **Exp. ID:** QUELD **Russian ID:** QUELD

Invest. Title: QUELD Furnace Experiment - MIM

Prime ☒
Contingent ☐

US PI: Smith, Reginald **Russian PI:** TBD

1. Session ID: MG:MTS:P:11

Session Type: Training

2. Session: QUELD Proficiency Training-NASA

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: L- 60

4. Session Scenario:

Session will begin with a short review of equipment operations and to answer any questions. The majority of the session will be conducted using the QUELD training unit, giving the crew members the opportunity to accomplish a complete set of procedures using the QUELD nominal operating procedures. Upon completion of this session, the crew members will be able to describe and perform all nominal operation functions associated with the QUELD, including sample loading, experiment initiation and experiment termination.

5. Session Constraints:

1. Session used to train the prime crew.
2. Crew can request additional proficiency training.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840393	Microgravity Isolation Mount (MIM) Training Unit	1
840394	QUELD Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	1	0	Experiment mock run
60	0	0	1	0	Contingency training

8. Data Processing:

N/A for preflight sessions

Mission: NASA 5 **Invest. ID:** 890043 **Exp. ID:** QUELD **Russian ID:** QUELD

Invest. Title: QUELD Furnace Experiment - MIM

Prime ☑
Contingent ☐

US PI: Smith, Reginald **Russian PI:** TBD

1. Session ID: MG:MTS:P:13

Session Type: Training

2. Session: QUELD Malfunction Operations-NASA

3. Session Timeline: **Crewtime Usage (mins):** 90 **Session Time (mins):** 90

Scheduled Days: L- 120, 240

4. Session Scenario:

Session will utilize the QUELD Training Unit and will begin with answers to questions from the crew members concerning any areas that are not clear. Any changes or modifications to equipment and/or procedures since the last training sesion will also be discussed. The remainder of the session will be spent with the QUELD Training Unit in accomplishing hands-on QUELD Malfunction procedures training. Upon completion of Lesson 6, the crew members will be aware of the type of equipment malfunctions that may occur on the QUELD and be able to describe all malfunction operations associated with the QUELD.

5. Session Constraints:

1. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840393	Microgravity Isolation Mount (MIM) Training Unit	1
840394	QUELD Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	0	0	1	0	Response and errors
30	0	0	1	0	Contingency with MIM
30	0	0	1	0	Hardware failures

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890043 **Exp. ID:** QUELD **Russian ID:** QUELD

Invest. Title: QUELD Furnace Experiment - MIM

Prime ☑
Contingent ☐

US PI: Smith, Reginald **Russian PI:** TBD

1. Session ID: MG:MTS:P:8

Session Type: Training

2. Session: QUELD Nominal Operations Procedures Training-NASA

3. Session Timeline: **Crewtime Usage (mins):** 90 **Session Time (mins):** 90

Scheduled Days: L- 120, 240

4. Session Scenario:

Session will begin with a short review of equipment operations and to answer any questions. The majority of the session will be conducted using the QUELD training unit, giving the crew members the opportunity to accomplish a complete set of procedures using the QUELD nominal operating procedures. Upon completion, the crew members will be able to describe and perform all nominal operation functions associated with the QUELD, including samples loading, experiment initiation and experiment termination.

5. Session Constraints:

1. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840393	Microgravity Isolation Mount (MIM) Training Unit	1
840394	QUELD Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	0	0	1	0	Set-up/installation
15	0	0	1	0	Loading of samples
15	0	0	1	0	Running of samples. Downloading data to MIM.
15	0	0	1	0	Set-up of MIM including MIM "modes" (configuration files)
15	0	0	1	0	Error codes familiarization
15	0	0	1	0	QUELD termination process

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890043 **Exp. ID:** QUELD **Russian ID:** QUELD

Invest. Title: QUELD Furnace Experiment - MIM

Prime ☒
Contingent ☐

US PI: Smith, Reginald **Russian PI:** TBD

1. Session ID: MG:MTS:P:9

Session Type: Training

2. Session: QUELD Overview and Operations-NASA

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 120

4. Session Scenario:

Session consists of a general discussion of science background and objectives, QUELD operating principals, and description of QUELD hardware systems and components (mechanical, electronics, and software and I/O data), a description of QUELD controls, description of QUELD/MIM interface. Upon completion, the crew members will be familiar with QUELD operating procedures, the hardware components and their functions. The crew members will also have a general understanding of the scientific objectives of the payload.

5. Session Constraints:

1. Session to be conducted in the classroom
2. Session used to train the prime crew

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840393	Microgravity Isolation Mount (MIM) Training Unit	1
840394	QUELD Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	0	0	1	0	Science overview
15	0	0	1	0	QUELD physical aspects
15	0	0	1	0	Types of QUELD experiments
15	0	0	1	0	QUELD use of the MIM

8. Data Processing:

1. N/A for preflight sessions.

Mission: STS 84 (SM-06) **Invest. ID:** 890043 **Exp. ID:** QUELD **Russian ID:** QUELD

Invest. Title: QUELD Furnace Experiment - MIM

Prime ☑
Contingent ☐

US PI: Smith, Reginald **Russian PI:** TBD

1. Session ID: MG:LOG:I:120

Session Type: Up Item

2. Session: QUELD Sample Transfer from STS-84 to Mir

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 4

4. Session Scenario:
QUELD furnace samples are transferred from the Shuttle to the Mir.

5. Session Constraints:
None

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
846720	MIPS2 Optical Disks	11
854846	QUELD Sample Case F	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Unstow QUELD samples from Shuttle stowage
20	20	1	1	0	Go to Mir and stow QUELD samples (velcro samples to side of MIM)

8. Data Processing:

1. No data downlink required.
2. Air-to-Ground voice communications may be required in a contingency situation.

Mission: NASA 5 **Invest. ID:** 890043 **Exp. ID:** QUELD **Russian ID:** QUELD

Invest. Title: QUELD Furnace Experiment - MIM

Prime ☑
Contingent ☐

US PI: Smith, Reginald **Russian PI:** TBD

1. Session ID: MG:MTS:I:2

Session Type: Inflight

2. Session: QUELD Experiment Mounting

3. Session Timeline: **Crewtime Usage (mins):** 40 **Session Time (mins):** 40

Scheduled Days: FD 63

4. Session Scenario:
The QUELD furnace will be set-up on the MIM.

5. Session Constraints:
1. None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160007	Microgravity Isolation Mount System (MIM)	1
840250	QUELD II Furnace Assembly	1
854831	QUELD Tool Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Retrieve QUELD furnace assembly from stowage
30	30	1	1	0	Mount QUELD onto MIM flotor platform

8. Data Processing:
1. Data downlink not required.
2. Air-to-Ground voice communications may be required in a contingency situation.

Mission: NASA 5 **Invest. ID:** 890043 **Exp. ID:** QUELD **Russian ID:** QUELD

Invest. Title: QUELD Furnace Experiment - MIM

Prime ☒
Contingent ☐

US PI: Smith, Reginald **Russian PI:** TBD

1. Session ID: MG:MTS:I:37

2. Session: QUELD Furnace Activation

Session Type: Inflight

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 19

4. Session Scenario:

MIM and SAMS are activated in preparation for QUELD Experiment Operations.

5. Session Constraints:

1. This session should be performed after "QUELD Experiment Mounting."
2. This session should be performed prior to QUELD Experiment Operations only when MIM is not already active.
3. This session can be conducted by Mir Crew if NASA Crew is not available.
4. This session cannot be performed in conjuction with LMD experiment opaerations.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160007	Microgravity Isolation Mount System (MIM)	1
840003	Mir Interface to Payload Systems-2 (MIPS)	1
840250	QUELD II Furnace Assembly	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	30	1	1	0	Activate MIM

8. Data Processing:

1. No data downlink is required for this session.
2. Air-to-ground voice communications may be required in a contingency situation.

Mission: NASA 5 **Invest. ID:** 890043 **Exp. ID:** QUELD **Russian ID:** QUELD

Invest. Title: QUELD Furnace Experiment - MIM

Prime ☒
Contingent ☐

US PI: Smith, Reginald **Russian PI:** TBD

1. Session ID: MG:MTS:I:38

Session Type: Inflight

2. Session: QUELD Furnace Experiment Operations-10 Hour Session

3. Session Timeline: **Crewtime Usage (mins):** 70 **Session Time (mins):** 670

Scheduled Days: FD 66, 67, 68, 69, 70, 73

4. Session Scenario:

Material science samples will be processed in the furnace.

5. Session Constraints:

1. This session should be performed when MIM is active.
2. This session is required to process 6 samples.
3. Samples should be velcroed to the side of the MIM facility.
4. MIM data recorded on the MIPS 2 optical drive.
5. This session can be conducted by Mir crew if NASA crew is unavailable.
6. Samples do not have to be removed immediately.
7. Flight days for sessions may be re-scheduled for timeline flexibility.
8. More than one sample run per day may be scheduled.
9. MIM and QUELD deactivation required after last run each day.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160007	Microgravity Isolation Mount System (MIM)	1
840003	Mir Interface to Payload Systems-2 (MIPS)	1
840250	QUELD II Furnace Assembly	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Remove and stow processed samples (if required)
15	15	1	1	0	MIM data transfer
15	15	1	1	0	Reconfigure QUELD/MIM
600	600	1	0	0	BREAK - Unattended experiment operations
5	5	1	1	0	Remove and stow processed samples
10	10	1	1	0	Deactivate MIM/QUELD
20	20	1	1	0	Inspect removal and installation of samples

8. Data Processing:

1. Data downlink from the MIM may be required for this session.
2. Air-to-ground voice communications may be required in a contingency situation.

Mission: NASA 5 **Invest. ID:** 890043 **Exp. ID:** QUELD **Russian ID:** QUELD

Invest. Title: QUELD Furnace Experiment - MIM

Prime ☒
Contingent ☐

US PI: Smith, Reginald **Russian PI:** TBD

1. Session ID: MG:MTS:I:6

Session Type: Inflight

2. Session: QUELD Furnace Experiment Dismount and Stowage

3. Session Timeline: **Crewtime Usage (mins):** 20 **Session Time (mins):** 20

Scheduled Days: FD 74

4. Session Scenario:

QUELD furnace is removed from the MIM facility. This session is performed either on completion of QUELD experiment operations or in preparation of other MIM experiment operations.

5. Session Constraints:

1. This session should be performed after "QUELD Furnace Experiment Operations."

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160007	Microgravity Isolation Mount System (MIM)	1
840250	QUELD II Furnace Assembly	1
854831	QUELD Tool Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	20	1	1	0	Dismount QUELD from MIM facility, and restow all equipment.

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Investigation ID: 890079 **Experiment ID:** SAMS **Russian ID:** SAMS

Investigation Title: Space Acceleration Measurement System (SAMS) Operations

US Investigators: DeLombard, R.

Russian Investigators: Kundik, Ye; Simakov, S.

Other Investigators: N/A

Payload Category: MG **Sub-Cat.:** FAC **Subjects Requested:** 0

Description: Disturbances to the on-orbit microgravity environment, typically 10-6 g to 10-2 g in magnitude and 10-4 Hz to 102 Hz in frequency, affect various types of microgravity science experiments. Additional benefits can be achieved by comparing measured data with mathematical models of the microgravity environment aboard spacecraft.

The Space Acceleration Measurement System (SAMS) is an acceleration measurement and data acquisition instrument, not a classical microgravity research experiment. The SAMS consists of a main unit and up to three remotely positioned triaxial sensor heads (TSH). Each TSH contains orthogonally positioned accelerometers, with a threshold sensitivity of 10-6 g. The main unit contains analog and digital signal processing circuitry and two optical disk drives for storage.

SAMS equipment measures acceleration disturbances in four ranges automatically selected by a stored software algorithm. The ranges are ±500 mg, ±50 mg, ±5 mg, and ±500 ug full scale. It is possible to select a specific range and inhibit the automatic range selection. This requires a serial computer connection to SAMS to interact with an internal menu driven program.

Each TSH and associated analog filter card in the main unit can be pre-selected to measure acceleration in one of six bandwidths. For the Mir Mission, bandwidths of 10 Hz and 100 Hz have been selected, pending approval by the Russian counterpart. Sample rates for the acceleration data are 50 and 500 samples per second, respectively. The data obtained at these sample rates will be approximately 400 megabytes (one double-sided optical disk full) per day.

The MIPS shall provide the time signal requested by SAMS. The MIPS time signal is synchronized to the Mir timing signal. This signal is used to time stamp data.

Science Objectives: 1. Provide a time history of the acceleration environment and to characterize the features of this environment to improve future experiment design.
2. Measure and record low level perturbations to the microgravity environment at or near microgravity experiment hardware and to support the microgravity investigators' research.

Functional Objectives: 1. Take module acceleration measurements during the performance of microgravity science experiments.

Sample Transfer Rqd: Yes **Hardware Transfer Rqd:** No

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
1	Spektr	5/20/95	☒	☒
2	Mir 21	2/21/96	☒	☒
2	NASA 2	3/22/96	☒	☒
2	Priroda	4/14/96	☒	☒
2	STS 74 (SM-02)	11/12/95	☒	☒
2	STS 76 (SM-03)	3/22/96	☒	☒
3	Mir 22	8/17/96	☒	☒
3	NASA 3	9/16/96	☒	☒
3	STS 79 (SM-04)	9/16/96	☒	☒
4	Mir 23	2/2/97	☒	☒
4	NASA 4	1/16/97	☒	☒
4	STS 81 (SM-05)	1/16/97	☒	☒
5	Mir 24	6/24/97	☒	☒
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	Mir 25	12/12/97	☒	☒
6	NASA 6	9/18/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒
7	Mir 26	5/30/98	☒	☒
7	NASA 7	1/15/98	☒	☒
7	STS 89 (SM-08)	1/15/98	☒	☒
7	STS 91 (SM-09)	5/29/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
MG	ENV	Flight	160008	Space Acceleration Measurement System (SAMS)
MG	ENV	Flight	820273	SAMS Optical Disk
MG	ENV	Flight	846717	SAMS Logbook

Mission: Mir 24 **Invest. ID:** 890079 **Exp. ID:** SAMS **Russian ID:** SAMS

Invest. Title: Space Acceleration Measurement System (SAMS) Operations **Prime** ☒ **Contingent** ☐

US PI: DeLombard, R. **Russian PI:** Kundik, Ye; Simakov, S.

1. Session ID: MG:FAC:P:10

2. Session: SAMS Proficiency **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 90 **Session Time (mins):** 90

Scheduled Days: L- 45

4. Session Scenario:

Crewmember will perform hands-on SAMS nominal, contingency, and malfunction procedures and have the opportunity to reinforce the knowledge gained from earlier training sessions. Upon completion of this training, the crewmember will be familiar with all aspects of the SAMS and its operation and will be able to describe all nominal and off-nominal functions. The crewmember will be able to recognize all SAMS malfunctions and apply the appropriate malfunction procedure for each situation.

5. Session Constraints:

1. Crewmember may request additional proficiency training.
2. Session to be used to train prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840395	SAMS Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
90	90	1	1	0	Hands-on training

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: Mir 24 **Invest. ID:** 890079 **Exp. ID:** SAMS **Russian ID:** SAMS

Invest. Title: Space Acceleration Measurement System (SAMS) Operations **Prime** ☒ **Contingent** ☐

US PI: DeLombard, R. **Russian PI:** Kundik, Ye; Simakov, S.

1. Session ID: MG:FAC:P:8

2. Session: SAMS Overview and Operations Familiarization **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 145

4. Session Scenario:

Session consists of a general discussion of science background and objectives, SAMS experiment timeline, equipment operation and malfunction procedures, and hardware descriptions. SAMS system and equipment components are described (including hardware illustrations/pictures) along with nominal facility ops from initial on-orbit acitivites to system deactivation. Upon completion of the session, the crewmember will be familiar with SAMS operating procedures, the hardware components and their functions, and the operation of the SAMS. The crewmember will also be familiar with equipment malfunction procedures.

5. Session Constraints:

1. Session used to train prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840395	SAMS Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	60	1	1	0	Classroom instruction

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: Mir 24 **Invest. ID:** 890079 **Exp. ID:** SAMS **Russian ID:** SAMS

Invest. Title: Space Acceleration Measurement System (SAMS) Operations **Prime** ☒ **Contingent** ☐

US PI: DeLombard, R. **Russian PI:** Kundik, Ye; Simakov, S.

1. Session ID: MG:FAC:P:9

2. Session: SAMS Equipment Nominal and Malfunction Operation **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 240

Scheduled Days: L- 144

4. Session Scenario:

Equipment operations are reviewed and any questions concerning operations are clarified. Crewmember will accomplish a complete set of nominal and malfunction procedures and have the opportunity to review off-nominal operations. Upon completion of the session, the crewmember will be able to describe all nominal and off-nominal operation functions associated with the SAMS. The crewmember will be able to recognize all SAMS malfunctions and apply the appropriate malfunction procedure for each situation.

5. Session Constraints:

1. Session to be used to train prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840395	SAMS Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
240	240	1	1	0	Hands-on training

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 890079 **Exp. ID:** SAMS **Russian ID:** SAMS

Invest. Title: Space Acceleration Measurement System (SAMS) Operations **Prime** ☒ **Contingent** ☐

US PI: DeLombard, R. **Russian PI:** Kundik, Ye; Simakov, S.

1. Session ID: MG:FAC:P:8

2. Session: SAMS Overview and Operations Familiarization **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 145

4. Session Scenario:

Session consists of a general discussion of science background and objectives, SAMS experiment timeline, equipment operation and malfunction procedures, and hardware descriptions. SAMS system and equipment components are described (including hardware illustrations/pictures) along with nominal facility ops from initial on-orbit acitivites to system deactivation. Upon completion of the session, the crewmember will be familiar with SAMS operating procedures, the hardware components and their functions, and the operation of the SAMS. The crewmember will also be familiar with equipment malfunction procedures.

5. Session Constraints:

1. Session used to train prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840395	SAMS Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	60	1	1	0	Classroom instruction

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: NASA 5 **Invest. ID:** 890079 **Exp. ID:** SAMS **Russian ID:** SAMS

Invest. Title: Space Acceleration Measurement System (SAMS) Operations **Prime** ☒ **Contingent** ☐

US PI: DeLombard, R. **Russian PI:** Kundik, Ye; Simakov, S.

1. Session ID: MG:FAC:P:9

2. Session: SAMS Equipment Nominal and Malfunction Operation **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 240

Scheduled Days: L- 144

4. Session Scenario:

Equipment operations are reviewed and any questions concerning operations are clarified. Crewmember will accomplish a complete set of nominal and malfunction procedures and have the opportunity to review off-nominal operations. Upon completion of the session, the crewmember will be able to describe all nominal and off-nominal operation functions associated with the SAMS. The crewmember will be able to recognize all SAMS malfunctions and apply the appropriate malfunction procedure for each situation.

5. Session Constraints:

1. Session to be used to train prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840395	SAMS Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
240	240	1	1	0	Hands-on training

8. Data Processing:

1. N/A for pre/postflight sessions.

Mission: Mir 24 **Invest. ID:** 890079 **Exp. ID:** SAMS **Russian ID:** SAMS

Invest. Title: Space Acceleration Measurement System (SAMS) Operations **Prime** ☒ **Contingent** ☐

US PI: DeLombard, R. **Russian PI:** Kundik, Ye; Simakov, S.

1. Session ID: MG:FAC:I:29

2. Session: SAMS Maintenance - TSH Bias Measurement **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 40 **Session Time (mins):** 40

Scheduled Days: FD 4, 34, 64, 94, 124

4. Session Scenario:

Tri-axial sensor heads are subjected to bias measurment procedures.

5. Session Constraints:

1. This session should be performed once per month.
2. This session must also be performed as soon as possible any time the SAMS unit is moved

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160008	Space Acceleration Measurement System (SAMS)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
40	40	1	1	0	TSH bias measurement

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890079 **Exp. ID:** SAMS **Russian ID:** SAMS

Invest. Title: Space Acceleration Measurement System (SAMS) Operations **Prime** ☒ **Contingent** ☐

US PI: DeLombard, R. **Russian PI:** Kundik, Ye; Simakov, S.

1. Session ID: MG:ENV:I:6

Session Type: Inflight

2. Session: SAMS Data Collection for Docking

3. Session Timeline: **Crewtime Usage (mins):** 50 **Session Time (mins):** 1490

Scheduled Days: FD 128

4. Session Scenario:

SAMS is activated using one 100 Hz sensor head and one 10 Hz sensor head. Acceleration forces are measured during shuttle docking event.

5. Session Constraints:

1. Activation should occur between 2 to 10 hours prior to docking.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160008	Space Acceleration Measurement System (SAMS)	1
820273	SAMS Optical Disk	1
846717	SAMS Logbook	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	20	1	1	0	Change disks, if required.
30	30	1	1	0	Activate SAMS
1440	1440	1	0	0	SAMS monitoring operations

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890079 **Exp. ID:** SAMS **Russian ID:** SAMS

Invest. Title: Space Acceleration Measurement System (SAMS) Operations **Prime** ☒ **Contingent** ☐

US PI: DeLombard, R. **Russian PI:** Kundik, Ye; Simakov, S.

1. Session ID: MG:ENV:I:7

2. Session: SAMS Data Collection for Undocking Events **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 5 **Session Time (mins):** 5

Scheduled Days: FD 8

4. Session Scenario:

SAMS data collection is deactivated.

5. Session Constraints:

1. Deactivation of SAMS maybe delayed for as long as necessary after docking.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160008	Space Acceleration Measurement System (SAMS)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Deactivate SAMS

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 890079 **Exp. ID:** SAMS **Russian ID:** SAMS

Invest. Title: Space Acceleration Measurement System (SAMS) Operations **Prime** ☒ **Contingent** ☐

US PI: DeLombard, R. **Russian PI:** Kundik, Ye; Simakov, S.

1. Session ID: MG:LOG:I:4

Session Type: Down Item

2. Session: SAMS Disks Transfer from Mir to Shuttle

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 4

4. Session Scenario:

SAMS disks are transferred from the Mir to the Shuttle.

5. Session Constraints:

1. Session can be performed in conjunction with other down item sessions to optimize crew time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820273	SAMS Optical Disk	6

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	30	1	1	0	Retrieve SAMS disks from Mir location and transfer to Shuttle for return to Earth.

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

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Investigation ID: 890093 **Experiment ID:** BIO3D **Russian ID:** BIO3D

Investigation Title: Biochemistry of 3-D Tissue Engineering - BTS

US Investigators: Lelkes/Hammond

Russian Investigators: N/A

Other Investigators: Goodwin, Thomas

Payload Category: MG **Sub-Cat.:** BT **Subjects Requested:** 0

Description: This investigation will investigate basic cell to cell interactions in a quiescent cell culture environment and their role in the formation of functional cell aggregates.

Science Objectives: The objectives are to investigate cell attachment patterns and interactions among the same cell type (mono-culture) and different cell types (co-culture); and their role in forming a functional tissue.

Functional Objectives: Cell cultures will be transported to the Mir in BSTC-M and integrated in the BEM in the BTS. Culture periods will vary with light microscopy and photography monitoring throughout. Samples will be stored at low temperatures or fixed for return to Earth for analysis.

Sample Transfer Rqd: Yes **Hardware Transfer Rqd:** Yes

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
HLS	CP	Flight	150018	Return to Houston Bag
MG	BT	Flight	160004	Biotechnology System (BTS)
OPS	SHR	Flight	510010	35mm film w/container
MG	BT	Flight	820250	Biotechnology System Stowage
SHR			852227	Camera Flt Bag
MG			854949	BioTechnology Refrigerator (BTR)
MG			854988	BTS-BIO3D Stowage Caddy
MG			854989	Biotechnology Specimen Temp Controller-Mir (BEM/BSTC-M)
MG			854990	BIO3D Increment 5 Logbook
			855587	BTR Module Rack

Mission: NASA 5 **Invest. ID:** 890093 **Exp. ID:** BIO3D **Russian ID:** BIO3D

Invest. Title: Biochemistry of 3-D Tissue Engineering - BTS

Prime ☒
Contingent ☐

US PI: Lelkes/Hammond **Russian PI:** N/A

1. Session ID: MG:BT:P:11

2. Session: Biochemistry of 3-D Tissue Engineering Nominal Operations

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 480 **Session Time (mins):** 480

Scheduled Days: L- 270

4. Session Scenario:

Equipment operations is reviewed and any questions concerning operations clarified. Crewmember will perform a complete set of nominal procedures and have the opportunity to review off-nominal operations. Upon completion of the session, the crewmember will be able to describe all nominal operation functions associated with the Biochemistry of 3-D Tissue Engineering experiment and nominal operation of the BEM and BTR and nominal operation of the BEM/BSTC-M and BTR.

5. Session Constraints:

1. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840402	Biotechnology System (BTS) Training Unit	1
846700	BTS Experiment Module (BEM)/BSTC-M Training Unit	1
854949	BioTechnology Refrigerator (BTR)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
480	480	1	1	0	Hands-on training

8. Data Processing:

1. N/A for pre/post flight sessions.

Mission: NASA 5 **Invest. ID:** 890093 **Exp. ID:** BIO3D **Russian ID:** BIO3D

Invest. Title: Biochemistry of 3-D Tissue Engineering - BTS

Prime ☒
Contingent ☐

US PI: Lelkes/Hammond **Russian PI:** N/A

1. Session ID: MG:BT:P:12

Session Type: Training

2. Session: Biochemistry of 3-D Tissue Engineering Overview and Ops Familiarization

3. Session Timeline: **Crewtime Usage (mins):** 90 **Session Time (mins):** 90

Scheduled Days: L- 270

4. Session Scenario:

Session consists of a general discussion of science background and objectives, experiment timeline, equipment operation and malfunction procedures, and hardware descriptions. BTS system and equipment components are described (including hardware illustrations/pictures) along with experiment hardware ops from initial on-orbit acitivites to system deactivation. Upon completion of the session, the crewmember will be familiar with Biochemistry of 3-D Tissue Engineering operating procedures, the hardware components and their functions, and the experiment operation with the BTS.

5. Session Constraints:

1. Session takes place in the classroom.
2. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840402	Biotechnology System (BTS) Training Unit	1
846700	BTS Experiment Module (BEM)/BSTC-M Training Unit	1
854949	BioTechnology Refrigerator (BTR)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
90	90	1	1	0	Classroom instruction

8. Data Processing:

1. N/A for pre/post flight sessions.

Mission: NASA 5 **Invest. ID:** 890093 **Exp. ID:** BIO3D **Russian ID:** BIO3D

Invest. Title: Biochemistry of 3-D Tissue Engineering - BTS

Prime ☒
Contingent ☐

US PI: Lelkes/Hammond **Russian PI:** N/A

1. Session ID: MG:BT:P:13

2. Session: Biochemistry of 3-D Tissue Engineering Off Nominal Procedures

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 270 **Session Time (mins):** 270

Scheduled Days: L- 150

4. Session Scenario:

Crewmember will perform hands-on nominal, contingency, and malfunction procedures and have the opportunity to reinforce the knowledge gained from earlier training sessions. Upon completion of this training, the crewmember will be familiar with all aspects of the experiment operation and will be able to describe all nominal and off-nominal functions. The crewmember will be able to recognize all malfunctions and apply the appropriate malfunction procedure for each situation.

5. Session Constraints:

1. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840402	Biotechnology System (BTS) Training Unit	1
846700	BTS Experiment Module (BEM)/BSTC-M Training Unit	1
854949	BioTechnology Refrigerator (BTR)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	60	1	1	0	BIO3D Experiment Malfunctions
90	90	1	1	0	Biotechnology Refrigerator (BTR) malfunctions
120	120	1	1	0	BEM/BSTC-M Malfunctions

8. Data Processing:

1. N/A for pre/post flight sessions.

Mission: NASA 5 **Invest. ID:** 890093 **Exp. ID:** BIO3D **Russian ID:** BIO3D

Invest. Title: Biochemistry of 3-D Tissue Engineering - BTS

Prime ☒
Contingent ☐

US PI: Lelkes/Hammond **Russian PI:** N/A

1. Session ID: MG:BT:P:14

Session Type: Training

2. Session: Biochemistry of 3-D Tissue Engineering Proficiency Training

3. Session Timeline: **Crewtime Usage (mins):** 420 **Session Time (mins):** 420

Scheduled Days: L- 150

4. Session Scenario:

Crewmember will perform hands-on nominal, contingency, and malfunction procedures and have the opportunity to reinforce the knowledge gained from earlier training sessions. Upon completion of this training, the crewmember will be familiar with all aspects of the experiment operation and will be able to describe all nominal and off-nominal functions. The crewmember will be able to recognize all malfunctions and apply the appropriate malfunction procedure for each situation.

5. Session Constraints:

1. Session used to train the prime crew.
2. Crew may request additional proficiency training.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840402	Biotechnology System (BTS) Training Unit	1
846700	BTS Experiment Module (BEM)/BSTC-M Training Unit	1
854949	BioTechnology Refrigerator (BTR)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
240	240	1	1	0	BIO3D Experiment
90	90	1	1	0	BEM/BSTC-M
90	90	1	1	0	BTR

8. Data Processing:

1. N/A for pre/post flight sessions.

Mission: STS 84 (SM-06) **Invest. ID:** 890093 **Exp. ID:** BIO3D **Russian ID:** BIO3D

Invest. Title: Biochemistry of 3-D Tissue Engineering - BTS **Prime** ☒ **Contingent** ☐

US PI: Lelkes/Hammond **Russian PI:** N/A

1. Session ID: MG:LOG:I:67

2. Session: Transfer - Hardware and Stowage from Shuttle to Mir **Session Type:** Up Item

3. Session Timeline: **Crewtime Usage (mins):** 105 **Session Time (mins):** 105

Scheduled Days: FD 4

4. Session Scenario:

BIO3D hardware will be transferred from the Shuttle to the Priroda and installed.

5. Session Constraints:

1. Session can be performed in conjunction with other Up Item sessions to optimize crew time.
2. BTR & BSTC-M should not be powered down for more than 45 minutes.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854949	BioTechnology Refrigerator (BTR)	1
854988	BTS-BIO3D Stowage Caddy	1
854989	Biotechnology Specimen Temp Controller-Mir (BEM/BSTC-M)	1
855587	BTR Module Rack	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	20	1	1	0	Power down BEM/BSTC-M, disconnect and transfer to Mir (BTS Location)
25	25	1	1	0	Install BEM/BSTC-M in BTS facility and power up
20	20	1	1	0	Power down BTR, disconnect and transfer to Mir
25	25	1	1	0	Install BTR in BTS facility and power up
15	15	1	1	0	Transfer BTS-Bio3D stowage caddy to Mir

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890093 **Exp. ID:** BIO3D **Russian ID:** BIO3D

Invest. Title: Biochemistry of 3-D Tissue Engineering - BTS

Prime ☒
Contingent ☐

US PI: Lelkes/Hammond **Russian PI:** N/A

1. Session ID: MG:BT:I:16

Session Type: Inflight

2. Session: Cell Sample Transfer, Fixation and Stowage of Fixed Samples

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: FD 7, 14, 21, 28, 35, 42, 56, 63, 70, 77, 84, 105

4. Session Scenario:
Culture samples are transferred to fresh modules and expended modules are fixed and stowed in BTR.

5. Session Constraints:
1. This session may be performed on schedule or minus one day. If schedule is adjusted by minus one day, maintain original flight day intervals.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160004	Biotechnology System (BTS)	1
820250	Biotechnology System Stowage	1
854949	BioTechnology Refrigerator (BTR)	1
854988	BTS-BIO3D Stowage Caddy	1
854989	Biotechnology Specimen Temp Controller-Mir (BEM/BSTC-M)	1
854990	BIO3D Increment 5 Logbook	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Unstow needed supplies
10	10	1	1	0	Open BTR, remove fresh culture modules
30	30	1	1	0	Open BEM/BSTC-M, remove sample from culture modules
80	80	1	1	0	Transfer sample to fresh module, fix expended modules
30	30	1	1	0	Replace culture modules in BEM/BSTC-M
10	10	1	1	0	Place fixed samples in BTR
10	10	1	1	0	Stow supplies

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890093 **Exp. ID:** BIO3D **Russian ID:** BIO3D

Invest. Title: Biochemistry of 3-D Tissue Engineering - BTS

Prime ☒
Contingent ☐

US PI: Lelkes/Hammond **Russian PI:** N/A

1. Session ID: MG:BT:I:18

Session Type: Inflight

2. Session: Science Experiment Termination

3. Session Timeline: **Crewtime Usage (mins):** 10 **Session Time (mins):** 10

Scheduled Days: FD 105

4. Session Scenario:

At the end of the experiment run, the BSTC-M experiment program will be terminated via the hardware's front panel by the BEM operator.

5. Session Constraints:

1. This session will be performed when the last culture samples are removed and fixed on FD 105.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160004	Biotechnology System (BTS)	1
854989	Biotechnology Specimen Temp Controller-Mir (BEM/BSTC-M)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Terminate experiment program via BEM/BSTC-M front panel

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890093 **Exp. ID:** BIO3D **Russian ID:** BIO3D

Invest. Title: Biochemistry of 3-D Tissue Engineering - BTS

Prime ☒
Contingent ☐

US PI: Lelkes/Hammond **Russian PI:** N/A

1. Session ID: MG:BT:I:59

Session Type: Inflight

2. Session: Media Sample and Testing

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: FD 6, 13, 20, 27, 34, 41, 48, 55, 62, 69, 76, 83, 90, 97, 104

4. Session Scenario:
Samples will be removed and analyzed during the experiment to check parameters.

5. Session Constraints:
1. This operation must be performed once every 7 days (-1day) during experiment operations beginning on FD 6 on one module per chamber.
2. This operation must be performed 1 day following Culture Microscopy and Photography operations.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820250	Biotechnology System Stowage	1
854949	BioTechnology Refrigerator (BTR)	1
854988	BTS-BIO3D Stowage Caddy	1
854989	Biotechnology Specimen Temp Controller-Mir (BEM/BSTC-M)	1
854990	BIO3D Increment 5 Logbook	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Unstow needed supplies and PCBA
15	15	1	1	0	Open BEM/BSTC-M, Remove sample from each culture module
60	60	1	1	0	Analyze samples with PCBA
15	15	1	1	0	Replace culture modules in BEM/BSTC-M
10	10	1	1	0	Record Observations
10	10	1	1	0	Stow supplies and PCBA

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890093 **Exp. ID:** BIO3D **Russian ID:** BIO3D

Invest. Title: Biochemistry of 3-D Tissue Engineering - BTS **Prime** ☒ **Contingent** ☐

US PI: Lelkes/Hammond **Russian PI:** N/A

1. Session ID: MG:BT:I:60

2. Session: Culture Microscopy and Photography **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: FD 5, 12, 19, 26, 33, 40, 47, 54, 61, 68, 75, 82, 89, 96, 103

4. Session Scenario:

Cultures will be examined microscopically and photographed.

5. Session Constraints:

1. This operation must be performed once every 7 days (-1day) during experiment operations beginning on FD 5 on one module in each chamber.
2. This operation must be performed 1 day prior to Media Sample and Testing Operations.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150018	Return to Houston Bag	1
510010	35mm film w/container	1
820250	Biotechnology System Stowage	1
852227	Camera Flt Bag	1
854988	BTS-BIO3D Stowage Caddy	1
854989	Biotechnology Specimen Temp Controller-Mir (BEM/BSTC-M)	1
854990	BIO3D Increment 5 Logbook	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Unstow and assemble camera and BTS microscope
15	15	1	1	0	Remove culture modules from BEM/BSTC-M
60	60	1	1	0	View and photograph cultures
15	15	1	1	0	Replace culture modules in BEM/BSTC-M
10	10	1	1	0	Record photography data
10	10	1	1	0	Disassemble and stow camera and BTS microscope, stow film

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890093 **Exp. ID:** BIO3D **Russian ID:** BIO3D

Invest. Title: Biochemistry of 3-D Tissue Engineering - BTS

Prime ☒
Contingent ☐

US PI: Lelkes/Hammond **Russian PI:** N/A

1. Session ID: MG:BT:I:61

Session Type: Inflight

2. Session: BEM/BSTC-M Engineering Evaluation Initiation

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 105

4. Session Scenario:

At the end of the tissue culture portion of the experiment, BEM/BSTC-M will be placed into an automated pre-programmed profile that exercises the hardware for evaluation. Parameters will be recorded during the daily Facility Maintenance Session.

5. Session Constraints:

1. The hardware can be placed in the evaluation mode after the final culture module has been removed.
2. This session will take place after the BTS Facility Functional Test-ECC1, ECC2, GSM.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854989	Biotechnology Specimen Temp Controller-Mir (BEM/BSTC-M)	1
854990	BIO3D Increment 5 Logbook	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	1	0	Log BEM/BSTC-M parameters
15	15	1	1	0	Set BEM/BSTC-M into the evaluation profile

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890093 **Exp. ID:** BIO3D **Russian ID:** BIO3D

Invest. Title: Biochemistry of 3-D Tissue Engineering - BTS **Prime** ☒ **Contingent** ☐

US PI: Lelkes/Hammond **Russian PI:** N/A

1. Session ID: MG:BT:I:67

2. Session: BEM/BSTC-M and BTR Continuous Operations **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 0 **Session Time (mins):** 1440

Scheduled Days: FD 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136

4. Session Scenario:

The BEM/BSTC-M and BTR will operate continuously throughout the course of the mission.

5. Session Constraints:

1. BEM/BSTC-M operation must be on a daily basis.
2. This session must be performed daily until the hardware is transferred to the Shuttle.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854949	BioTechnology Refrigerator (BTR)	1
854989	Biotechnology Specimen Temp Controller-Mir (BEM/BSTC-M)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
1440	1440	1	0	0	BEM/BSTC-M & BTR continuous operations

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890093 **Exp. ID:** BIO3D **Russian ID:** BIO3D

Invest. Title: Biochemistry of 3-D Tissue Engineering - BTS

Prime ☒
Contingent ☐

US PI: Lelkes/Hammond **Russian PI:** N/A

1. Session ID: MG:FAC:I:39

Session Type: Inflight

2. Session: BEM/BSTC-M and BTR Facility Maintenance

3. Session Timeline: **Crewtime Usage (mins):** 10 **Session Time (mins):** 10

Scheduled Days: FD 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136

4. Session Scenario:

BEM/BSTC-M and BTR will be examined visually and its status recorded on a daily basis. The filters on the hardware will be cleaned daily during this session.

5. Session Constraints:

1. This session must be performed at least once every 24 hours..
2. BTS hardware is scheduled for continuous operation in session "BEM/BSTC-M and BTR Continuous Operations" and is required with this session.
3. This session must be performed daily until the hardware is transferred to the Shuttle at the end of the Increment 5 mission.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854949	BioTechnology Refrigerator (BTR)	1
854989	Biotechnology Specimen Temp Controller-Mir (BEM/BSTC-M)	1
854990	BIO3D Increment 5 Logbook	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Visual examination of BEM/BSTC-M and BTR, check temp. & clean fan inlet screen (with grey tape) if necessary
5	5	1	1	0	Recording of BEM/BSTC-M and BTR in Bio3D Increment 5 logbook.

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 890093 **Exp. ID:** BIO3D **Russian ID:** BIO3D

Invest. Title: Biochemistry of 3-D Tissue Engineering - BTS **Prime** ☒ **Contingent** ☐

US PI: Lelkes/Hammond **Russian PI:** N/A

1. Session ID: MG:LOG:I:68

2. Session: Transfer - Hardware and Stowage from Mir to Shuttle **Session Type:** Down Item

3. Session Timeline: **Crewtime Usage (mins):** 75 **Session Time (mins):** 75

Scheduled Days: FD 4

4. Session Scenario:

BEM/BSTC-M, BTR and BTS-BIO3D Stowage Caddy will be transferred from the Priroda to the Shuttle and stowed.

5. Session Constraints:

1. Session can be performed in conjunction with other Down Item sessions to optimize crew time.
2. BTR should not be powered down for more than 45 minutes.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160004	Biotechnology System (BTS)	1
854949	BioTechnology Refrigerator (BTR)	1
854988	BTS-BIO3D Stowage Caddy	1
854989	Biotechnology Specimen Temp Controller-Mir (BEM/BSTC-M)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	20	1	1	0	Power down BEM/BSTC-M, disconnect from BTS facility and transfer to Shuttle
20	20	1	1	0	Power down BTR, disconnect from BTS facility and transfer to Shuttle
25	25	1	1	0	Connect and power up BTR
10	10	1	1	0	Transfer BTS-BIO3D Stowage Caddy

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Investigation ID: 890252 **Experiment ID:** CAPE **Russian ID:** CAPE

Investigation Title: Canadian Protein Crystallization Experiment - MIM

US Investigators: Sygusch, Jurgen

Russian Investigators: N/A

Other Investigators: N/A

Payload Category: MG **Sub-Cat.:** BT **Subjects Requested:** 0

Description: The investigation will utilize the liquid-liquid diffusion technique to grow protein crystals. The proteins will be grown in two separate crystallization units, one mounted in the MIM and the other on the MIM wall.

Science Objectives: Determination of the atomic structure of clinically important protein molecules by means of x-ray diffraction on protein crystals grown in microgravity conditions. Rational for production of new drugs depends on the availability of x-ray diffraction quality protein crystals sufficiently early in the drug developement process.

Functional Objectives: To provide optimum and extended conditions to initiate and promote the protein crystal growth process. To provide a video record of the crystal growth. To compare the growth of protein crystals with and without vibration isolation.

Sample Transfer Rqd: No **Hardware Transfer Rqd:** Yes

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
MG	FAC	Flight	160007	Microgravity Isolation Mount System (MIM)
OPS	SHR	Flight	840003	Mir Interface to Payload Systems-2 (MIPS)
SHR	SHR	Flight	840255	8mm Video Tape
MG	FAC	Flight	852231	MIM Optical Disks
MG			854991	Crystallization Unit A
MG			854992	Controller Unit A
MG			854993	Tape Recorder A
MG			854994	Crystallization Unit B
MG			854995	Controller Unit B
MG			854996	Tape Recorder B
MG			854999	Controller Cable A (CAPE-02-A)
MG			855000	Controller Cable B (CAPE-02-B)
MG			855001	LMA Tray
MG			855002	MIM Interface Plate
MG			855003	Contingency Power Cable
MG			855004	Power Cable A (CAPE-01-A)
MG			855005	Power Cable B (CAPE-01-B)

Mission: NASA 5 **Invest. ID:** 890252 **Exp. ID:** CAPE **Russian ID:** CAPE

Invest. Title: Canadian Protein Crystallization Experiment - MIM

Prime ☒
Contingent ☐

US PI: Sygusch, Jurgen **Russian PI:** N/A

1. Session ID: MG:BT:P:22

2. Session: CAPE Equipment Overview and Operations Familiarization

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 240

4. Session Scenario:

Session consists of a general discussion of science background and objectives, experiment timeline, equipment operation and malfunction procedures, and hardware descriptions, CAPE system and equipment components are described (including hardware illustrations/pictures) along with nominal facility operations. Upon completion of the session, the crewmember will be familiar with the CAPE operating procedures, the hardware components and their functions. The crewmember will also be familiar with equipment malfunction procedures.

5. Session Constraints:

1. Session to be conducted in the classroom.
2. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840393	Microgravity Isolation Mount (MIM) Training Unit	1
854998	Controller Training Unit	2
855002	MIM Interface Plate	1
855006	Video Training Unit	2
855007	Crystallization Training Unit B	1
855008	Crystallization Training Unit A	1
855009	Training Power Cable	2
855010	Training Controller Cable	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	60	1	1	0	Classroom instruction

8. Data Processing:

1. N/A for pre/post flight sessions.

Mission: NASA 5 **Invest. ID:** 890252 **Exp. ID:** CAPE **Russian ID:** CAPE

Invest. Title: Canadian Protein Crystallization Experiment - MIM

Prime ☒
Contingent ☐

US PI: Sygusch, Jurgen **Russian PI:** N/A

1. Session ID: MG:BT:P:23

Session Type: Training

2. Session: CAPE Equipment Nominal and Malfunction Operation

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 240

Scheduled Days: L- 240

4. Session Scenario:

Equipment operations is reviewed and any questions concerning operations clarified. Crewmember will perform a complete set of nominal and malfunction procedures and have the opportunity to review off-nominal operations. Upon completion of the session, the crewmember will be able to describe all nominal and off-nominal operation functions associated with the CAPE. The crewmember will be able to recognize all CAPE malfunctions and apply the appropriate malfunction procedure for each situation.

5. Session Constraints:

1. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840393	Microgravity Isolation Mount (MIM) Training Unit	1
854998	Controller Training Unit	2
855002	MIM Interface Plate	1
855006	Video Training Unit	2
855007	Crystallization Training Unit B	1
855008	Crystallization Training Unit A	1
855009	Training Power Cable	2
855010	Training Controller Cable	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
240	240	1	1	0	Hands-on training

8. Data Processing:

1. N/A for pre/post flight sessions.

Mission: NASA 5 **Invest. ID:** 890252 **Exp. ID:** CAPE **Russian ID:** CAPE

Invest. Title: Canadian Protein Crystallization Experiment - MIM

Prime ☒
Contingent ☐

US PI: Sygusch, Jurgen **Russian PI:** N/A

1. Session ID: MG:BT:P:24

2. Session: CAPE Proficiency

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 240

Scheduled Days: L- 110

4. Session Scenario:

Crewmember will perform hands-on CAPE nominal, contingency, and malfunction procedures and have the opportunity to reinforce the knowledge gained from earlier training sessions. Upon completion of this training, the crewmember will be familiar with all aspects of the CAPE and its operation and will be able to describe all nominal and off-nominal functions. The crewmember will be able to recognize all CAPE malfunctions and apply the appropriate malfunction procedure for each situation.

5. Session Constraints:

1. Crew may request additional proficiency training.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840393	Microgravity Isolation Mount (MIM) Training Unit	1
854998	Controller Training Unit	2
855002	MIM Interface Plate	1
855006	Video Training Unit	2
855007	Crystallization Training Unit B	1
855008	Crystallization Training Unit A	1
855009	Training Power Cable	2
855010	Training Controller Cable	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
240	240	1	1	0	Hands-on training

8. Data Processing:

1. N/A for pre/post flight sessions.

Mission: STS 84 (SM-06) **Invest. ID:** 890252 **Exp. ID:** CAPE **Russian ID:** CAPE

Invest. Title: Canadian Protein Crystallization Experiment - MIM

Prime ☒
Contingent ☐

US PI: Sygusch, Jurgen **Russian PI:** N/A

1. Session ID: MG:LOG:I:73

Session Type: Up Item

2. Session: CAPE Transfer from Shuttle to Mir

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: FD 4

4. Session Scenario:
CAPE is transferred from the Shuttle to the Mir and stowed.

5. Session Constraints:
1. Avoid any unnecessary jarring or bumping of CAPE systems while transferring.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
852231	MIM Optical Disks	4
854991	Crystallization Unit A	1
854992	Controller Unit A	1
854993	Tape Recorder A	1
854994	Crystallization Unit B	1
854995	Controller Unit B	1
854996	Tape Recorder B	1
854999	Controller Cable A (CAPE-02-A)	1
855000	Controller Cable B (CAPE-02-B)	1
855001	LMA Tray	6
855002	MIM Interface Plate	1
855003	Contingency Power Cable	1
855004	Power Cable A (CAPE-01-A)	1
855005	Power Cable B (CAPE-01-B)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	60	1	1	0	Unstow CAPE systems from Shuttle location, transfer to Mir, and stow on Mir.

8. Data Processing:
1. No data downlink required.

Mission: NASA 5 **Invest. ID:** 890252 **Exp. ID:** CAPE **Russian ID:** CAPE

Invest. Title: Canadian Protein Crystallization Experiment - MIM **Prime** ☒ **Contingent** ☐

US PI: Sygusch, Jurgen **Russian PI:** N/A

1. Session ID: MG:BT:I:29

2. Session: CAPE Experiment Initiation **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: FD 8

4. Session Scenario:

Activation of the CAPE to begin the protein crystal growth process.

5. Session Constraints:

1. This session must be performed as soon as possible after the transfer session.
2. Avoid any unnecessary jarring or bumping of CAPE Systems while performing this task.
3. Must be performed after "Mounting & MIM Verification".
4. May be performed 1 day after "Mounting & MIM Verification".

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160007	Microgravity Isolation Mount System (MIM)	1
854991	Crystallization Unit A	1
854992	Controller Unit A	1
854993	Tape Recorder A	1
854994	Crystallization Unit B	1
854995	Controller Unit B	1
854996	Tape Recorder B	1
854999	Controller Cable A (CAPE-02-A)	1
855000	Controller Cable B (CAPE-02-B)	1
855001	LMA Tray	6
855002	MIM Interface Plate	1
855004	Power Cable A (CAPE-01-A)	1
855005	Power Cable B (CAPE-01-B)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
40	40	1	1	0	Activate CAPE System A
20	20	1	1	0	Mount CAPE System B
40	40	1	1	0	Activate CAPE System B
20	20	1	1	0	Activate MIM data storage

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890252 **Exp. ID:** CAPE **Russian ID:** CAPE

Invest. Title: Canadian Protein Crystallization Experiment - MIM **Prime** ☒ **Contingent** ☐

US PI: Sygusch, Jurgen **Russian PI:** N/A

1. Session ID: MG:BT:I:33

Session Type: Inflight

2. Session: CAPE Experiment Termination, Dismount and Stowage

3. Session Timeline: **Crewtime Usage (mins):** 90 **Session Time (mins):** 90

Scheduled Days: FD 39

4. Session Scenario:

Deactivation of the CAPE& MIM to stop the protein crystal growth process. CAPE is dismounted and stowed.

5. Session Constraints:

1. Avoid any unnecessary jarring or bumping of CAPE systems while performing this task.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160007	Microgravity Isolation Mount System (MIM)	1
840255	8mm Video Tape	2
852231	MIM Optical Disks	3
854991	Crystallization Unit A	1
854992	Controller Unit A	1
854993	Tape Recorder A	1
854994	Crystallization Unit B	1
854995	Controller Unit B	1
854996	Tape Recorder B	1
854999	Controller Cable A (CAPE-02-A)	1
855000	Controller Cable B (CAPE-02-B)	1
855002	MIM Interface Plate	1
855003	Contingency Power Cable	1
855004	Power Cable A (CAPE-01-A)	1
855005	Power Cable B (CAPE-01-B)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	20	1	1	0	Deactivate CAPE system A (B)
20	20	1	1	0	Deactivate MIM
20	20	1	1	0	Dismount CAPE system A (B)
30	30	1	1	0	Stow CAPE Systems

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890252 **Exp. ID:** CAPE **Russian ID:** CAPE

Invest. Title: Canadian Protein Crystallization Experiment - MIM **Prime** ☒ **Contingent** ☐

US PI: Sygusch, Jurgen **Russian PI:** N/A

1. Session ID: MG:BT:I:34

Session Type: Inflight

2. Session: CAPE/MIM Continuous Operations

3. Session Timeline: **Crewtime Usage (mins):** 0 **Session Time (mins):** 1440

Scheduled Days: FD 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39

4. Session Scenario:

MIM operates untended during CAPE experiment operations.

5. Session Constraints:

1. This session cannot be performed with other MIM experiments.
2. Do not open locker door on MIM.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160007	Microgravity Isolation Mount System (MIM)	1
854991	Crystallization Unit A	1
854992	Controller Unit A	1
854993	Tape Recorder A	1
854994	Crystallization Unit B	1
854995	Controller Unit B	1
854996	Tape Recorder B	1
854999	Controller Cable A (CAPE-02-A)	1
855000	Controller Cable B (CAPE-02-B)	1
855002	MIM Interface Plate	1
855004	Power Cable A (CAPE-01-A)	1
855005	Power Cable B (CAPE-01-B)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
1440	1440	1	0	0	MIM operates continuously during CAPE experiment operations (untended)

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890252 **Exp. ID:** CAPE **Russian ID:** CAPE

Invest. Title: Canadian Protein Crystallization Experiment - MIM

Prime ☒
Contingent ☐

US PI: Sygusch, Jurgen **Russian PI:** N/A

1. Session ID: MG:BT:I:62

Session Type: Inflight

2. Session: CAPE/MIM Daily Status Checks

3. Session Timeline: **Crewtime Usage (mins):** 10 **Session Time (mins):** 10

Scheduled Days: FD 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39

4. Session Scenario:
Perform daily check of MIM facility and CAPE.

5. Session Constraints:
1. Avoid any unnecessary jarring or bumping of the MIM facility while performing this task.
2. Check may be performed daily plus or minus two days.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160007	Microgravity Isolation Mount System (MIM)	1
854991	Crystallization Unit A	1
854992	Controller Unit A	1
854993	Tape Recorder A	1
854994	Crystallization Unit B	1
854995	Controller Unit B	1
854996	Tape Recorder B	1
854999	Controller Cable A (CAPE-02-A)	1
855000	Controller Cable B (CAPE-02-B)	1
855002	MIM Interface Plate	1
855004	Power Cable A (CAPE-01-A)	1
855005	Power Cable B (CAPE-01-B)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Perform daily status check of MIM and CAPE Tape Recorders.

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890252 **Exp. ID:** CAPE **Russian ID:** CAPE

Invest. Title: Canadian Protein Crystallization Experiment - MIM **Prime** ☒ **Contingent** ☐

US PI: Sygusch, Jurgen **Russian PI:** N/A

1. Session ID: MG:BT:I:63

2. Session: MIM Data Sampling Rate Change **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 9, 19

4. Session Scenario:

Change MIM data sampling rate during experiment operations.

5. Session Constraints:

1. Avoid any unnecessary jarring or bumping of the MIM facility while performing this task.
2. Delaying this session can cause the MIM hard disk to become full causing loss of subsequent data.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160007	Microgravity Isolation Mount System (MIM)	1
840003	Mir Interface to Payload Systems-2 (MIPS)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	30	1	1	0	Change MIM data sampling rate during experiment operations.

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890252 **Exp. ID:** CAPE **Russian ID:** CAPE

Invest. Title: Canadian Protein Crystallization Experiment - MIM

Prime ☒
Contingent ☐

US PI: Sygusch, Jurgen **Russian PI:** N/A

1. Session ID: MG:BT:I:64

Session Type: Inflight

2. Session: CAPE Video Tape Changeout

3. Session Timeline: **Crewtime Usage (mins):** 20 **Session Time (mins):** 20

Scheduled Days: FD 13, 18, 23, 28, 33

4. Session Scenario:
Changeout video tapes during experiment operations.

5. Session Constraints:
1. Avoid any unnecessary jarring or bumping of the MIM facility while performing this task.
2. This session should be performed at 5 day intervals.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160007	Microgravity Isolation Mount System (MIM)	1
840255	8mm Video Tape	2
854993	Tape Recorder A	1
854996	Tape Recorder B	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	20	1	1	0	Changeout video tapes on Tape Recorders A and B.

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890252 **Exp. ID:** CAPE **Russian ID:** CAPE

Invest. Title: Canadian Protein Crystallization Experiment - MIM **Prime** ☒ **Contingent** ☐

US PI: Sygusch, Jurgen **Russian PI:** N/A

1. Session ID: MG:BT:I:65

2. Session: MIM Data Archiving **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: FD 39

4. Session Scenario:

Download MIM data to MIPS Optical Disk.

5. Session Constraints:

1. Avoid any unnecessary jarring or bumping of the MIM facility while performing this task.
2. This session should be performed after the CAPE Experiment Termination, Dismount and Stowage session.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160007	Microgravity Isolation Mount System (MIM)	1
840003	Mir Interface to Payload Systems-2 (MIPS)	1
852231	MIM Optical Disks	3

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	120	1	1	0	Transfer MIM data to Optical Disk through MIPS-2

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890252 **Exp. ID:** CAPE **Russian ID:** CAPE

Invest. Title: Canadian Protein Crystallization Experiment - MIM **Prime** ☒ **Contingent** ☐

US PI: Sygusch, Jurgen **Russian PI:** N/A

1. Session ID: MG:BT:I:66

2. Session: CAPE Mounting to MIM and CAPE/MIM Controller Verification **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 230 **Session Time (mins):** 320

Scheduled Days: FD 7

4. Session Scenario:

The CAPE is unstowed and setup/mounted on the MIM. Selection of optimum MIM isolation mode is performed. CAPE/MIM Configuration files are transferred and Controller verification runs are completed.

5. Session Constraints:

1. This session must be completed before starting any experiment.
2. MIM data will be transfered to Optical Disks after this run.
3. The CAPE experiment is not required to be activated during this session.
4. Data downlinking will be required and should be done at first available opportunity.
5. This session must be performed as soon as possible after transfer from shuttle.
6. Avoid any unnecessary jarring or bumping of CAPE Systems while performing this task.
7. Session must be performed before "Experiment Initiation" session.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160007	Microgravity Isolation Mount System (MIM)	1
840003	Mir Interface to Payload Systems-2 (MIPS)	1
852231	MIM Optical Disks	2
854991	Crystallization Unit A	1
854992	Controller Unit A	1
854993	Tape Recorder A	1
854999	Controller Cable A (CAPE-02-A)	1
855001	LMA Tray	6
855002	MIM Interface Plate	1
855004	Power Cable A (CAPE-01-A)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	30	1	1	0	Retrieve CAPE Systems from stowage
20	20	1	1	0	Activate and mount LMA Trays
20	20	1	1	0	Mount CAPE System A
15	15	1	1	0	MIPS and MIM Activation
35	35	1	1	0	Startup and Configuration file transfer
10	10	1	1	0	Zero calibration and set controller
50	50	1	1	0	Controller verification runs
10	10	1	1	0	Zero calibration and set controller
5	5	1	1	0	Initiate Data analysis
30	30	1	0	0	Data Analysis
5	5	1	1	0	Initiate transfer of results to MIPS-2L
20	20	1	0	0	Transfer data to MIPS-2L

5	5	1	1	0	Initiate transfer to Optical Disk 1
20	20	1	0	0	Data transfer to Optical Disk 1
5	5	1	1	0	Initiate transfer to Optical Disk 2
20	20	1	0	0	Data transfer to Optical Disk 2
5	5	1	1	0	Transfer results to MIPS Optical Disk
5	5	1	1	0	MIM Deactivation
10	10	1	1	0	Downlink Result

8. Data Processing:

1. Data downlink will be required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 890252 **Exp. ID:** CAPE **Russian ID:** CAPE

Invest. Title: Canadian Protein Crystallization Experiment - MIM

Prime ☒
Contingent ☐

US PI: Sygusch, Jurgen **Russian PI:** N/A

1. Session ID: MG:LOG:I:74

Session Type: Down Item

2. Session: CAPE Transfer from Mir to Shuttle

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: FD 4

4. Session Scenario:
CAPE is transferred from the Mir to the Shuttle and stowed.

5. Session Constraints:
1. Avoid any unnecessary jarring or bumping of CAPE systems while performing this task.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840255	8mm Video Tape	12
852231	MIM Optical Disks	4
854991	Crystallization Unit A	1
854992	Controller Unit A	1
854993	Tape Recorder A	1
854994	Crystallization Unit B	1
854995	Controller Unit B	1
854996	Tape Recorder B	1
854999	Controller Cable A (CAPE-02-A)	1
855000	Controller Cable B (CAPE-02-B)	1
855001	LMA Tray	6
855002	MIM Interface Plate	1
855003	Contingency Power Cable	1
855004	Power Cable A (CAPE-01-A)	1
855005	Power Cable B (CAPE-01-B)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	60	1	1	0	Unstow CAPE from Mir location, transfer to Shuttle, and stow on Shuttle. Video record the transfer process.

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

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Investigation ID: 890255 **Experiment ID:** DCAM **Russian ID:** DCAM

Investigation Title: Ambient Diffusion Controlled Protein Crystal Growth

US Investigators: Carter, D.

Russian Investigators: N/A

Other Investigators: DeLucas, L.

Payload Category: MG **Sub-Cat.:** BT **Subjects Requested:** 0

Description: The primary objective of the DCAM experiment is to produce large, high-quality crystals of selected proteins under controlled conditions in microgravity. Crystals of sufficient size and suitable quality are essential for protein crystallographic analysis of molecular structures via x-ray diffraction and computer modeling.
All proteins are pre-loaded into the DCAM prior to the STS ferry flight. Once integrated into Priroda/Mir, and the crystals will grow for the remainder of the flight. Monthly photography sessions will be required throughout the flight. Data recording required will be the maintenance of a temperature log which will be updated during photography sessions and status checks.

The success of the DCAM has been proven on many STS flights; however, the success of these longer duration flights will be determined by the size and quality of the crystals "grown" aboard Mir.

Science Objectives: To grow large, well-ordered crystals of many different types of proteins and viruses for analysis and characterization in ground laboratories.

Functional Objectives:

Sample Transfer Rqd: No **Hardware Transfer Rqd:** Yes

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
2	NASA 2	3/22/96	☒	☒
2	STS 76 (SM-03)	3/22/96	☒	☒
3	NASA 3	9/16/96	☒	☒
3	STS 79 (SM-04)	9/16/96	☒	☒
4	NASA 4	1/16/97	☒	☒
4	STS 81 (SM-05)	1/16/97	☒	☒
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	NASA 6	9/18/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒
7	NASA 7	1/15/98	☒	☒
7	STS 89 (SM-08)	1/15/98	☒	☒
7	STS 91 (SM-09)	5/29/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
ES	SHR	Flight	810236	Nikon F3 Camera System
MG	BT	Flight	846718	PCG Tables
MG	BT	Flight	848787	Diffusion Controlled Protein Crystal Growth (DCAM)

Mission: NASA 5 **Invest. ID:** 890255 **Exp. ID:** DCAM **Russian ID:** DCAM

Invest. Title: Ambient Diffusion Controlled Protein Crystal Growth

Prime ☒
Contingent ☐

US PI: Carter, D. **Russian PI:** N/A

1. Session ID: MG:BT:P:19

Session Type: Training

2. Session: DCAM Overview and Operations Familiarization

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: L- 123

4. Session Scenario:

Session consists of a general discussion of science background and objectives, experiment timeline, equipment operation, and hardware descriptions. DCAM system and equipment components are described (including hardware illustrations/pictures) along with nominal facility operations from initial on-orbit installation to removal for return to ground. Upon completion of the session, the crewmember will be familiar with DCAM operations and procedures, the hardware components and their functions.

5. Session Constraints:

1. Session to be conducted in the classroom.
2. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848788	Diffusion Controlled Protein Crystal Growth (DCAM) Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	30	1	1	0	Classroom instruction

8. Data Processing:

1. N/A for pre/post flight sessions.

Mission: NASA 5 **Invest. ID:** 890255 **Exp. ID:** DCAM **Russian ID:** DCAM

Invest. Title: Ambient Diffusion Controlled Protein Crystal Growth

Prime ☒
Contingent ☐

US PI: Carter, D. **Russian PI:** N/A

1. Session ID: MG:BT:P:20

2. Session: DCAM Equipment Operations

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: L- 122

4. Session Scenario:

Equipment operations is reviewed and any questions concerning operations clarified. Crewmember will perform a complete set of installation, photography, and de-installation procedures. Upon completion of the session, the crewmember will be able to describe all nominal operation functions associated with the DCAM.

5. Session Constraints:

1. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848788	Diffusion Controlled Protein Crystal Growth (DCAM) Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	30	1	1	0	Hands-on training

8. Data Processing:

1. N/A for pre/post flight sessions.

Mission: NASA 5 **Invest. ID:** 890255 **Exp. ID:** DCAM **Russian ID:** DCAM

Invest. Title: Ambient Diffusion Controlled Protein Crystal Growth

Prime ☒
Contingent ☐

US PI: Carter, D. **Russian PI:** N/A

1. Session ID: MG:BT:P:21

2. Session: DCAM Proficiency

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 80

4. Session Scenario:

Crewmember will perform hands-on DCAM nominal, contingency, and malfunction procedures and have the opportunity to reinforce the knowledge gained from earlier training sessions. Upon completion of this training, the crewmember will be familiar with all aspects of the DCAM and its operation and will be able to describe all nominal and off-nominal functions. The crewmember will be able to recognize all DCAM malfunctions and apply the appropriate malfunction procedure for each situation.

5. Session Constraints:

1. Crew may request additional proficiency training.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848788	Diffusion Controlled Protein Crystal Growth (DCAM) Training Unit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	60	1	1	0	Hands-on training

8. Data Processing:

1. N/A for pre/post flight sessions.

Mission: STS 84 (SM-06) **Invest. ID:** 890255 **Exp. ID:** DCAM **Russian ID:** DCAM

Invest. Title: Ambient Diffusion Controlled Protein Crystal Growth **Prime** ☒ **Contingent** ☐

US PI: Carter, D. **Russian PI:** N/A

1. Session ID: MG:LOG:I:71

Session Type: Up Item

2. Session: DCAM Transfer and Installation in Mir

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 4

4. Session Scenario:

DCAMs are transferred from the Shuttle to Mir and stowed.

5. Session Constraints:

1. It is suggested that this session should be performed in conjunction with the "DCAM Transfer from Mir to Shuttle" returning the previous long duration DCAM trays.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848787	Diffusion Controlled Protein Crystal Growth (DCAM)	3

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	30	1	1	0	Unstow DCAM from Shuttle location, transfer to Mir, and stow on Mir.

8. Data Processing:

1. No data downlink required.

Mission: NASA 5 **Invest. ID:** 890255 **Exp. ID:** DCAM **Russian ID:** DCAM

Invest. Title: Ambient Diffusion Controlled Protein Crystal Growth **Prime** ☒ **Contingent** ☐

US PI: Carter, D. **Russian PI:** N/A

1. Session ID: MG:BT:I:28

2. Session: DCAM Photography Operations **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 245 **Session Time (mins):** 125

Scheduled Days: FD 31, 61, 91, 121

4. Session Scenario:

Protein samples within the DCAM are to be photographed periodically during the growth process. Note that the growth process initiation and termination requires no crew interaction (automated).

5. Session Constraints:

1. Session must be performed once per month starting approximately 30 days after arrival on orbit and continuing through the end of the mission.
2. Photography performed by NASA crewmember with assistance from a Mir crewmember.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
810236	Nikon F3 Camera System	1
848787	Diffusion Controlled Protein Crystal Growth (DCAM)	3

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	120	1	2	0	Remove camera from stowage, photograph samples, and return camera to stowage
5	5	1	1	0	Visually observe samples and record observations in on-board procedures PCG tables

8. Data Processing:

1. No data downlink required.

Mission: STS 86 (SM-07) **Invest. ID:** 890255 **Exp. ID:** DCAM **Russian ID:** DCAM

Invest. Title: Ambient Diffusion Controlled Protein Crystal Growth

Prime ☒
Contingent ☐

US PI: Carter, D. **Russian PI:** N/A

1. Session ID: MG:LOG:I:72

Session Type: Down Item

2. Session: DCAM Transfer from Mir to Shuttle

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 4

4. Session Scenario:

DCAMs are transferred from the Mir to Shuttle and stowed.

5. Session Constraints:

1. Crewmember will need to remove the log pages from the on-board procedures and transfer them for return to Houston.
2. It is suggested that this session be performed with the "DCAM transfer and Installation in Mir" session reflecting the upcoming long duration stowage of the DCAM trays.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
846718	PCG Tables	1
848787	Diffusion Controlled Protein Crystal Growth (DCAM)	3

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	30	1	1	0	Unstow DCAM from Mir location, transfer to Shuttle, and stow on Shuttle.

8. Data Processing:

1. No data downlink required.

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Investigation ID: 890265 **Experiment ID:** CGEL **Russian ID:** CGEL

Investigation Title: Colloidal Gelation

US Investigators: Weitz, D.

Russian Investigators: N/A

Other Investigators: N/A

Payload Category: MG **Sub-Cat.:** FP **Subjects Requested:**

Description: The goal of CGEL is to investigate a series of critical problems in colloid science that can not be investigated on Earth due to limitations imposed by sedimentation or convection. The results obtained in CGEL will not only significantly further our understanding of the fundamental physics of colloidal suspensions, but will also facilitate our goal of fabricating novel materials using colloidal precursors. In particular, CGEL will allow us to use static and dynamic light scattering to monitor the behavior of the colloidal samples.

Science Objectives: There are three separate experiments in CGEL, each with its own scientific objective.
1.) Binary Alloy Colloidal Crystals: study the growth mechanisms and structure of colloidal crystals formed by mixtures of different colloids.
2.) Colloid-Polymer Mixtures: study the non-equilibrium gel structure formed when sufficient polymer is mixed with a colloidal suspension, inducing an attractive interaction due to depletion.
3.) Fractal Colloid Gels: confirm that fractal colloidal gels can in fact be grown in microgravity and to check whether this can be done with a variety of different colloidal particles.

Functional Objectives:
1. Unstow Equipment and Setup in MGBx.
2. Process Binary Colloidal Alloy samples.
3. Perform Colloid Polymer Mixtures.
4. Process Fractal Aggregation Samples.
5. Deactivate and Stow CGEL equipment.

Sample Transfer Rqd: No **Hardware Transfer Rqd:** Yes

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒
7	NASA 7	1/15/98	☒	☒
7	STS 89 (SM-08)	1/15/98	☒	☒
7	STS 91 (SM-09)	5/29/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
MG	FAC	Flight	160006	Microgravity Glovebox System
MG	ENV	Flight	160008	Space Acceleration Measurement System (SAMS)
OPS	SHR	Flight	510010	35mm film w/container
ES	SHR	Flight	810236	Nikon F3 Camera System
MG	ENV	Flight	820273	SAMS Optical Disk
SHR	SHR	Flight	840255	8mm Video Tape
MG	FAC	Flight	840406	Microgravity Glovebox (MGBX) Video System
MG			854851	PCMCIA Hard Drive
MG	FP	Flight	855030	Airlock/Cable Assembly
MG	FP	Flight	855031	External Data Cable
MG	FP	Flight	855032	External Signal Cable
MG	FP	Flight	855033	External Power Cable
MG	FP	Flight	855034	Internal Power Cable
MG	FP	Flight	855035	Loose Parts Box
MG	FP	Flight	855036	Module
MG	FP	Flight	855037	Power Control Box
MG	FP	Flight	855038	Sample Cell Holder
MG	FP	Flight	855039	Sample Cell Holder Foam
MG	FP	Flight	855040	Docking Station
MG	FP	Flight	855041	IBM Thinkpad

MG	FP	Flight	855042	Video Camera
MG	FP	Flight	855043	Source/Detector Module, Spare
MG	FP	Flight	855044	Camera Fixture Base
MG	FP	Flight	855045	Camera Fixture Rod Assembly
MG	FP	Flight	855046	Docking Station Power Cable
MG	FP	Flight	855047	PLS Extension Cable
			855602	DC Power Supply
			855603	DC Power Supply Cable

Mission: NASA 5 **Invest. ID:** 890265 **Exp. ID:** CGEL **Russian ID:** CGEL

Invest. Title: Colloidal Gelation

Prime ☒
Contingent ☐

US PI: Weitz, D. **Russian PI:** N/A

1. Session ID: MG:FP:P:68

2. Session: CGEL Overview and Operations Familiarization

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 280

4. Session Scenario:

Session consists of a general discussion of science background and objectives, CGEL experiment timeline, equipment operation and malfunction procedures, and hardware descriptions. CGEL system and equipment components are described (including hardware illustrations/pictures) along with nominal facility ops from initial on-orbit acitivites to system deactivation. Upon completion of the session, the crewmember will be familiar with operating procedures, the hardware components and their functions, and the operation of the CGEL. The crewmember will also be familiar with equipment malfunction procedures.

5. Session Constraints:

1. Session takes place in the classroom.
2. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840395	SAMS Training Unit	1
840396	Microgravity Glovebox (MGBX) Training Unit	1
854851	PCMCIA Hard Drive	1
855013	Airlock/Cable Assembly	1
855014	External Data Cable	1
855015	External Signal Cable	1
855016	External Power Cable	1
855017	Loose Parts Box	1
855018	Internal Power Cable	1
855019	Module	1
855020	Power Control Box	1
855021	Sample Cell Holder	1
855022	Sample Cell Holder Foam	1
855023	Docking Station	1
855024	IBM Thinkpad	1
855025	Video Camera	1
855026	Camera Fixture Base	1
855027	Camera Fixture Rod Assembly	1
855028	Docking Station Power Cable	1
855029	PLS Extension Cable	1
855602	DC Power Supply	1
855603	DC Power Supply Cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	60	1	1	0	Classroom instruction

8. Data Processing:

1. N/A for pre/post flight sessions.

Mission: NASA 5 **Invest. ID:** 890265 **Exp. ID:** CGEL **Russian ID:** CGEL

Invest. Title: Colloidal Gelation

Prime ☒
Contingent ☐

US PI: Weitz, D. **Russian PI:** N/A

1. Session ID: MG:FP:P:69

2. Session: CGEL Equipment Nominal and Malfunction Operations

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 300 **Session Time (mins):** 300

Scheduled Days: L- 150, 280

4. Session Scenario:

Equipment operations is reviewed and any questions concerning operations clarified. Crewmember will perform a complete set of nominal and malfunction procedures and have the opportunity to review off-nominal operations. Upon completion of the session, the crewmember will be able to describe all nominal and off-nominal operation functions associated with the CGEL. The crewmember will be able to recognize all CGEL malfunctions and apply the appropriate malfunction procedure for each situation.

5. Session Constraints:

1. Session used to train the prime crew.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840395	SAMS Training Unit	1
840396	Microgravity Glovebox (MGBX) Training Unit	1
854851	PCMCIA Hard Drive	1
855013	Airlock/Cable Assembly	1
855014	External Data Cable	1
855015	External Signal Cable	1
855016	External Power Cable	1
855017	Loose Parts Box	1
855018	Internal Power Cable	1
855019	Module	1
855020	Power Control Box	1
855021	Sample Cell Holder	1
855022	Sample Cell Holder Foam	1
855023	Docking Station	1
855024	IBM Thinkpad	1
855025	Video Camera	1
855026	Camera Fixture Base	1
855027	Camera Fixture Rod Assembly	1
855028	Docking Station Power Cable	1
855029	PLS Extension Cable	1
855602	DC Power Supply	1
855603	DC Power Supply Cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
300	300	1	1	0	Hands-on training

8. Data Processing:

1. N/A for pre/post flight sessions.

Mission: NASA 5 **Invest. ID:** 890265 **Exp. ID:** CGEL **Russian ID:** CGEL

Invest. Title: Colloidal Gelation

Prime ☒
Contingent ☐

US PI: Weitz, D. **Russian PI:** N/A

1. Session ID: MG:FP:P:70

2. Session: CGEL Proficiency

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: L- 150

4. Session Scenario:

Crewmember will perform hands-on CGEL nominal, contingency, and malfunction procedures and have the opportunity to reinforce the knowledge gained from earlier training sessions. Upon completion of this training, the crewmember will be familiar with all aspects of the CGEL and its operation and will be able to describe all nominal and off-nominal functions. The crewmember will be able to recognize all CGEL malfunctions and apply the appropriate malfunction procedure for each situation.

5. Session Constraints:

1. Crew may request additional proficiency training.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840395	SAMS Training Unit	1
840396	Microgravity Glovebox (MGBX) Training Unit	1
854851	PCMCIA Hard Drive	1
855013	Airlock/Cable Assembly	1
855014	External Data Cable	1
855015	External Signal Cable	1
855016	External Power Cable	1
855017	Loose Parts Box	1
855018	Internal Power Cable	1
855019	Module	1
855020	Power Control Box	1
855021	Sample Cell Holder	1
855022	Sample Cell Holder Foam	1
855023	Docking Station	1
855024	IBM Thinkpad	1
855025	Video Camera	1
855026	Camera Fixture Base	1
855027	Camera Fixture Rod Assembly	1
855028	Docking Station Power Cable	1
855029	PLS Extension Cable	1
855602	DC Power Supply	1
855603	DC Power Supply Cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
180	180	1	1	0	Hands-on training

8. Data Processing:

1. N/A for pre/post flight sessions.

Mission: STS 84 (SM-06) **Invest. ID:** 890265 **Exp. ID:** CGEL **Russian ID:** CGEL

Invest. Title: Colloidal Gelation

Prime ☒
Contingent ☐

US PI: Weitz, D. **Russian PI:** N/A

1. Session ID: MG:LOG:I:89

Session Type: Up Item

2. Session: CGEL Transfer from Shuttle to Mir

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 4

4. Session Scenario:
CGEL Transfer from Shuttle to Mir

5. Session Constraints:
1. None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854851	PCMCIA Hard Drive	3
855030	Airlock/Cable Assembly	1
855031	External Data Cable	1
855032	External Signal Cable	1
855033	External Power Cable	1
855034	Internal Power Cable	1
855035	Loose Parts Box	1
855036	Module	1
855037	Power Control Box	1
855038	Sample Cell Holder	7
855039	Sample Cell Holder Foam	1
855040	Docking Station	2
855041	IBM Thinkpad	2
855042	Video Camera	1
855043	Source/Detector Module, Spare	1
855044	Camera Fixture Base	1
855045	Camera Fixture Rod Assembly	1
855046	Docking Station Power Cable	1
855047	PLS Extension Cable	1
855602	DC Power Supply	1
855603	DC Power Supply Cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	30	1	1	0	CGEL Transfer from Shuttle to Mir

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890265 **Exp. ID:** CGEL **Russian ID:** CGEL

Invest. Title: Colloidal Gelation

Prime ☒
Contingent ☐

US PI: Weitz, D. **Russian PI:** N/A

1. Session ID: MG:FP:I:72

2. Session: Unstow Equipment and Setup in MGBx

Session Type: Inflight

3. Session Timeline: **Crewtime Usage (mins):** 135 **Session Time (mins):** 135

Scheduled Days: FD 5

4. Session Scenario:
Unstow CGEL equipment, install in MGBx, power up, and initialize the experiment.

5. Session Constraints:
1. This session must be performed prior to session "Gel Properties for Colloidal Polymer Mixtures-IIA".

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160006	Microgravity Glovebox System	1
160008	Space Acceleration Measurement System (SAMS)	1
840406	Microgravity Glovebox (MGBX) Video System	1
854851	PCMCIA Hard Drive	1
855030	Airlock/Cable Assembly	1
855031	External Data Cable	1
855032	External Signal Cable	1
855033	External Power Cable	1
855034	Internal Power Cable	1
855035	Loose Parts Box	1
855036	Module	1
855037	Power Control Box	1
855038	Sample Cell Holder	1
855039	Sample Cell Holder Foam	1
855040	Docking Station	1
855041	IBM Thinkpad	1
855042	Video Camera	1
855046	Docking Station Power Cable	1
855047	PLS Extension Cable	1
855602	DC Power Supply	1
855603	DC Power Supply Cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Unstow and setup CGEL mixer
60	60	1	1	0	Unstow equipment and setup in MGBx
15	15	1	1	0	Install SAMS on MGBx
50	50	1	1	0	Initialize experiment

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contigency situation.

Mission: NASA 5 **Invest. ID:** 890265 **Exp. ID:** CGEL **Russian ID:** CGEL

Invest. Title: Colloidal Gelation

Prime ☒
Contingent ☐

US PI: Weitz, D. **Russian PI:** N/A

1. Session ID: MG:FP:I:73

2. Session: Binary Colloidal Alloy Samples - IA

Session Type: Inflight

3. Session Timeline: **Crewtime Usage (mins):** 215 **Session Time (mins):** 380

Scheduled Days: FD 47

4. Session Scenario:
Binary colloidal alloy samples are unstowed and inspected, homogenized, and experiment operations performed.

5. Session Constraints:
1. Each sample must be run in this session prior to processing the samples through session "Binary Colloidal Alloy Samples - IB".
2. Experiment operations must take place on one sample at a time, 3 samples per session.
3. Samples must be homogenized and processed in the same day.
4. CGEL equipment is setup in MGBx prior to this session.
5. The video tapes must be correlated to each of the Binary Colloidal Alloy Samples such that only one sample is recorded on a particular video tape.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160006	Microgravity Glovebox System	1
160008	Space Acceleration Measurement System (SAMS)	1
840255	8mm Video Tape	3
840406	Microgravity Glovebox (MGBX) Video System	1
854851	PCMCIA Hard Drive	1
855030	Airlock/Cable Assembly	1
855031	External Data Cable	1
855032	External Signal Cable	1
855033	External Power Cable	1
855034	Internal Power Cable	1
855035	Loose Parts Box	1
855036	Module	1
855037	Power Control Box	1
855038	Sample Cell Holder	1
855039	Sample Cell Holder Foam	1
855040	Docking Station	1
855041	IBM Thinkpad	1
855042	Video Camera	1
855046	Docking Station Power Cable	1
855047	PLS Extension Cable	1
855602	DC Power Supply	1
855603	DC Power Supply Cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
40	40	1	1	0	Power Up MGBx and SAMS

40	40	1	1	0	
5	5	1	1	0	Label and install video tape in DAVID
10	10	1	1	0	Power up CGEL hardware
15	15	1	1	0	Unstow, inspect, homogenize and install first sample in CGEL
30	30	1	1	0	Perform video operations on first sample
5	5	1	1	0	Initiate experiment operations
30	30	1	0	0	Unattended experiment operations
5	5	1	1	0	Monitor experiment operations
25	25	1	0	0	Unattended experiment operations
5	5	1	1	0	Remove sample and stow
15	15	1	1	0	Unstow, inspect, homogenize and install second sample in CGEL
30	30	1	1	0	Perform video operations on second sample
5	5	1	1	0	Initiate experiment operations
30	30	1	0	0	Unattended experiment operations
5	5	1	1	0	Monitor experiment operations
25	25	1	0	0	Unattended experiment operations
5	5	1	1	0	Remove sample and stow
15	15	1	1	0	Unstow, inspect, homogenize and install third sample in CGEL
30	30	1	1	0	Perform video operations
5	5	1	1	0	Initiate experiment operations
30	30	1	0	0	Unattended experiment operations
5	5	1	1	0	Monitor experiment operations
25	25	1	0	0	Unattended experiment operations
5	5	1	1	0	Remove sample and stow
10	10	1	1	0	Power down CGEL
5	5	1	1	0	Power down MGBx and SAMS

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890265 **Exp. ID:** CGEL **Russian ID:** CGEL

Invest. Title: Colloidal Gelation

Prime ☒
Contingent ☐

US PI: Weitz, D. **Russian PI:** N/A

1. Session ID: MG:FP:I:74

2. Session: Binary Colloidal Alloy Samples - IB

Session Type: Inflight

3. Session Timeline: **Crewtime Usage (mins):** 255 **Session Time (mins):** 405

Scheduled Days: FD 49, 55, 79, 111

4. Session Scenario:

Binary colloidal alloy samples are photographed and experiment operations continue to document crystal growth.

5. Session Constraints:

1. Each sample must be run in session "Binary Colloidal Alloy Samples - IA" prior to processing in this session.
2. Experiment operations must take place on one sample at a time, 3 samples per session.
3. This session must be performed on the scheduled day (+/- 1day) after the samples have been processed in session "Binary Colloidal Alloy Samples - IA".
4. Photograph only those samples showing striking crystal development.
5. CGEL equipment is setup in MGBx prior to this session.
6. The video tapes must be correlated to each of the Binary Colloidal Alloy Samples such that only one sample is recorded on a particular video tape. The same video tape used for a particular sample in "Binary Colloidal Alloy Samples - IA" must be used in this session.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160006	Microgravity Glovebox System	1
160008	Space Acceleration Measurement System (SAMS)	1
510010	35mm film w/container	1
810236	Nikon F3 Camera System	1
840255	8mm Video Tape	3
840406	Microgravity Glovebox (MGBX) Video System	1
854851	PCMCIA Hard Drive	1
855030	Airlock/Cable Assembly	1
855031	External Data Cable	1
855032	External Signal Cable	1
855033	External Power Cable	1
855034	Internal Power Cable	1
855035	Loose Parts Box	1
855036	Module	1
855037	Power Control Box	1
855038	Sample Cell Holder	1
855039	Sample Cell Holder Foam	1
855040	Docking Station	1
855041	IBM Thinkpad	1
855042	Video Camera	1
855044	Camera Fixture Base	1
855045	Camera Fixture Rod Assembly	1
855046	Docking Station Power Cable	1
855047	PLS Extension Cable	1

855602	DC Power Supply	1
855603	DC Power Supply Cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
40	40	1	1	0	Power up MGBx and SAMS
30	30	1	1	0	Setup for 35 mm photography
60	60	1	1	0	Inspect and photograph crystaline samples (max=3 samples)
15	15	1	1	0	Stow photography equipment
10	10	1	1	0	Power up CGEL hardware
5	5	1	1	0	Install first sample in CGEL experiment module
10	10	1	1	0	Perform video operations on first sample
50	50	1	0	0	Unattended experiment operations
10	10	1	1	0	Remove and stow video tape; Install video tape for next sample
5	5	1	1	0	Remove sample and stow
5	5	1	1	0	Install second sample in CGEL experiment module
10	10	1	1	0	Perform video operations on second sample
50	50	1	0	0	Unattended experiment operations
10	10	1	1	0	Remove and stow video tape; Install video tape for next sample
5	5	1	1	0	Remove sample and stow
5	5	1	1	0	Install third sam[ple in CGEL experiment module
10	10	1	1	0	Perform video operations on third sample
50	50	1	0	0	Unattended experiment operations
5	5	1	1	0	Remove and stow video tape
5	5	1	1	0	Remove sample and stow
10	10	1	1	0	Power down CGEL
5	5	1	1	0	Power down MGBx and SAMS

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890265 **Exp. ID:** CGEL **Russian ID:** CGEL

Invest. Title: Colloidal Gelation

Prime ☒
Contingent ☐

US PI: Weitz, D. **Russian PI:** N/A

1. Session ID: MG:FP:I:75

2. Session: GEL Properties for Colloid Polymer Mixtures - IIA

Session Type: Inflight

3. Session Timeline: **Crewtime Usage (mins):** 90 **Session Time (mins):** 360

Scheduled Days: FD 11, 13, 16

4. Session Scenario:

Colloidal polymer samples are homogenized and a brief set of experiment operations are performed, followed by a waiting period with a final experiment operations session.

5. Session Constraints:

1. Experiment operations must take place on two samples each day.
2. Initial homogenization must be done just prior to experiment operations (on the same day).
3. CGEL hardware and mixer are setup in the MGBx prior to the start of this session.
4. Flight days may be scheduled +/- 1 day.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160006	Microgravity Glovebox System	1
160008	Space Acceleration Measurement System (SAMS)	1
854851	PCMCIA Hard Drive	1
855030	Airlock/Cable Assembly	1
855031	External Data Cable	1
855032	External Signal Cable	1
855033	External Power Cable	1
855034	Internal Power Cable	1
855035	Loose Parts Box	1
855036	Module	1
855037	Power Control Box	1
855038	Sample Cell Holder	2
855039	Sample Cell Holder Foam	1
855040	Docking Station	1
855041	IBM Thinkpad	1
855046	Docking Station Power Cable	1
855602	DC Power Supply	1
855603	DC Power Supply Cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Power up MGBx and SAMS
10	10	1	1	0	Power up CGEL
5	5	1	1	0	Unstow next sample
5	5	1	1	0	Homogenize sample
5	5	1	1	0	Install sample in CGEL experiment module and start operations
80	80	1	0	0	Unattended operations
5	5	1	1	0	Experiment operations

30	30	1	0	0	Unattended operations
5	5	1	1	0	Experiment operations
25	25	1	0	0	Unattended operations
5	5	1	1	0	Remove sample and stow
5	5	1	1	0	Unstow next sample
5	5	1	1	0	Homogenize sample
5	5	1	1	0	Install sample in CGEL experiment module and start operations
80	80	1	0	0	Unattended operations
5	5	1	1	0	Experiment operations
30	30	1	0	0	Unattended operations
5	5	1	1	0	Experiment operations
25	25	1	0	0	Unattended operations
5	5	1	1	0	Remove sample and stow
10	10	1	1	0	Power down CGEL
5	5	1	1	0	Power down MGBx and SAMS

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890265 **Exp. ID:** CGEL **Russian ID:** CGEL

Invest. Title: Colloidal Gelation

Prime ☒
Contingent ☐

US PI: Weitz, D. **Russian PI:** N/A

1. Session ID: MG:FP:I:76

Session Type: Inflight

2. Session: Gel Properties for Colloid Polymer Homogenization - IIB

3. Session Timeline: **Crewtime Usage (mins):** 80 **Session Time (mins):** 80

Scheduled Days: FD 16

4. Session Scenario:

All 6 colloidal polymer are homogenized and stowed where they will not be disturbed for 30 days.

5. Session Constraints:

1. CGEL hardware and mixer are setup in MGBx prior to the start of this sesion.
2. Final homogenization must occur on all colloid polymer samples in the sample holder during the mixing setup.
3. Samples must be stowed where they will not be disturbed for approximately 30 days after final homogenization.
4. Session "Gel Properties for Colloid Polymer Mixtures - IIA" must be complete before this session is performed.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160006	Microgravity Glovebox System	1
160008	Space Acceleration Measurement System (SAMS)	1
854851	PCMCIA Hard Drive	1
855030	Airlock/Cable Assembly	1
855031	External Data Cable	1
855032	External Signal Cable	1
855033	External Power Cable	1
855034	Internal Power Cable	1
855035	Loose Parts Box	1
855036	Module	1
855037	Power Control Box	1
855038	Sample Cell Holder	1
855039	Sample Cell Holder Foam	1
855040	Docking Station	1
855041	IBM Thinkpad	1
855046	Docking Station Power Cable	1
855602	DC Power Supply	1
855603	DC Power Supply Cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
40	40	1	1	0	Power up MGBx and SAMS
10	10	1	1	0	Power up CGEL
5	5	1	1	0	Unstow samples
40	40	1	1	0	Homogenize all six colloid polymer samples
5	5	1	1	0	Stow all six samples

10	10	1	1	0	Power down CGEL
5	5	1	1	0	Power down MGBx and SAMS

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890265 **Exp. ID:** CGEL **Russian ID:** CGEL

Invest. Title: Colloidal Gelation

Prime ☒
Contingent ☐

US PI: Weitz, D. **Russian PI:** N/A

1. Session ID: MG:FP:I:77

2. Session: Three Phase Colloid Polymer Initiation - IIC

Session Type: Inflight

3. Session Timeline: **Crewtime Usage (mins):** 155 **Session Time (mins):** 270

Scheduled Days: FD 17

4. Session Scenario:

A three phase colloidal polymer sample is homogenized, followed by a waiting period and then experiment operations which include video and still photography.

5. Session Constraints:

1. Session "Three Phase Colloid Polymer Growth - IID" must be started after this session.
2. CGEL hardware is setup in MGBx prior to the start of this session.
3. Sample must be disturbed as little as possible after the initial homogenization to allow for crystal growth.
4. A new video tape must be used for this session.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160006	Microgravity Glovebox System	1
160008	Space Acceleration Measurement System (SAMS)	1
510010	35mm film w/container	1
810236	Nikon F3 Camera System	1
840255	8mm Video Tape	1
840406	Microgravity Glovebox (MGBX) Video System	1
854851	PCMCIA Hard Drive	1
855030	Airlock/Cable Assembly	1
855031	External Data Cable	1
855032	External Signal Cable	1
855033	External Power Cable	1
855034	Internal Power Cable	1
855035	Loose Parts Box	1
855036	Module	1
855037	Power Control Box	1
855038	Sample Cell Holder	1
855039	Sample Cell Holder Foam	1
855040	Docking Station	1
855041	IBM Thinkpad	1
855042	Video Camera	1
855044	Camera Fixture Base	1
855045	Camera Fixture Rod Assembly	1
855046	Docking Station Power Cable	1
855047	PLS Extension Cable	1
855602	DC Power Supply	1
855603	DC Power Supply Cable	1

7. Session Flow:

1g Time	0g Time	0g

(mins)	(mins)	Factor	Operators	Subjects	Description
40	40	1	1	0	Power up MGBx and SAMS
10	10	1	1	0	Power up CGEL
10	10	1	1	0	Unstow sample, label and install video tape
5	5	1	1	0	Homogenize sample
5	5	1	1	0	Install sample in CGEL experiment module
60	60	1	0	0	Unattended operation
20	20	1	1	0	Perform video operations
5	5	1	1	0	Experiment operations
30	30	1	0	0	Unattended operation
5	5	1	1	0	Experiment operations
25	25	1	0	0	Unattended operation
5	5	1	1	0	Remove sample and stow
10	10	1	1	0	Power down CGEL
30	30	1	1	0	Setup for 35 mm photography
20	20	1	1	0	Inspect and photograph
15	15	1	1	0	Stow photography equipment
5	5	1	1	0	Stow sample in a place where it will not be disturbed
5	5	1	1	0	Power down MGBx and SAMS

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890265 **Exp. ID:** CGEL **Russian ID:** CGEL

Invest. Title: Colloidal Gelation

Prime ☒
Contingent ☐

US PI: Weitz, D. **Russian PI:** N/A

1. Session ID: MG:FP:I:78

2. Session: Three Phase Colloid Polymer Growth - IID

Session Type: Inflight

3. Session Timeline: **Crewtime Usage (mins):** 145 **Session Time (mins):** 200

Scheduled Days: FD 19, 23, 45

4. Session Scenario:

Experiment operations are performed on the three phase colloid polymer, including video and still photgraphy. Experiment operations and still photography are repeated on one sample to monitor crystal growth.

5. Session Constraints:

1. This session must occur after session "Three Phase Colloid Polymer Initiation -IIC".
2. Experiment operations must take place on one sample processed each time this session is run.
3. The sample must be distrubed as little as possible during the 29 days after the initial homogenizati[on (which occurred during "Three Phase Colloid Polymer Initiation - IIC" session) to allow for crystal growth.
4. CGEL hardware is setup in the MGBx prior to the start of this session.
5. The same video tape used in session "Three Phase Colloid Polymer Initiation - IIC" must be used to start this session.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160006	Microgravity Glovebox System	1
160008	Space Acceleration Measurement System (SAMS)	1
510010	35mm film w/container	1
810236	Nikon F3 Camera System	1
840255	8mm Video Tape	1
840406	Microgravity Glovebox (MGBX) Video System	1
854851	PCMCIA Hard Drive	1
855030	Airlock/Cable Assembly	1
855031	External Data Cable	1
855032	External Signal Cable	1
855033	External Power Cable	1
855034	Internal Power Cable	1
855035	Loose Parts Box	1
855036	Module	1
855037	Power Control Box	1
855038	Sample Cell Holder	1
855039	Sample Cell Holder Foam	1
855040	Docking Station	1
855041	IBM Thinkpad	1
855042	Video Camera	1
855044	Camera Fixture Base	1
855045	Camera Fixture Rod Assembly	1
855046	Docking Station Power Cable	1
855047	PLS Extension Cable	1
855602	DC Power Supply	1
855603	DC Power Supply Cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
40	40	1	1	0	Power up MGBx and SAMS
10	10	1	1	0	Power up CGEL
5	5	1	1	0	Unstow sample
5	5	1	1	0	Install sample in CGEL experiment module
20	20	1	1	0	Perform video operations
5	5	1	1	0	Experiment operations
30	30	1	0	0	Unattended operations
5	5	1	1	0	Experiment operations
25	25	1	0	0	Unattended operations
5	5	1	1	0	Remove sample and stow
10	10	1	1	0	Power down CGEL
30	30	1	1	0	Setup for 35 mm photography
20	20	1	1	0	Inspect and photograph
15	15	1	1	0	Stow photography equipment
5	5	1	1	0	Stow sample in a place where it will not be disturbed
5	5	1	1	0	Power down MGBx and SAMS

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890265 **Exp. ID:** CGEL **Russian ID:** CGEL

Invest. Title: Colloidal Gelation

Prime ☒
Contingent ☐

US PI: Weitz, D. **Russian PI:** N/A

1. Session ID: MG:FP:I:79

2. Session: Three Phase Colloidal Growth Video Tape Removal - IIE

Session Type: Inflight

3. Session Timeline: **Crewtime Usage (mins):** 10 **Session Time (mins):** 10

Scheduled Days: FD 45

4. Session Scenario:

During session "Three Phase Colloid Po[lymer Growth - IID" video is being recorded and the tape must be removed after operations have been completed.

5. Session Constraints:

1. Session must be performed after the last day of the "Three Phase Colloidal Growth - IID" session.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160006	Microgravity Glovebox System	1
840255	8mm Video Tape	1
840406	Microgravity Glovebox (MGBX) Video System	1
855042	Video Camera	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Perform video tape removal

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890265 **Exp. ID:** CGEL **Russian ID:** CGEL

Invest. Title: Colloidal Gelation

Prime ☒
Contingent ☐

US PI: Weitz, D. **Russian PI:** N/A

1. Session ID: MG:FP:I:80

Session Type: Inflight

2. Session: Long Term Colloid Polymers - IIF

3. Session Timeline: **Crewtime Usage (mins):** 220 **Session Time (mins):** 370

Scheduled Days: FD 50, 51

4. Session Scenario:
Colloidal polymer samples are photographed and experiment operations continue to document 30 days of crystal growth.

5. Session Constraints:
1. Session "Gel Properties for Colloid Polymer Homogenization-IIB" must have been completed approximately 30 days prior to this session.
2. Experiment operations must take place on one sample at a time, 3 samples per session.
3. CGEL equipment is setup in MGBx prior to this session.
4. Samples are handled gently (without bumping) so as not to destroy the crystals.
5. The video tapes must be correlated to each of the Long Term Colloidal Polymers such that only one sample is recorded on a particular video tape.
6. Flight days may be scheduled +/- 1 day.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160006	Microgravity Glovebox System	1
160008	Space Acceleration Measurement System (SAMS)	1
510010	35mm film w/container	1
810236	Nikon F3 Camera System	1
840255	8mm Video Tape	3
840406	Microgravity Glovebox (MGBX) Video System	1
854851	PCMCIA Hard Drive	1
855030	Airlock/Cable Assembly	1
855031	External Data Cable	1
855032	External Signal Cable	1
855033	External Power Cable	1
855034	Internal Power Cable	1
855035	Loose Parts Box	1
855036	Module	1
855037	Power Control Box	1
855038	Sample Cell Holder	2
855039	Sample Cell Holder Foam	1
855040	Docking Station	1
855041	IBM Thinkpad	1
855042	Video Camera	1
855044	Camera Fixture Base	1
855045	Camera Fixture Rod Assembly	1
855046	Docking Station Power Cable	1
855047	PLS Extension Cable	1

855602	DC Power Supply	1
855603	DC Power Supply Cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
40	40	1	1	0	Power up MGBx and SAMS
30	30	1	1	0	Setup for 35 mm photography
60	60	1	1	0	Inspect and photograph 3 crystaline samples
15	15	1	1	0	Stow photography equipment
10	10	1	1	0	Power up CGEL hardware
5	5	1	1	0	Install first sample in CGEL experiment module
10	10	1	1	0	Perform video operations on first sample
50	50	1	0	0	Unattended experiment operations
10	10	1	1	0	Remove and stow video tape; Install video tape for next sample
5	5	1	1	0	Remove sample and stow
5	5	1	1	0	Install second sample in CGEL experiment module
10	10	1	1	0	Perform video operations on second sample
50	50	1	0	0	Unattended experiment operations
10	10	1	1	0	Remove and stow video tape; Install video tape for next sample
5	5	1	1	0	Remove sample and stow
5	5	1	1	0	Install third sam[ple in CGEL experiment module
10	10	1	1	0	Perform video operations on third sample
50	50	1	0	0	Unattended experiment operations
5	5	1	1	0	Remove and stow video tape
5	5	1	1	0	Remove sample and stow
10	10	1	1	0	Power down CGEL
5	5	1	1	0	Power down MGBx and SAMS

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890265 **Exp. ID:** CGEL **Russian ID:** CGEL

Invest. Title: Colloidal Gelation

Prime ☒
Contingent ☐

US PI: Weitz, D. **Russian PI:** N/A

1. Session ID: MG:FP:I:81

Session Type: Inflight

2. Session: Fractal Aggregation Combination Samples - IIIA

3. Session Timeline: **Crewtime Usage (mins):** 100 **Session Time (mins):** 460

Scheduled Days: FD 58, 59, 61, 62, 64, 65, 68

4. Session Scenario:

Fractal aggregation samples are unstowed and inspected. Samples are combined in the MGBx and homogenized with the CGEL mixer. The CGEL hardware is setup in the MGBx and experiment operations performed.

5. Session Constraints:

1. Experiment operations must take place on one sample at a time until all 7 samples are processed. (A new sample is processed each session).
2. Samples must be combined, homogenized and run through experiment operations with as little delay between combining, mixing and running as possible.
3. Samples must be stowed in a place, so as not to be disturbed prior to running the session "Fractal Aggregation Gel Properties - IIIC".
4. The last sample must remain installed in CGEL experiment module for the session "Fractal Aggregation Gelation Process - IIIB" which must occur the following day.
5. Flight days may be scheduled +/- 1 day.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160006	Microgravity Glovebox System	1
160008	Space Acceleration Measurement System (SAMS)	1
510010	35mm film w/container	1
810236	Nikon F3 Camera System	1
854851	PCMCIA Hard Drive	1
855030	Airlock/Cable Assembly	1
855031	External Data Cable	1
855032	External Signal Cable	1
855033	External Power Cable	1
855034	Internal Power Cable	1
855035	Loose Parts Box	1
855036	Module	1
855037	Power Control Box	1
855038	Sample Cell Holder	1
855039	Sample Cell Holder Foam	1
855040	Docking Station	1
855041	IBM Thinkpad	1
855044	Camera Fixture Base	1
855045	Camera Fixture Rod Assembly	1
855046	Docking Station Power Cable	1
855602	DC Power Supply	1
855603	DC Power Supply Cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	1	0	Temporarily stow CGEL Hardware
5	5	1	1	0	Unstow sample cell holders and install in MBGx
40	40	1	1	0	Power up MGBx and SAMS
20	20	1	1	0	Combine samples in sample cell holder
5	5	1	1	0	Homogenize sample
15	15	1	1	0	Unstow CGEL hardware and setup in MGBx
10	10	1	1	0	Initialize experiment
5	5	1	1	0	Install sample in CGEL experiment module & start operations
360	360	1	0	0	Unattended experiment operations
5	5	1	1	0	Remove sample and stow (Not performed for last sample)
10	10	1	1	0	Power down CGEL
5	5	1	1	0	Power down MGBx and SAMS

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890265 **Exp. ID:** CGEL **Russian ID:** CGEL

Invest. Title: Colloidal Gelation

Prime ☒
Contingent ☐

US PI: Weitz, D. **Russian PI:** N/A

1. Session ID: MG:FP:I:82

Session Type: Inflight

2. Session: Fractal Aggregation Gelation Process - IIIB

3. Session Timeline: **Crewtime Usage (mins):** 65 **Session Time (mins):** 120

Scheduled Days: FD 71, 78

4. Session Scenario:

One fractal aggregate sample is allowed to grow with an experiment operations session in the middle and at the end of a 10 day period.

5. Session Constraints:

1. The sample installed in CGEL at the start of this session is the last sample from the "Fractal Aggregation Combination Samples - IIIA" session.
2. This session takes place following the "Fractal Aggregation Combination Samples - IIIA" session.
3. Experiment operations must take place on one sample processed each time this session is run.
4. Sample must not be homogenized or disturbed in any way.
5. CGEL hardware is setup in MGBx prior to the start of this session.
6. Sample must be stowed undisturbed in CGEL experiment module in MGBx for all 10 days.
7. Session "Fractal Aggregation Gelation Process Photography - IIID" must be performed after this session and on the same day as the last scheduled flight day of this session.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160006	Microgravity Glovebox System	1
160008	Space Acceleration Measurement System (SAMS)	1
840255	8mm Video Tape	1
840406	Microgravity Glovebox (MGBX) Video System	1
854851	PCMCIA Hard Drive	1
855030	Airlock/Cable Assembly	1
855031	External Data Cable	1
855032	External Signal Cable	1
855033	External Power Cable	1
855034	Internal Power Cable	1
855035	Loose Parts Box	1
855036	Module	1
855037	Power Control Box	1
855038	Sample Cell Holder	1
855039	Sample Cell Holder Foam	1
855040	Docking Station	1
855041	IBM Thinkpad	1
855042	Video Camera	1
855046	Docking Station Power Cable	1
855047	PLS Extension Cable	1
855602	DC Power Supply	1
855603	DC Power Supply Cable	1

7. Session Flow:

1g Time	0g Time	0g

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
40	40	1	1	0	Power up MGBx and SAMS
5	5	1	1	0	Label and install video tapes
10	10	1	1	0	Power up CGEL
20	20	1	1	0	Perform video operations
5	5	1	1	0	Start experiment operations
30	30	1	0	0	Unattended experiment operations
5	5	1	1	0	Monitor experiment operations
25	25	1	0	0	Unattended experiment operations
10	10	1	1	0	Power down CGEL
5	5	1	1	0	Power down MGBx and SAMS (not performed last session)

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890265 **Exp. ID:** CGEL **Russian ID:** CGEL

Invest. Title: Colloidal Gelation

Prime ☒
Contingent ☐

US PI: Weitz, D. **Russian PI:** N/A

1. Session ID: MG:FP:I:83

Session Type: Inflight

2. Session: Fractal Aggregation Gel Properties - IIIC

3. Session Timeline: **Crewtime Usage (mins):** 200 **Session Time (mins):** 365

Scheduled Days: FD 80, 81

4. Session Scenario:
Fractal aggregation gel samples are photographed and experiment operations continue to document gelation.

5. Session Constraints:
1. Each sample must be run in Session "Fractal Aggregation Combination Samples - IIIA" at least 10 days prior to processing in this session.
2. Experiment operations take place on one sample at a time, 3 samples per session, until all 6 samples are processed.
3. CGEL experiment is setup in MGBx prior to this session.
4. Samples are handled gently (without bumping) so as not to destroy the sample structure.
5. Flight days may be scheduled +/- 1 day.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160006	Microgravity Glovebox System	1
160008	Space Acceleration Measurement System (SAMS)	1
510010	35mm film w/container	1
810236	Nikon F3 Camera System	1
854851	PCMCIA Hard Drive	1
855030	Airlock/Cable Assembly	1
855031	External Data Cable	1
855032	External Signal Cable	1
855033	External Power Cable	1
855034	Internal Power Cable	1
855035	Loose Parts Box	1
855036	Module	1
855037	Power Control Box	1
855038	Sample Cell Holder	1
855039	Sample Cell Holder Foam	1
855040	Docking Station	1
855041	IBM Thinkpad	1
855042	Video Camera	1
855044	Camera Fixture Base	1
855045	Camera Fixture Rod Assembly	1
855046	Docking Station Power Cable	1
855047	PLS Extension Cable	1
855602	DC Power Supply	1
855603	DC Power Supply Cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description

45	45	1	1	0	Unstow samples and power up MGBx and SAMS
30	30	1	1	0	Setup for 35 mm photography
60	60	1	1	0	Inspect and photograph samples (3 samples)
15	15	1	1	0	Stow photography equipment
10	10	1	1	0	Power up CGEL
5	5	1	1	0	Install first sample in CGEL experiment module
5	5	1	1	0	Inititate experiment operations
30	30	1	0	0	Unattended experiment operations
5	5	1	1	0	Monitor experiment operations
25	25	1	0	0	Unattended experiment operations
5	5	1	1	0	Remove sample and stow
5	5	1	1	0	Install second sample in CGEL experiment module
5	5	1	1	0	Initiate experiment operations
30	30	1	0	0	Unattended experiment operations
5	5	1	1	0	Monitor experiment operations
25	25	1	0	0	Unattended experiment operations
5	5	1	1	0	Remove sample and stow
5	5	1	1	0	Install third sample in CGEL experiment module
5	5	1	1	0	Initiate experiment operations
30	30	1	0	0	Unattended experiment operations
5	5	1	1	0	Monitor experiment operations
25	25	1	0	0	Unattended experiment operations
5	5	1	1	0	Remove sample and stow
10	10	1	1	0	Power down CGEL
5	5	1	1	0	Power down MGBx and SAMS

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890265 **Exp. ID:** CGEL **Russian ID:** CGEL

Invest. Title: Colloidal Gelation

Prime ☒
Contingent ☐

US PI: Weitz, D. **Russian PI:** N/A

1. Session ID: MG:FP:I:84

Session Type: Inflight

2. Session: Fractal Aggregation Gelation Process Photography - IIID

3. Session Timeline: **Crewtime Usage (mins):** 75 **Session Time (mins):** 75

Scheduled Days: FD 78

4. Session Scenario:
One Fractal aggregate sample is photographed.

5. Session Constraints:
1. The sample in this session is the last sample from the "Fractal Aggregation Combination Samples - IIIA" session.
2. This session takes place following the last "Fractal Aggregation Gelation Process - IIIB" session.
3. MGBx and SAMS are still powered up from session "Fractal Aggregation Gelation Process - IIIB"

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160006	Microgravity Glovebox System	1
160008	Space Acceleration Measurement System (SAMS)	1
510010	35mm film w/container	1
810236	Nikon F3 Camera System	1
854851	PCMCIA Hard Drive	1
855030	Airlock/Cable Assembly	1
855031	External Data Cable	1
855032	External Signal Cable	1
855033	External Power Cable	1
855034	Internal Power Cable	1
855035	Loose Parts Box	1
855036	Module	1
855037	Power Control Box	1
855038	Sample Cell Holder	1
855039	Sample Cell Holder Foam	1
855044	Camera Fixture Base	1
855045	Camera Fixture Rod Assembly	1
855047	PLS Extension Cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	30	1	1	0	Setup for 35 mm photography
20	20	1	1	0	Inspect and photograph
15	15	1	1	0	Stow photography equipment
5	5	1	1	0	Stow sample back in experiment module
5	5	1	1	0	Power down MGBx and SAMS

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890265 **Exp. ID:** CGEL **Russian ID:** CGEL

Invest. Title: Colloidal Gelation

Prime ☒
Contingent ☐

US PI: Weitz, D. **Russian PI:** N/A

1. Session ID: MG:FP:I:85

Session Type: Inflight

2. Session: Deactivate and Stow Equipment

3. Session Timeline: **Crewtime Usage (mins):** 50 **Session Time (mins):** 50

Scheduled Days: FD 120

4. Session Scenario:
Remove CGEL hardware from MGBx.

5. Session Constraints:
1. All session must be completed or a session which includes setup must be performed.
2. CGEL experiment is setup in MGBx prior to this session.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
160006	Microgravity Glovebox System	1
160008	Space Acceleration Measurement System (SAMS)	1
510010	35mm film w/container	1
810236	Nikon F3 Camera System	1
854851	PCMCIA Hard Drive	1
855030	Airlock/Cable Assembly	1
855031	External Data Cable	1
855032	External Signal Cable	1
855033	External Power Cable	1
855034	Internal Power Cable	1
855035	Loose Parts Box	1
855036	Module	1
855037	Power Control Box	1
855038	Sample Cell Holder	1
855039	Sample Cell Holder Foam	1
855040	Docking Station	1
855041	IBM Thinkpad	1
855044	Camera Fixture Base	1
855045	Camera Fixture Rod Assembly	1
855047	PLS Extension Cable	1
855602	DC Power Supply	1
855603	DC Power Supply Cable	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
40	40	1	1	0	Stow CGEL equipment
10	10	1	1	0	Stow SAMS equipment

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 890265 **Exp. ID:** CGEL **Russian ID:** CGEL

Invest. Title: Colloidal Gelation

Prime ☒
Contingent ☐

US PI: Weitz, D. **Russian PI:** N/A

1. Session ID: MG:LOG:I:90

Session Type: Down Item

2. Session: CGEL Transfer from Mir to Shuttle

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 4

4. Session Scenario:
CGEL Transfer from Mir to Shuttle

5. Session Constraints:
1. None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
510010	35mm film w/container	8
820273	SAMS Optical Disk	1
840255	8mm Video Tape	8
854851	PCMCIA Hard Drive	3
855038	Sample Cell Holder	7

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	30	1	1	0	CGEL Transfer from Mir to Shuttle

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

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Investigation ID: 890271 **Experiment ID:** Photo **Russian ID:**

Investigation Title: Photo/TV Operations

US Investigators: G. Robbins

Russian Investigators:

Other Investigators:

Payload Category: OPS **Sub-Cat.:** SHR **Subjects Requested:**

Description: Shared video equipment and consummables for discipline experiment support.

Science Objectives:
1. Supply disciplines with central location and use of shared photo/tv equipment and consummables.
2. Uniform production and distribution of photographs and videos.

Functional Objectives:

Sample Transfer Rqd: No **Hardware Transfer Rqd:** No

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
2	STS 76 (SM-03)	3/22/96	☒	☒
3	STS 79 (SM-04)	9/16/96	☒	☒
4	Mir 23	2/2/97	☒	☒
4	NASA 4	1/16/97	☒	☒
4	STS 81 (SM-05)	1/16/97	☒	☒
5	Mir 24	6/24/97	☒	☒
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	Mir 25	12/12/97	☒	☒
6	NASA 6	9/18/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒
7	Mir 26	5/30/98	☒	☒
7	NASA 7	1/15/98	☒	☒
7	STS 89 (SM-08)	1/15/98	☒	☒
7	STS 91 (SM-09)	5/29/98	☒	☒

Hardware Items for Investigation:

Mission: Mir 24 **Invest. ID:** 890271 **Exp. ID:** Photo **Russian ID:**

Invest. Title: Photo/TV Operations

Prime ☒
Contingent ☐

US PI: G. Robbins **Russian PI:**

1. Session ID: OPS:SHR:P:1

2. Session: Basic Photo (Mir Crew)

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 120

Scheduled Days: L- 270

4. Session Scenario:

Crew is introduced to basic workings of the photographic hardware (Hasselblad, Nikon, camcorder).

5. Session Constraints:

1. Classroom with projection equipment.
2. Training session is not specific to Earth observation.
3. Scheduled day can be anytime from L-10 to L-6 months.
4. Training is for 1 cosmonaut
5. This is a multi-media presentation and requires NASA P-TV classroom.. Needs to be in the U.S.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
810233	Hasselblad 70-mm Camera System (NASA)	1
810236	Nikon F3 Camera System	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	2	0	Basic photographic principles
60	0	0	2	0	Introduction to basic hardware

8. Data Processing:

1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 890271 **Exp. ID:** Photo **Russian ID:**

Invest. Title: Photo/TV Operations

Prime ☒
Contingent ☐

US PI: G. Robbins **Russian PI:**

1. Session ID: OPS:SHR:P:2

Session Type: Training

2. Session: 35 mm EQ (Nikon Camera)

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: L- 270

4. Session Scenario:
Crew is introduced to basic workings of Nikon camera.

5. Session Constraints:
1. Classroom with projection equipment.
2. Training session is not specific to Earth observation.
3. Scheduled day can be anytime from L-10 to L-4 months.
4. Training is for 1 cosmonaut + U.S. astronaut (receives all camera hardware training).

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
810236	Nikon F3 Camera System	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	1	0	Hands-on training
60	0	0	1	0	Overview of Nikon system
60	0	0	1	0	Features

8. Data Processing:
1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 890271 **Exp. ID:** Photo **Russian ID:**

Invest. Title: Photo/TV Operations

Prime ☒
Contingent ☐

US PI: G. Robbins **Russian PI:**

1. Session ID: OPS:SHR:P:3

Session Type: Training

2. Session: Camcorder EQ

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: L- 180

4. Session Scenario:
Crew is introduced to basic workings of the NASA camcorder.

5. Session Constraints:
1. Classroom with projection equipment.
2. Training session is not specific to Earth observation.
3. Scheduled day can be anytime from L-10 to L-4 months.
4. Training is for 1 cosmonaut + U.S. astronaut (receives all camera hardware training).

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	1	0	Cannon A1 features
120	0	0	1	0	Hands-on training

8. Data Processing:

1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 890271 **Exp. ID:** Photo **Russian ID:**

Invest. Title: Photo/TV Operations

Prime ☒
Contingent ☐

US PI: G. Robbins **Russian PI:**

1. Session ID: OPS:SHR:P:4

Session Type: Training

2. Session: General Photo Skills/Hands-on Practice

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: L- 180

4. Session Scenario:
Crewmembers practice photographic skills necessary for documenting in-cabin experiments and external activties and views.

5. Session Constraints:
1. Classroom with projection equipment.
2. Training session is not specific to Earth observation.
3. Scheduled day can be anytime from L-10 to L-4 months.
4. This session should be scheduled after Basic Photo Training, including training on all camera systems.
5. Time should be scheduled on a day to allow outdoor photography.
6. Training is for 1 cosmonaut + U.S. astronaut (receives all camera hardware training).

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
810233	Hasselblad 70-mm Camera System (NASA)	1
810236	Nikon F3 Camera System	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
180	0	0	1	0	General photo skills

8. Data Processing:
1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 890271 **Exp. ID:** Photo **Russian ID:**

Invest. Title: Photo/TV Operations

Prime ☒
Contingent ☐

US PI: G. Robbins **Russian PI:**

1. Session ID: OPS:SHR:P:5

Session Type: Training

2. Session: Earth Observation Photo Techniques - 1

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: L- 90

4. Session Scenario:

Crewmembers review onboard procedures and FDF products/cue cards, and camera interface with Mir (windows, etc...)

5. Session Constraints:

1. Mir station mock-up is required to demonstrate interfaces.
2. Training session is not specific to Earth observations.
3. Session should occur between L-4 and L-2 months.
4. Training for cosmonaut and U.S. astronaut (trained on all camera hardware).

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
410037	MIR Interface to Payload Systems-2 (MIPS-2)	1
810233	Hasselblad 70-mm Camera System (NASA)	1
810236	Nikon F3 Camera System	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
90	0	0	1	0	Review interfaces to Mir station
90	0	0	1	0	Review FDF products

8. Data Processing:

1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 890271 **Exp. ID:** Photo **Russian ID:**

Invest. Title: Photo/TV Operations

Prime ☒
Contingent ☐

US PI: G. Robbins **Russian PI:**

1. Session ID: OPS:SHR:P:7

Session Type: Training

2. Session: Experiment Photo Techniques

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: L- 90

4. Session Scenario:
Crewmembers review onboard procedures and FDF products/cue cards, and camera interface with Mir (windows, etc...)

5. Session Constraints:
1. Mir station mock-up is required to demonstrate interfaces.
2. Mockups, photographs, or actual experiment training hardware is required.
3. JSC Building 8 photo processing is required.
4. Session should occur between L-4 and L-2 months.
5. Training for cosmonaut and U.S. astronaut (trained on all camera hardware).

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
410037	MIR Interface to Payload Systems-2 (MIPS-2)	1
810233	Hasselblad 70-mm Camera System (NASA)	1
810236	Nikon F3 Camera System	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
90	0	0	1	0	Review interfaces to Mir station
90	0	0	1	0	Review FDF products

8. Data Processing:
1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890271 **Exp. ID:** Photo **Russian ID:**

Invest. Title: Photo/TV Operations

Prime ☒
Contingent ☐

US PI: G. Robbins **Russian PI:**

1. Session ID: OPS:SHR:P:2

Session Type: Training

2. Session: 35 mm EQ (Nikon Camera)

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: L- 270

4. Session Scenario:
Crew is introduced to basic workings of Nikon camera.

5. Session Constraints:
1. Classroom with projection equipment.
2. Training session is not specific to Earth observation.
3. Scheduled day can be anytime from L-10 to L-4 months.
4. Training is for 1 cosmonaut + U.S. astronaut (receives all camera hardware training).

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
810236	Nikon F3 Camera System	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	1	0	Hands-on training
60	0	0	1	0	Overview of Nikon system
60	0	0	1	0	Features

8. Data Processing:
1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890271 **Exp. ID:** Photo **Russian ID:**

Invest. Title: Photo/TV Operations

Prime ☒
Contingent ☐

US PI: G. Robbins **Russian PI:**

1. Session ID: OPS:SHR:P:3

Session Type: Training

2. Session: Camcorder EQ

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: L- 180

4. Session Scenario:
Crew is introduced to basic workings of the NASA camcorder.

5. Session Constraints:
1. Classroom with projection equipment.
2. Training session is not specific to Earth observation.
3. Scheduled day can be anytime from L-10 to L-4 months.
4. Training is for 1 cosmonaut + U.S. astronaut (receives all camera hardware training).

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	1	0	Cannon A1 features
120	0	0	1	0	Hands-on training

8. Data Processing:
1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890271 **Exp. ID:** Photo **Russian ID:**

Invest. Title: Photo/TV Operations

Prime ☒
Contingent ☐

US PI: G. Robbins **Russian PI:**

1. Session ID: OPS:SHR:P:4

2. Session: General Photo Skills/Hands-on Practice

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: L- 180

4. Session Scenario:

Crewmembers practice photographic skills necessary for documenting in-cabin experiments and external activties and views.

5. Session Constraints:

1. Classroom with projection equipment.
2. Training session is not specific to Earth observation.
3. Scheduled day can be anytime from L-10 to L-4 months.
4. This session should be scheduled after Basic Photo Training, including training on all camera systems.
5. Time should be scheduled on a day to allow outdoor photography.
6. Training is for 1 cosmonaut + U.S. astronaut (receives all camera hardware training).

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
810233	Hasselblad 70-mm Camera System (NASA)	1
810236	Nikon F3 Camera System	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
180	0	0	1	0	General photo skills

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890271 **Exp. ID:** Photo **Russian ID:**

Invest. Title: Photo/TV Operations

Prime ☒
Contingent ☐

US PI: G. Robbins **Russian PI:**

1. Session ID: OPS:SHR:P:5

Session Type: Training

2. Session: Earth Observation Photo Techniques - 1

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: L- 90

4. Session Scenario:
Crewmembers review onboard procedures and FDF products/cue cards, and camera interface with Mir (windows, etc...)

5. Session Constraints:
1. Mir station mock-up is required to demonstrate interfaces.
2. Training session is not specific to Earth observations.
3. Session should occur between L-4 and L-2 months.
4. Training for cosmonaut and U.S. astronaut (trained on all camera hardware).

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
410037	MIR Interface to Payload Systems-2 (MIPS-2)	1
810233	Hasselblad 70-mm Camera System (NASA)	1
810236	Nikon F3 Camera System	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
90	0	0	1	0	Review interfaces to Mir station
90	0	0	1	0	Review FDF products

8. Data Processing:
1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890271 **Exp. ID:** Photo **Russian ID:**

Invest. Title: Photo/TV Operations

Prime ☒
Contingent ☐

US PI: G. Robbins **Russian PI:**

1. Session ID: OPS:SHR:P:6

2. Session: Basic Photo (NASA Crew)

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: L- 270

4. Session Scenario:
Crew is introduced to basic workings of the photographic hardware (Hasselblad, Nikon, camcorder).

5. Session Constraints:
1. Classroom with projection equipment.
2. Training session is not specific to Earth observation.
3. Scheduled day can be anytime from L-10 to L-6 months.
4. Training is for U.S. astronaut.
5. This is a multi-media presentation and requires NASA P-TV classroom. Needs to be in the U.S.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
810233	Hasselblad 70-mm Camera System (NASA)	1
810236	Nikon F3 Camera System	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	1	0	Basic photographic principles
60	0	0	1	0	Introduction to basic hardware

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890271 **Exp. ID:** Photo **Russian ID:**

Invest. Title: Photo/TV Operations

Prime ☒
Contingent ☐

US PI: G. Robbins **Russian PI:**

1. Session ID: OPS:SHR:P:7

Session Type: Training

2. Session: Experiment Photo Techniques

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: L- 90

4. Session Scenario:
Crewmembers review onboard procedures and FDF products/cue cards, and camera interface with Mir (windows, etc...)

5. Session Constraints:
1. Mir station mock-up is required to demonstrate interfaces.
2. Mockups, photographs, or actual experiment training hardware is required.
3. JSC Building 8 photo processing is required.
4. Session should occur between L-4 and L-2 months.
5. Training for cosmonaut and U.S. astronaut (trained on all camera hardware).

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
410037	MIR Interface to Payload Systems-2 (MIPS-2)	1
810233	Hasselblad 70-mm Camera System (NASA)	1
810236	Nikon F3 Camera System	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
90	0	0	1	0	Review interfaces to Mir station
90	0	0	1	0	Review FDF products

8. Data Processing:
1. N/A for preflight sessions.

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Investigation ID: 890437 **Experiment ID:** SVD **Russian ID:** SVD

Investigation Title: Mir Inventory

US Investigators: N/A

Russian Investigators: N/A

Other Investigators:

Payload Category: OPS **Sub-Cat.:** SHR **Subjects Requested:**

Description: Mir Station inventory performed by the NASA crewmember approximately three months prior to Shuttle docking.

Science Objectives:

Functional Objectives: To provide a "snapshot" of the hardware on Mir prior to the docking of the Shuttle.

Sample Transfer Rqd: No **Hardware Transfer Rqd:** No

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
2	NASA 2	3/22/96	☒	☒
3	NASA 3	9/16/96	☒	☒
4	NASA 4	1/16/97	☒	☒
5	NASA 5	5/15/97	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
OPS	SHR	Flight	853495	Flight Data File - Stowage Verification Document

Mission: NASA 5 **Invest. ID:** 890437 **Exp. ID:** SVD **Russian ID:** SVD

Invest. Title: Mir Inventory **Prime** ☒ **Contingent** ☐

US PI: N/A **Russian PI:** N/A

1. Session ID: OPS:SHR:I:1

2. Session: Mir Inventory Session **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 90 **Session Time (mins):** 90

Scheduled Days: FD 55, 56, 57, 58, 59, 60

4. Session Scenario:

Using the Stowage Verification Document (SVD), the NASA crewmember will verify the locations of hardware within the Mir Modules.

5. Session Constraints:

Each module should be inventoried in its entirety during a session. The complete inventory of Mir should be completed three months prior to the next Shuttle docking. The listed flight days are approximate flight days.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
853495	Flight Data File - Stowage Verification Document	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow FDF-SVD
5	5	1	1	0	Go to TBD Mir Module
75	75	1	1	0	Visually verify hardware listed in the SVD. Denote any deviations from planned configuration.
5	5	1	1	0	Stow FDF-SVD

8. Data Processing:

1) Air-to-ground communication necessary to relay any discrepancies noted between the actual configuration of Mir and the SVD.
2) Photos/Video, if available, is desired.

Investigation ID: 890606 **Experiment ID:** Facility **Russian ID:** Facility

Investigation Title: Facility Operations

US Investigators: N/A

Russian Investigators:

Other Investigators:

Payload Category: OPS **Sub-Cat.:** FAC **Subjects Requested:**

Description: Session listed under this operation cover activities needed to maintain the facilities of various experimental hardware.

Science Objectives:

Functional Objectives:

Sample Transfer Rqd: No **Hardware Transfer Rqd:** No

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
3	Mir 22	8/17/96	☒	☒
3	NASA 3	9/16/96	☒	☒
4	Mir 23	2/2/97	☒	☒
4	NASA 4	1/16/97	☒	☒
4	STS 81 (SM-05)	1/16/97	☒	☒
5	Mir 24	6/24/97	☒	☒
5	NASA 5	5/15/97	☒	☒
6	Mir 25	12/12/97	☒	☒
6	NASA 6	9/18/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒
7	Mir 26	5/30/98	☒	☒
7	NASA 7	1/15/98	☒	☒
7	STS 89 (SM-08)	1/15/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
SHR	SHR	Flight	820433	MIPS-2C Controller
SHR	SHR	Flight	848745	Magneto Optical Cartridge (MIPS)
SHR		Flight	852156	MIPS-2L Hard Drive
OPS		Flight	854850	PCMCIA Card - MIPS Controller Software
MG			854851	PCMCIA Hard Drive
OPS			854852	PCMCIA Card
HLS		Flight	854853	PCMCIA Card - SIR Controller Software

Mission: STS 86 (SM-07) **Invest. ID:** 890606 **Exp. ID:** Facility **Russian ID:** Facility

Invest. Title: Facility Operations

Prime ☒
Contingent ☐

US PI: N/A **Russian PI:**

1. Session ID: OPS:LOG:I:7

Session Type: Down Item

2. Session: MIPS Hardware Transfer (Mir to Shuttle)

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 6

4. Session Scenario:
Transfer MIPS hardware items from stowage locations in the Shuttle to the Mir per the manifest.

5. Session Constraints:
None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820433	MIPS-2C Controller	1
848745	Magneto Optical Cartridge (MIPS)	2
852156	MIPS-2L Hard Drive	3
854850	PCMCIA Card - MIPS Controller Software	2
854851	PCMCIA Hard Drive	4
854852	PCMCIA Card	5
854853	PCMCIA Card - SIR Controller Software	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	1	0	Unstow hardware from Mir locations
15	15	1	1	0	Transfer items from Mir & stow in Shuttle

8. Data Processing:

None at this time.

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Investigation ID: 890096 **Experiment ID:** MO **Russian ID:** SMP-US

Investigation Title: Space Medicine Program - US Medical Operations

US Investigators: WG-8

Russian Investigators: TBD

Other Investigators:

Payload Category: SMP **Sub-Cat.:** MO **Subjects Requested:**

Description: TBD

Science Objectives:

Functional Objectives:

Sample Transfer Rqd: No **Hardware Transfer Rqd:** No

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
2	Mir 21	2/21/96	☒	☒
2	NASA 2	3/22/96	☒	☒
2	STS 74 (SM-02)	11/12/95	☒	☒
2	STS 76 (SM-03)	3/22/96	☒	☒
3	Mir 22	8/17/96	☒	☒
3	NASA 3	9/16/96	☒	☒
3	STS 79 (SM-04)	9/16/96	☒	☒
4	Mir 23	2/2/97	☒	☒
4	NASA 4	1/16/97	☒	☒
4	STS 81 (SM-05)	1/16/97	☒	☒
5	Mir 24	6/24/97	☒	☒
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	Mir 25	12/12/97	☒	☒
6	NASA 6	9/18/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒
7	Mir 26	5/30/98	☒	☒
7	NASA 7	1/15/98	☒	☒
7	STS 89 (SM-08)	1/15/98	☒	☒
7	STS 91 (SM-09)	5/29/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
SMP	ENV	Flight	150069	Formaldehyde Monitor Kit Assy
SMP	ENV	Flight	150073	Crew Passive Dosimeter
SMP	ENV	Flight	150075	Dosimeter for Station
OPS	SHR	Flight	150155	Mir Interface to Payload Systems-3 (MIPS-3)
SMP	HSR	Flight	810164	TEPC (Tissue Equivalent Proportional Counter)
SMP	MET	Flight	820423	PCBA Cartridge Kit
SHR9	SHR	Flight	820431	MIPS-2L Laptop
SHR	SHR	Flight	820433	MIPS-2C Controller
OPS	SHR	Flight	820441	Standard I/F MIPS Optical Disks
OPS	SHR	Flight	840003	Mir Interface to Payload Systems-2 (MIPS)
SMP	MO	Flight	848741	TEPC-Computer Common Power/Data Harness
SMP	NEU	Training	852118	Mir Interface to Payload System-2L Laptop/MIPS-3C
HLS	SHR	Flight	852131	BDL Accessory Kit
SMP		Flight	852212	Mir Supplemental Medical Kit Resupply Kit (MRK)

SMP		Flight	852213	MSMK Medical Checklist
HLS	SHR	Flight	852241	Barcode and Data Logger (BDL) Assy.
SMP	MO	Flight	854783	PCMCIA Card (BDL Software Modifications)
SMP	MO	Flight	854898	Emergency Medications Kit (EMK)
SMP	MO	Flight	854899	Medical Extended Duration Orbiter Pack (MEDOP)
SMP	MO	Flight	854900	Medications and Bandages Kit (MBK)

Mission: Mir 24 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:P:42

Session Type: Training

2. Session: MO-2 MSMK Refresher Training

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 120

Scheduled Days: L- 30

4. Session Scenario:

Crewmembers will receive a comprehensive review of the contents, layout, capabilities, and on-board documentation of the MSMK (EMK, MEDOP, MBK), MRK, and PCBA Cartridge Kit. A review of diagnostic and therapeutic procedures will also be conducted.

5. Session Constraints:

1. Session dates are estimated.
2. Should be scheduled as close to launch as possible.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820423	PCBA Cartridge Kit	1
852212	Mir Supplemental Medical Kit Resupply Kit (MRK)	1
852241	Barcode and Data Logger (BDL) Assy.	1
854898	Emergency Medications Kit (EMK)	1
854899	Medical Extended Duration Orbiter Pack (MEDOP)	1
854900	Medications and Bandages Kit (MBK)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	2	0	MSMK (EMK, MEDOP, MBK) refresher training

8. Data Processing:

N/A

Mission: Mir 24 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:P:44

2. Session: MO-2 MSMK Familiarization and Medical Diagnostic Procedures **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 840 **Session Time (mins):** 420

Scheduled Days: L- 270

4. Session Scenario:

Crewmember will be instructed in the contents, layout, and on-board documentation of the MSMK (EMK, MEDOP, MBK), MRK, and PCBA Cartridge Kit. Training and practice in utilizing this diagnostic equipment will be conducted.

5. Session Constraints:

None

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820423	PCBA Cartridge Kit	1
852212	Mir Supplemental Medical Kit Resupply Kit (MRK)	1
852241	Barcode and Data Logger (BDL) Assy.	1
854898	Emergency Medications Kit (EMK)	1
854899	Medical Extended Duration Orbiter Pack (MEDOP)	1
854900	Medications and Bandages Kit (MBK)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
420	0	0	2	0	MSMK (EMK, MEDOP, MBK) familiarization/diagnostic procedures

8. Data Processing:

1. N/A

Mission: Mir 24 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:P:47

Session Type: Training

2. Session: MO-2 MSMK Medical Therapeutics I

3. Session Timeline: **Crewtime Usage (mins):** 840 **Session Time (mins):** 420

Scheduled Days: L- 270

4. Session Scenario:

Crewmembers will be instructed in basic therapeutic procedures such as eye foreign body removal, intramuscular and subcutaneous injections, and nosebleed treatment. Procedure demonstration will be followed by hands-on practice.

5. Session Constraints:

1. None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
852212	Mir Supplemental Medical Kit Resupply Kit (MRK)	1
852241	Barcode and Data Logger (BDL) Assy.	1
854898	Emergency Medications Kit (EMK)	1
854899	Medical Extended Duration Orbiter Pack (MEDOP)	1
854900	Medications and Bandages Kit (MBK)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
420	0	0	2	0	MSMK (EMK, MEDOP, MBK) therapeutic procedures training

8. Data Processing:

N/A

Mission: Mir 24 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:P:49

2. Session: MO-2 MSMK Medical Therapeutics II

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 480 **Session Time (mins):** 240

Scheduled Days: L- 150

4. Session Scenario:

Crewmembers will be instructed in advanced therapeutic procedures such as airway management, suturing, and intravenous drug administration. Procedure demonstration will be followed by hands-on-practice.

5. Session Constraints:

1. Training days are estimated

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
852212	Mir Supplemental Medical Kit Resupply Kit (MRK)	1
852241	Barcode and Data Logger (BDL) Assy.	1
854898	Emergency Medications Kit (EMK)	1
854899	Medical Extended Duration Orbiter Pack (MEDOP)	1
854900	Medications and Bandages Kit (MBK)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
240	0	0	2	0	MSMK (EMK, MEDOP, MBK) advanced therapeutic procedures training

8. Data Processing:

1.N/A

Mission: Mir 24 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:P:51

Session Type: Training

2. Session: MO-2 MSMK Diagnostic/Analysis Equipment Training

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 120

Scheduled Days: L- 60

4. Session Scenario:
Crewmembers will be instructed in the use of the pulse oximeter and portable clinical blood analyzer.

5. Session Constraints:
1. Session dates are estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820423	PCBA Cartridge Kit	1
852212	Mir Supplemental Medical Kit Resupply Kit (MRK)	1
852241	Barcode and Data Logger (BDL) Assy.	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	2	0	MSMK (EMK, MEDOP, MBK) diagnostic/analysis equipment training

8. Data Processing:

1. N/A

Mission: NASA 5 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:P:15

2. Session: MO-11 Training Session - Radiation Data Download

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: L- 45, 120

4. Session Scenario:

The operator is familiarized with hardware and operations. Functional training units will be used to perform full and partial data downloads, memory erasures, and related file processing tasks. Material is covered in two sessions. The first is initial training. The second is a refresher. Training dates are estimated.

5. Session Constraints:

1. Training dates are estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
810164	TEPC (Tissue Equivalent Proportional Counter)	1
820431	MIPS-2L Laptop	1
820432	MIPS-2C Optical Disk Drive	1
820441	Standard I/F MIPS Optical Disks	1
848741	TEPC-Computer Common Power/Data Harness	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	1	0	Familiarization with TEPC download
60	0	0	1	0	TEPC download refresher

8. Data Processing:

N/A

Mission: NASA 5 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:P:22

Session Type: Training

2. Session: MO-12 Training Session - Radiation Monitoring

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: L- 210

4. Session Scenario:
Familiarization with dosimeters worn by the astronaut and placement procedures for dosimeters that will be placed on the wall of the Mir.

5. Session Constraints:
1. Exact days have been estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150073	Crew Passive Dosimeter	1
150075	Dosimeter for Station	18

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	0	0	1	0	Familiarization training with crew and passive dosimeters

8. Data Processing:
1. N/A

Mission: NASA 5 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:P:25

2. Session: MO-6 Psychological Factors for Long-Duration Flights

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: L- 30, 180

4. Session Scenario:

Important psychological factors of long duration missions will be discussed with the primary and back-up crewmembers. The information will also incorporate the experiences of previous crewmembers to fly aboard Mir. The in-flight psychological support and monitoring programs provided by the Russian and U.S. sides will be discussed, as will the support provided to the crewmember's family during flight.

5. Session Constraints:

1. Private room, free from distractions, needed for briefing.
2. Both prime and back-up crewmembers will be trained.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	1	0	Psychological Factors Briefing

8. Data Processing:

1. N/A

Mission: NASA 5 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:P:41

Session Type: Training

2. Session: MO-6 Crew Status & Support Tracker (CSST) Software Training

3. Session Timeline: **Crewtime Usage (mins):** 90 **Session Time (mins):** 90

Scheduled Days: L- 90

4. Session Scenario:

Questions to be presented on the CSST questionnaire will be reviewed and discussed with the crewmembers. Training will also be given on using the software.

5. Session Constraints:

1. N/A

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840003	Mir Interface to Payload Systems-2 (MIPS)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
90	0	0	1	0	CSST Software Training

8. Data Processing:

1. N/A

Mission: NASA 5 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:P:43

Session Type: Training

2. Session: MO-2 MSMK Refresher Training

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: L- 30

4. Session Scenario:

Crewmember will receive a comprehensive review of the contents, layout, capabilities, and on-board documentation of the MSMK (EMK, MEDOP, MBK), MRK, and PCBA Cartridge Kit. A review of diagnostic and therapeutic procedures will also be conducted.

5. Session Constraints:

1. Session dates are estimated.
2. Should be scheduled as close to launch as possible.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820423	PCBA Cartridge Kit	1
852212	Mir Supplemental Medical Kit Resupply Kit (MRK)	1
852241	Barcode and Data Logger (BDL) Assy.	1
854898	Emergency Medications Kit (EMK)	1
854899	Medical Extended Duration Orbiter Pack (MEDOP)	1
854900	Medications and Bandages Kit (MBK)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	1	0	MSMK (EMK, MEDOP, MBK) refresher training

8. Data Processing:

1. N/A

Mission: NASA 5 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:P:45

2. Session: MO-2 MSMK Familiarization and Medical Diagnostic Procedures

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 420 **Session Time (mins):** 420

Scheduled Days: L- 300

4. Session Scenario:

Crewmember will be instructed in the contents, layout, and on-board documentation of the MSMK (EMK, MEDOP, MBK), MRK, and PCBA Cartridge Kit. Training and practice in utilizing this diagnostic equipment will be conducted.

5. Session Constraints:

1. None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820423	PCBA Cartridge Kit	1
852212	Mir Supplemental Medical Kit Resupply Kit (MRK)	1
852241	Barcode and Data Logger (BDL) Assy.	1
854898	Emergency Medications Kit (EMK)	1
854899	Medical Extended Duration Orbiter Pack (MEDOP)	1
854900	Medications and Bandages Kit (MBK)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
420	0	0	1	0	MSMK (EMK, MEDOP, MBK) familiarization/diagnostic procedures

8. Data Processing:

1. N/A

Mission: NASA 5 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:P:46

Session Type: Training

2. Session: MO-2 MSMK Medical Therapeutics I

3. Session Timeline: **Crewtime Usage (mins):** 420 **Session Time (mins):** 420

Scheduled Days: L- 300

4. Session Scenario:

Crewmembers will be instructed in basic therapeutic procedures such as eye foreign body removal, intramuscular and subcutaneous injections, and nosebleed treatment. Procedures demonstration will be followed by hands-on-practice.

5. Session Constraints:

1. N/A

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
852212	Mir Supplemental Medical Kit Resupply Kit (MRK)	1
852241	Barcode and Data Logger (BDL) Assy.	1
854898	Emergency Medications Kit (EMK)	1
854899	Medical Extended Duration Orbiter Pack (MEDOP)	1
854900	Medications and Bandages Kit (MBK)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
420	0	0	1	0	MSMK (EMK, MEDOP, MBK) therapeutic procedures training

8. Data Processing:

1. N/A

Mission: NASA 5 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:P:48

2. Session: MO-2 MSMK Medical Therapeutics II

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 240

Scheduled Days: L- 180

4. Session Scenario:

Crewmember will be instructed in advanced therapeutic procedures such as airway management, suturing, and intravenous drug administration. Procedure demonstration will be followed by hands-on practice.

5. Session Constraints:

1. None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
852212	Mir Supplemental Medical Kit Resupply Kit (MRK)	1
852241	Barcode and Data Logger (BDL) Assy.	1
854898	Emergency Medications Kit (EMK)	1
854899	Medical Extended Duration Orbiter Pack (MEDOP)	1
854900	Medications and Bandages Kit (MBK)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
240	0	0	1	0	MSMK (EMK, MEDOP, MBK) advanced therapeutic procedures training

8. Data Processing:

1. N/A

Mission: NASA 5 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:P:50

Session Type: Training

2. Session: MO-2 MSMK Diagnostic/Analysis Equipment Training

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: L- 90

4. Session Scenario:

Crewmember will be instructed in the use of the pulse oximeter and the portable clinical blood analyzer. Procedures for downloading MSMK (EMK, MEDOP, MBK) usage and resupply data to the ground will also be covered.

5. Session Constraints:

1. Dates are estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820423	PCBA Cartridge Kit	1
848753	MIPS Laptop Computer Trainer Unit	1
852212	Mir Supplemental Medical Kit Resupply Kit (MRK)	1
852241	Barcode and Data Logger (BDL) Assy.	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	1	0	MSMK (EMK, MEDOP, MBK) diagnostic/analysis equipment training

8. Data Processing:

1. N/A

Mission: NASA 5 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:P:52

Session Type: Training

2. Session: MO-12 Training Session - Passive Dosimetry Deployment

3. Session Timeline: **Crewtime Usage (mins):** 15 **Session Time (mins):** 15

Scheduled Days: L- 45

4. Session Scenario:
Operator is familiarized with passive dosimetry hardware. Deployment locations and procedures are reviewed.

5. Session Constraints:
1. None

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150073	Crew Passive Dosimeter	1
150075	Dosimeter for Station	18

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	0	0	1	0	Familiarization with dosimeter deployment

8. Data Processing:
1. N/A

Mission: NASA 5 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:P:53

Session Type: Training

2. Session: MO-14 Training Environmental Health Anomalies/Air Pollutants

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: L- 90, 180

4. Session Scenario:
A training session and a proficiency session will be performed preflight. Crewmembers will be trained to collect air samples and record relevant data.

5. Session Constraints:
1. None at this time

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150069	Formaldehyde Monitor Kit Assy	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	0	0	1	0	Training Session

8. Data Processing:

N/A

Mission: STS 84 (SM-06) **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:LOG:I:14

2. Session: Transfer Session BDL-PCMCIA Card from Shuttle to Mir **Session Type:** Up Item

3. Session Timeline: **Crewtime Usage (mins):** 15 **Session Time (mins):** 15

Scheduled Days: FD 5

4. Session Scenario:

PCMCIA cards containing modifications to BDL software will be transferred from the Shuttle to the Mir.

5. Session Constraints:

1. Exact performance day has been estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854783	PCMCIA Card (BDL Software Modifications)	3

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	1	0	Transfer PCMCIA cards from Shuttle to Mir

8. Data Processing:

1. N/A

Mission: STS 84 (SM-06) **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:LOG:I:24

2. Session: MO-14 Transfer Session: Formaldehyde Monitor Kit Assys from Shuttle to Mir **Session Type:** Up Item

3. Session Timeline: **Crewtime Usage (mins):** 15 **Session Time (mins):** 15

Scheduled Days: FD 5

4. Session Scenario:

Transfer Formaldehyde Monitor Kit Assys from Shuttle to Mir.

5. Session Constraints:

1. U.S. astronaut is to perform transfer of the Formaldehyde Monitor Kit Assys.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150069	Formaldehyde Monitor Kit Assy	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	1	0	Transfer Formaldehyde Monitor Kit Assys from Shuttle to Mir.

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communications may be required in the event of a contingency situation.

Mission: STS 84 (SM-06) **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:LOG:I:27

2. Session: MO-2 Transfer Session - MSMK, MRK, and PCBA Cartridge Kit from Shuttle to Mir **Session Type:** Up Item

3. Session Timeline: **Crewtime Usage (mins):** 15 **Session Time (mins):** 15

Scheduled Days: FD 5

4. Session Scenario:

Transfer MSMK (containing the EMK, MEDOP, and MBK), MRK, and PCBA Cartridge Kit from Shuttle to Mir.

5. Session Constraints:

1. U.S. astronaut to perform transfer of MSMK (EMK, MEDOP, MBK), MRK, & PCBA Cartridge Kit.
2. Late load (L-1 to L-4 days)
3. Upon docking with the Mir, the PCBA Cartridge Kit must be transferred to the Mir Refrigerator as soon as possible to preserve perishables.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820423	PCBA Cartridge Kit	1
852212	Mir Supplemental Medical Kit Resupply Kit (MRK)	1
852213	MSMK Medical Checklist	1
854898	Emergency Medications Kit (EMK)	1
854899	Medical Extended Duration Orbiter Pack (MEDOP)	1
854900	Medications and Bandages Kit (MBK)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	1	0	Transfer MSMK (EMK, MEDOP, MBK), MRK, and PCBA Cartridge Kit from Shuttle to Mir

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: STS 84 (SM-06) **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:LOG:I:29

2. Session: MO-12 Transfer Session - Radiation Monitoring **Session Type:** Up Item

3. Session Timeline: **Crewtime Usage (mins):** 10 **Session Time (mins):** 10

Scheduled Days: FD 5

4. Session Scenario:

Dosimeters for station will be transferred from the Shuttle to the Mir.

5. Session Constraints:

1. Exact performance day has been estimated.
2. Crew dosimeter is worn by long duration crewmember (launch to landing).

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150073	Crew Passive Dosimeter	1
150075	Dosimeter for Station	18

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Transfer items from the MIR to the Shuttle.

8. Data Processing:

1. N/A

Mission: NASA 5 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:I:13

2. Session: MO-11 Radiation Data Download Every Four Weeks **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 85 **Session Time (mins):** 665

Scheduled Days: FD 14, 42, 70, 98, 126, 139

4. Session Scenario:

Every four weeks, TEPC data will be downloaded to a host computer for data archiving and/or telemetry. Data is downloaded from the TEPC to the harddrive of a laptop computer. After the download is complete the TEPC is comanded to erase its memory to allow storage of future data. Data is then processed by the laptop to create a small results file to use for telemetry. Afterward, the TEPC is disconnected and data files are compressed and transferred to optical disk to facilitate delivery of data to the ground. Data may also be transferred via telemetry. During portions of the download and memory erase, the TEPC does not need to be attended by the operator. These are identified as "breaks" in the session flow below.

5. Session Constraints:

1. Session is scheduled every four weeks for a data download. Telemetry file should be downlinked as crewtime permits. (TEPC moved from Spektr into Priroda during increment 2.)
2. The host computer is tied up for the duration of the session.
3. Exact performance days have been estimated. Last download should be conducted approximately 3 to 5 days prior to docking with shuttle.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
810164	TEPC (Tissue Equivalent Proportional Counter)	1
820431	MIPS-2L Laptop	1
820441	Standard I/F MIPS Optical Disks	1
848741	TEPC-Computer Common Power/Data Harness	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
28	28	1	1	0	Connect TEPC and initiate download
260	260	1	0	0	Break for data download
2	2	1	1	0	Initiate file processing
130	130	1	0	0	Break for memory erase
3	3	1	1	0	Initiate file processing
60	60	1	0	0	Break for file processing
20	20	1	1	0	Return to normal configuration MIPS/TEPC
130	130	1	0	0	Transfer files to optical disk (crew required for 5 minutes every 30 minutes)
25	25	1	1	0	Crew monitoring of the above step
7	7	1	1	0	Stow Disk/Telemetery file

8. Data Processing:

1. Data from the TEPC is downloaded into a host computer. Files are then stored on data storage media for later return for ground based analysis. Some computer processing of data is conducted as part of the download sequence. A small summary file is generated for telemetry.
2. Data downlink is highly desired.

Mission: NASA 5 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:I:2

Session Type: Inflight

2. Session: MO-1 Private Medical Conference

3. Session Timeline: **Crewtime Usage (mins):** 15 **Session Time (mins):** 15

Scheduled Days: FD 1, 2, 3, 4, 5, 6, 7, 14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84, 91, 98, 105, 112, 119, 126, 133, 140

4. Session Scenario:
Private medical conferences will be held weekly. Astronaut will discuss medical status, human factors, and habitation systems. Daily communication with the U.S. crewmember is requested.

5. Session Constraints:
1. Private medical conferences are scheduled weekly.
2. Exact performance days have been estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	0	1	Discuss medical status, human factors, and habitation systems

8. Data Processing:
1. Voice communication required daily.

Mission: NASA 5 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:I:27

2. Session: MO-6 Crew Status and Support Tracker (CSST) **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 7, 14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84, 91, 98, 105, 112, 119, 126, 133

4. Session Scenario:

The crewmember will be requested to complete a brief psychological checklist, the Crew Status and Support Tracker (CSST), using a computer once per week (perferably Friday). The checklist will include questions regarding adaptation to isolation and confinement, personal assessment of work load and performance, quality of sleep, recommendations for enhancing psychological support, and other areas related to maintaining psychological well-being and effective team functioning. This information will be downlinked and made accessable to NASA Flight Surgeon.

5. Session Constraints:

1. Flight days have been estimated.
2. The assessment must be completed in an area free from distractions (e.g., other crewmembers, loud noise, etc.)
3. Following completion of the checklist, data must be downloaded to the MIPS optical disk.
4. Downlink from the MIPS should be done as soon as possible.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820433	MIPS-2C Controller	1
820441	Standard I/F MIPS Optical Disks	1
852118	Mir Interface to Payload System-2L Laptop/MIPS-3C	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	0	1	Fill out questionnaire
15	15	1	1	0	Data Download/Downlink

8. Data Processing:

1. Data downlink required.
2. Telemetry time is needed once per week to transfer 1 file approximately 100k in size.

Mission: NASA 5 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:I:28

Session Type: Inflight

2. Session: MO-12 Radiation Monitoring

3. Session Timeline: **Crewtime Usage (mins):** 45 **Session Time (mins):** 45

Scheduled Days: FD 5

4. Session Scenario:

Astronaut will wear crew dosimeter from launch to landing. Eighteen passive dosimeters will be deployed throughout the station to monitor radiation during flight. After instrumentation and placement, continuous monitoring will occur.

5. Session Constraints:

1. Location for dosimeters for station will be specified in procedures.
2. Exact days have been estimated (as soon as possible is desired during docked phase).
3. Crew dosimeter (increments 3-7) is being worn by long duration astronaut (from launch to landing) as well as during EVA.
4. Deployment of the new NASA dosimeters should be scheduled concurrently with the stowage and return of the used flight dosimeters from the previous NASA mission. This assures that monitoring occurs in the same locations as the previous mission.
5. Astronaut will wear dosimeter during EVA.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150073	Crew Passive Dosimeter	1
150075	Dosimeter for Station	18

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
45	45	1	1	0	Astronaut instrumentation and placement of 18 passive dosimeters (continuous monitoring)

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:I:29

2. Session: MO-9 Physical Exam **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 65 **Session Time (mins):** 65

Scheduled Days: FD 30, 60, 90, 120, 140

4. Session Scenario:

Once per month the following will be performed: (a) crewmember will complete a subjective description of health (Russian Form 020) to assess in-flight health status (b) blood analysis using the PCBA will be performed once per month or according to medical indications.

5. Session Constraints:

1. Request the session to be completed withing a 2 day period of MK-1 (12 lead ECG).

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820423	PCBA Cartridge Kit	1
852212	Mir Supplemental Medical Kit Resupply Kit (MRK)	1
852241	Barcode and Data Logger (BDL) Assy.	1
854898	Emergency Medications Kit (EMK)	1
854899	Medical Extended Duration Orbiter Pack (MEDOP)	1
854900	Medications and Bandages Kit (MBK)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	0	1	Complete Russian Form 020
5	5	1	0	1	Blood Collection
45	45	1	1	0	Blood Chemistry Analysis

8. Data Processing:

1. Report results of PEX during A/G Session.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:I:31

Session Type: Inflight

2. Session: MO:2 Install Updated BDL software

3. Session Timeline: **Crewtime Usage (mins):** 13 **Session Time (mins):** 13

Scheduled Days: FD 6

4. Session Scenario:

The NASA astronaut will remove the current PCMCIA card from the BDL and install a new PCMCIA card containing software upgrades. A backup of the PCMCIA card will be stowed in the BDL Accessory kit.

5. Session Constraints:

1. Performance dates are estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
852131	BDL Accessory Kit	1
852241	Barcode and Data Logger (BDL) Assy.	2
854783	PCMCIA Card (BDL Software Modifications)	3

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
1	1	1	1	0	Unstow new PCMCIA card.
1	1	1	1	0	Remove old PCMCIA card from first BDL.
2	2	1	1	0	Install and activate new PCMCIA card in first BDL.
1	1	1	1	0	Stow old card in Return to Houston Bag.
1	1	1	1	0	Remove old PCMCIA card from second BDL.
2	2	1	1	0	Install and activate the new PCMCIA card in second BDL.
1	1	1	1	0	Stow old card in Return to Houston Bag.
1	1	1	1	0	Unstow BDL Accessory Kit.
1	1	1	1	0	Remove old backup PCMCIA card and stow in Return to Houston Bag.
1	1	1	1	0	Stow new backup PCMCIA card in BDL Accessory Kit.
1	1	1	1	0	Stow BDL Accessory Kit.

8. Data Processing:

N/A

Mission: NASA 5 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:I:32

2. Session: MO-2 Barcode Data Logger Download of MSMK General Usage Data **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 28, 56, 84, 112, 140

4. Session Scenario:

The crewmember will retrieve optical diskettes from storage and then proceed to configure systems to support barcode data logger download. Crewmember will download barcode data logger MSMK (EMK, MEDOP, and MBK) usage data onto Mir Interface to Payloads System (MIPS) computer. The data will then be downloaded to optical diskettes and stored for later actions.

5. Session Constraints:

1. Download of barcode data logger data to be performed by astronaut.
2. Sessions are once per month and at the end of the mission, or if medical indications of flight crew warrant the need for downloading the barcode data logger MSMK (EMK, MEDOP, and MBK) usage data.
3. Download session must be performed before downlink session.
4. If downlink is not available, download should not be performed.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820441	Standard I/F MIPS Optical Disks	6
840003	Mir Interface to Payload Systems-2 (MIPS)	1
852241	Barcode and Data Logger (BDL) Assy.	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Retrieve optical diskettes
10	10	1	1	0	Configure systems for download
10	10	1	1	0	Download barcode data logger data to optical diskettes
5	5	1	1	0	Store optical diskettes for later actions

8. Data Processing:

1. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:I:35

Session Type: Inflight

2. Session: MO-10 Analysis of Urine Samples

3. Session Timeline: **Crewtime Usage (mins):** 10 **Session Time (mins):** 10

Scheduled Days: FD 30, 60, 90, 120

4. Session Scenario:

After void, urinalysis will be performed using chemstrip and color chart, then recorded in the MSMK (EMK, MEDOP, MBK) crew log and report results to ground.

5. Session Constraints:

1. Session will be performed monthly in conjunction with Russian MK 27 (Biochemical Research of Urine). It is acceptable to have this session rescheduled.
2. Exact performance days have been estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854898	Emergency Medications Kit (EMK)	1
854899	Medical Extended Duration Orbiter Pack (MEDOP)	1
854900	Medications and Bandages Kit (MBK)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Urinalysis

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.
3. Urinalysis results are downlinked (Voice) during the next available communication session.

Mission: NASA 5 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:I:36

2. Session: MO-11 TEPC Display Call Down **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 10 **Session Time (mins):** 10

Scheduled Days: FD 7, 14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84, 91, 98, 105, 112, 119, 126, 133, 140

4. Session Scenario:

Several values from the TEPC display are logged and later voiced to ground.

5. Session Constraints:

1. When applicable, the weekly call downs should coincide with the monthly download sessions to voice down pre-shutdown values.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
810164	TEPC (Tissue Equivalent Proportional Counter)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Log TEPC display values on TEPC data sheet
5	5	1	1	0	Voice data to ground during any available com pass

8. Data Processing:

1. Air to ground voice communication is required.

Mission: NASA 5 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:I:37

2. Session: MO-14 Environmental Health Anomalies/Air Pollutants **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 1470

Scheduled Days: FD 10, 40, 80, 120, 150

4. Session Scenario:

Sample Mir air for formaldehyde using area and personal sampling devices. Area and personal sampling occurs simultaneously during each scheduled day. Each scheduled day, area and personal sampling devices are deployed in duplicate (i.e. 2 area and 2 personal). Personal monitors will be exposed for 12 hours and area monitors for 24 hours. Start/stop time, date, and location are recorded.

5. Session Constraints:

1. Careful selection of deployment location for area monitoring is very important to ensure that a representative sample of the cabin air has been collected and adequate air flow across the sampler has been maintained. The sampling location will be determined after consultation with the Russian Investigators.
2. Flight days are estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150069	Formaldehyde Monitor Kit Assy	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow sampling devices
5	5	1	1	0	Start sampling; record sampling data
720	720	1	0	0	12 hour interval/break
5	5	1	1	0	Stop personal sampling; record sampling data
5	5	1	1	0	Stow personal area sampling devices
720	720	1	0	0	12 hour interval/break
5	5	1	1	0	Stop area sampling; record sampling data
5	5	1	1	0	Stow area sampling devices

8. Data Processing:

1. Samples will be returned to ground-based laboratory for analyses.
2. No data downlink required.
3. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:I:38

2. Session: MO-2 Barcode Data Logger Downlink of MSMK General Usage Data **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 25 **Session Time (mins):** 25

Scheduled Days: FD 28, 56, 84, 112, 140

4. Session Scenario:

Crewmember will retrieve the optical diskettes of the barcode data logger data. The crewmember will then configure systems to support the downlink of the barcode data logger data stored on the optical diskettes. This session will conclude with a successful downlink of the barcode data logger data to the TsUP.

5. Session Constraints:

1. The barcode data logger downlink will be performed by the astronaut.
2. Sessions are once per month and at end of mission, or if medical indications of flight crew warrant the need for downlinking the barcode data logger MSMK usage data.
3. Download session must be performed before downlink session.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150155	Mir Interface to Payload Systems-3 (MIPS-3)	1
820441	Standard I/F MIPS Optical Disks	6

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Retrieve optical diskettes
10	10	1	1	0	Configure systems for downlink
10	10	1	1	0	Downlink barcode reader data

8. Data Processing:

1. Air-to-ground voice communication may be required in the event of a contingency situation.
2. Data downlink required.

Mission: STS 86 (SM-07) **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:LOG:I:13

Session Type: Down Item

2. Session: MO-12 Transfer Session - Radiation Monitoring

3. Session Timeline: **Crewtime Usage (mins):** 10 **Session Time (mins):** 10

Scheduled Days: FD 5

4. Session Scenario:
Dosimeters for station will be transferred from the Mir to the Shuttle.

5. Session Constraints:
1. Exact performance day has been estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150073	Crew Passive Dosimeter	1
150075	Dosimeter for Station	18

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Transfer items from the Mir to the Shuttle

8. Data Processing:
1. N/A

Mission: STS 86 (SM-07) **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:LOG:I:25

2. Session: Transfer Session - BDL-PCMCIA Cards from Mir to Shuttle **Session Type:** Down Item

3. Session Timeline: **Crewtime Usage (mins):** 15 **Session Time (mins):** 15

Scheduled Days: FD 7

4. Session Scenario:

PCMCIA cards containing modifications to BDL software will be transferred from the Mir to the Shuttle.

5. Session Constraints:

1. Exact performance day has been estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854783	PCMCIA Card (BDL Software Modifications)	3

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	1	0	Transfer PCMCIA cards from Mir to Shuttle

8. Data Processing:

1. N/A

Mission: STS 86 (SM-07) **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:LOG:I:26

2. Session: MO-14 Transfer Session: Formaldehyde Monitor Kits from Mir to Shuttle **Session Type:** Down Item

3. Session Timeline: **Crewtime Usage (mins):** 15 **Session Time (mins):** 15

Scheduled Days: FD 8

4. Session Scenario:
Transfer Formaldehyde Monitor Kit Assys from Mir to Shuttle.

5. Session Constraints:
1. U.S. astronaut is to perform transfer of the Formaldehyde Monitor Kit Assys.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150069	Formaldehyde Monitor Kit Assy	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	1	0	Transfer Formaldehyde Monitor Kit Assys from Mir to Shuttle.

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:LOG:I:28

2. Session: MO-2 Transfer Session - MSMK, MRK, and PCBA Cartridge Kit from Mir to Shuttle

Session Type: Down Item

3. Session Timeline: **Crewtime Usage (mins):** 15 **Session Time (mins):** 15

Scheduled Days: FD 5

4. Session Scenario:
Transfer MSMK (EMK, MEDOP, MBK), MRK, and PCBA Cartridge Kit from Mir to Shuttle.

5. Session Constraints:
1. U.S. astronaut to perform transfer

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
820423	PCBA Cartridge Kit	1
852212	Mir Supplemental Medical Kit Resupply Kit (MRK)	1
852213	MSMK Medical Checklist	1
854898	Emergency Medications Kit (EMK)	1
854899	Medical Extended Duration Orbiter Pack (MEDOP)	1
854900	Medications and Bandages Kit (MBK)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	1	0	Transfer MSMK (EMK, MEDOP, MBK), MRK, and PCBA Cartridge Kit from Mir to Shuttle

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:LOG:I:31

Session Type: Down Item

2. Session: MO-2 Transfer Session - Old TEPC from Mir to Shuttle

3. Session Timeline: **Crewtime Usage (mins):** 15 **Session Time (mins):** 15

Scheduled Days: FD 7

4. Session Scenario:
Old Mir TEPC Kit will be transferred from the Mir to the Shuttle.

5. Session Constraints:
1. Exact performance day has been estimated.
2. US astronaut to perform transfer.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
810164	TEPC (Tissue Equivalent Proportional Counter)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	1	0	Transfer old Mir TEPC kit from Mir to Shuttle

8. Data Processing:
1. No data downlink required.
2. Air-to-ground may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:R:1

Session Type: Postflight

2. Session: MO-3 Postflight Rehabilitation

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: R+ 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21

4. Session Scenario:
Crewmember will receive treatment for physical readaptation to a 1-g environment following long duration space flight.

5. Session Constraints:
TBD

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	0	1	Postflight rehabilitation

8. Data Processing:
N/A

Mission: NASA 5 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:R:2

Session Type: Postflight

2. Session: MO-4 Physical Examination

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: R+ 0, 2, 6, 14, 30

4. Session Scenario:
Crewmember will receive postflight medical examinations.

5. Session Constraints:
1. None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	0	1	Physical examination

8. Data Processing:
N/A

Mission: NASA 5 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:R:3

2. Session: MO-5 Medical Status Check **Session Type:** Postflight

3. Session Timeline: **Crewtime Usage (mins):** 15 **Session Time (mins):** 15

Scheduled Days: R+ 1, 3, 4, 5, 7, 8, 9, 10, 12, 17, 20

4. Session Scenario:

Crewmember will receive postflight medical status checks.

5. Session Constraints:

1. None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	0	0	0	1	Medical status checks

8. Data Processing:

N/A

Mission: NASA 5 **Invest. ID:** 890096 **Exp. ID:** MO **Russian ID:** SMP-US

Invest. Title: Space Medicine Program - US Medical Operations

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:** TBD

1. Session ID: SMP:MO:R:4

Session Type: Postflight

2. Session: MO-6 Psychological Debriefing

3. Session Timeline: **Crewtime Usage (mins):** 90 **Session Time (mins):** 90

Scheduled Days: R+ 3, 14, 45

4. Session Scenario:

Debriefings will be conducted in order to: (1) follow-up on any concerns identified by the crewmember or psychological support team during the flight; (2) assess the current psychological health and postflight adaptation of the crewmember, (3) obtain crew evaluations of the in-flight psychological support activities; and (4) obtain crew assessment of individual and team dynamics during flight.

5. Session Constraints:

1. Private room, free from distractions, needed for debriefing.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
90	0	0	0	1	Psychological debriefing

8. Data Processing:

1. N/A

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Investigation ID: 890597 **Experiment ID:** MSD042 **Russian ID:**

Investigation Title: Return to Duty Sensorimotor Neurological Assessment

US Investigators: WG-8

Russian Investigators:

Other Investigators:

Payload Category: SMP **Sub-Cat.:** NEU **Subjects Requested:**

Description:

Science Objectives:

Functional Objectives:

Sample Transfer Rqd: No **Hardware Transfer Rqd:** No

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
3	NASA 3	9/16/96	☒	☒
4	NASA 4	1/16/97	☒	☒
5	NASA 5	5/15/97	☒	☒
6	NASA 6	9/18/97	☒	☒
7	NASA 7	1/15/98	☒	☒

Hardware Items for Investigation:

Mission: NASA 5 **Invest. ID:** 890597 **Exp. ID:** MSD042 **Russian ID:**

Invest. Title: Return to Duty Sensorimotor Neurological Assessment **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:NEU:P:1

Session Type: Preflight

2. Session: Preflight Sensorimotor Test Battery

3. Session Timeline: **Crewtime Usage (mins):** 40 **Session Time (mins):** 40

Scheduled Days: L- 30, 60

4. Session Scenario:

A short battery of sensorimotor control tasks will be performed on US crewmember. Tasks include: balance control, locomotor control, and eye-head coordination.

5. Session Constraints:

1. Crewmember should limit participation in provocative training exercises (e.g., flight motion simulators, centrifuge simulations, training aircraft) within 24 hours prior to testing.
2. Crewmember should limit alcohol consumption within 24 hours prior to testing.
3. At each pre- and postflight test session, crewmember will be asked to report on recent drug and alcohol consumption, physical activities, and eating and sleeping schedules.
4. This session should be as close to flight as possible and in the US if possible.
5. Minimum time between preflight sessions is 2 days, maximum time is 60 days.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854784	Equitest Posture Platform System	1
854785	Locomotor Coordination System	1
854786	Eye-Head Coordination System	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
40	0	0	0	1	Sensorimotor Test Battery

8. Data Processing:

N/A

Mission: NASA 5 **Invest. ID:** 890597 **Exp. ID:** MSD042 **Russian ID:**

Invest. Title: Return to Duty Sensorimotor Neurological Assessment

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:NEU:R:1

Session Type: Postflight

2. Session: Postflight Sensorimotor Test Battery

3. Session Timeline: **Crewtime Usage (mins):** 40 **Session Time (mins):** 40

Scheduled Days: R+ 2, 6, 14, 30

4. Session Scenario:

A short battery of sensorimotor control tasks will be performed on US crewmember. Tasks include: balance control, locomotor coordination, and eye-head coordination.

5. Session Constraints:

1. Crewmember should limit participation in provocative training exercises (e.g., flight motion simulators, centrifuge simulations, training aircraft) within 24 hours prior to testing.
2. Crewmember should limit alcohol intake with 24 hours prior to testing.
3. At each pre- and postflight test session, the crewmember will be asked to report on recent drug and alcohol consumption, physical activities, and eating and sleeping schedules.
4. The dosage and timing of all in-flight medications as well as actual exercise, meal, and sleep schedules will be obtained postflight from the flight data file.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854784	Equitest Posture Platform System	1
854785	Locomotor Coordination System	1
854786	Eye-Head Coordination System	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
40	0	0	0	1	Sensorimotor Test Battery

8. Data Processing:

N/A

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Investigation ID: 890605 **Experiment ID:** MSD002 **Russian ID:**

Investigation Title: Monitoring Orthostatic Function During Entry, Landing, & Egress

US Investigators: John Charles, Ph.D.

Russian Investigators:

Other Investigators:

Payload Category: SMP **Sub-Cat.:** MO **Subjects Requested:**

Description:

Science Objectives:

Functional Objectives:

Sample Transfer Rqd: No **Hardware Transfer Rqd:** No

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
4	NASA 4	1/16/97	☒	☒
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	NASA 6	9/18/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒
7	NASA 7	1/15/98	☒	☒
7	STS 89 (SM-08)	1/15/98	☒	☒
7	STS 91 (SM-09)	5/29/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
SMP			854895	TEAC Data Tapes
SMP			854896	Entry Blood Pressure Monitoring Assembly
SMP			854897	Entry Blood Pressure Monitoring BioBag

Mission: NASA 5 **Invest. ID:** 890605 **Exp. ID:** MSD002 **Russian ID:**

Invest. Title: Monitoring Orthostatic Function During Entry, Landing, & Egress **Prime** ☒ **Contingent** ☐

US PI: John Charles, Ph.D. **Russian PI:**

1. Session ID: SMP:MON:P:3

2. Session: Hardware Familiarization Session **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 360

4. Session Scenario:

The US crewmember will be introduced to the monitoring hardware and inflight timeline. A brief overview of previous related studies will be discussed, as well as the purpose of this operational activity. Constraints and issues will be addressed.

5. Session Constraints:

1. This session should occur prior to other crew training or data collection.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854895	TEAC Data Tapes	3
854896	Entry Blood Pressure Monitoring Assembly	1
854897	Entry Blood Pressure Monitoring BioBag	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	1	0	Hardware familiarization

8. Data Processing:

N/A

Mission: STS 84 (SM-06) **Invest. ID:** 890605 **Exp. ID:** MSD002 **Russian ID:**

Invest. Title: Monitoring Orthostatic Function During Entry, Landing, & Egress **Prime** ☒ **Contingent** ☐

US PI: John Charles, Ph.D. **Russian PI:**

1. Session ID: SMP:MON:P:1

2. Session: Operator Instrumentation Training **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: L- 60, 90, 180

4. Session Scenario:

A Shuttle crewmember will be trained to instrument a subject with blood pressure and heart rate monitoring hardware. During the first session, the operator will participate in the actual LDM U.S. crewmember's BDC session. The second training session will be performed with an unsuited subject volunteer. For the third training, a subject volunteer will don a pressure suit. The operator will then be trained to integrate the experiment hardware with the pressure suit.

5. Session Constraints:

1. These training dates are estimated and should be coordinated through shuttle training.
2. Training sessions should occur within L-6 months to launch timeframe.
3. The first training session must be held in conjunction with the BDC session for the LDM crewmember.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854895	TEAC Data Tapes	3
854896	Entry Blood Pressure Monitoring Assembly	1
854897	Entry Blood Pressure Monitoring BioBag	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	1	0	Training on hardware instrumentation

8. Data Processing:

N/A

Mission: STS 86 (SM-07) **Invest. ID:** 890605 **Exp. ID:** MSD002 **Russian ID:**

Invest. Title: Monitoring Orthostatic Function During Entry, Landing, & Egress **Prime** ☒ **Contingent** ☐

US PI: John Charles, Ph.D. **Russian PI:**

1. Session ID: SMP:MON:P:1

2. Session: Operator Instrumentation Training **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: L- 60, 90, 180

4. Session Scenario:

A Shuttle crewmember will be trained to instrument a subject with blood pressure and heart rate monitoring hardware. During the first session, the operator will participate in the actual LDM U.S. crewmember's BDC session. The second training session will be performed with an unsuited subject volunteer. For the third training, a subject volunteer will don a pressure suit. The operator will then be trained to integrate the experiment hardware with the pressure suit.

5. Session Constraints:

1. These training dates are estimated and should be coordinated through shuttle training.
2. Training sessions should occur within L-6 months to launch timeframe.
3. The first training session must be held in conjunction with the BDC session for the LDM crewmember.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854895	TEAC Data Tapes	3
854896	Entry Blood Pressure Monitoring Assembly	1
854897	Entry Blood Pressure Monitoring BioBag	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	1	0	Training on hardware instrumentation

8. Data Processing:

N/A

Mission: NASA 5 **Invest. ID:** 890605 **Exp. ID:** MSD002 **Russian ID:**

Invest. Title: Monitoring Orthostatic Function During Entry, Landing, & Egress **Prime** ☒ **Contingent** ☐

US PI: John Charles, Ph.D. **Russian PI:**

1. Session ID: SMP:MON:P:2

Session Type: BDC

2. Session: Preflight HR & BP Measurements

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: L- 60

4. Session Scenario:

The US Crewmember will be instrumented prior to donning pressure suit. Five recumbent, five seated, and five standing blood pressure and heart rate measurements will be obtained with the suit unpressured and then with the suit pressured.

5. Session Constraints:

1. This session should occur within the L-60 to L-30 day timeframe.
2. A Shuttle crewmember operator will be required to participate in this session.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854895	TEAC Data Tapes	3
854896	Entry Blood Pressure Monitoring Assembly	1
854897	Entry Blood Pressure Monitoring BioBag	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	0	1	Instrumentation, suit donning, baseline HR & BP measurements

8. Data Processing:

N/A

Mission: STS 84 (SM-06) **Invest. ID:** 890605 **Exp. ID:** MSD002 **Russian ID:**

Invest. Title: Monitoring Orthostatic Function During Entry, Landing, & Egress **Prime** ☒ **Contingent** ☐

US PI: John Charles, Ph.D. **Russian PI:**

1. Session ID: SMP:MON:I:1

Session Type: Inflight

2. Session: Inflight Continuous HR & BP Measurements

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 90

Scheduled Days: FD 9

4. Session Scenario:

On landing day, returning US crewmember will be instrumented by the operator prior to donning the pressure suit. Blood pressure and heart rate will be monitored during the pre-landing, landing, and postlanding period. A posture test similar to the preflight test (seated, standing only) will be performed after wheelstop, either in the Orbiter or on the CTV (as soon as possible).

5. Session Constraints:

1. This session must occur on the last FD of the returning long duration astronaut's return shuttle flight.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854895	TEAC Data Tapes	3
854896	Entry Blood Pressure Monitoring Assembly	1
854897	Entry Blood Pressure Monitoring BioBag	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
90	90	1	1	1	Operator will instrument crewmember. BP & HR will be continuously monitored.

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 890605 **Exp. ID:** MSD002 **Russian ID:**

Invest. Title: Monitoring Orthostatic Function During Entry, Landing, & Egress **Prime** ☒ **Contingent** ☐

US PI: John Charles, Ph.D. **Russian PI:**

1. Session ID: SMP:MON:I:1

Session Type: Inflight

2. Session: Inflight Continuous HR & BP Measurements

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 90

Scheduled Days: FD 9

4. Session Scenario:

On landing day, returning US crewmember will be instrumented by the operator prior to donning the pressure suit. Blood pressure and heart rate will be monitored during the pre-landing, landing, and postlanding period. A posture test similar to the preflight test (seated, standing only) will be performed after wheelstop, either in the Orbiter or on the CTV (as soon as possible).

5. Session Constraints:

1. This session must occur on the last FD of the returning long duration astronaut's return shuttle flight.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854895	TEAC Data Tapes	3
854896	Entry Blood Pressure Monitoring Assembly	1
854897	Entry Blood Pressure Monitoring BioBag	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
90	90	1	1	1	Operator will instrument crewmember. BP & HR will be continuously monitored.

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

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Investigation ID: 890607 **Experiment ID:** MSD053 **Russian ID:** Water

Investigation Title: Analysis of Mir Archival Water Samples

US Investigators: WG-8

Russian Investigators:

Other Investigators:

Payload Category: SMP **Sub-Cat.:** ENV **Subjects Requested:**

Description: Detailed analysis of source and finished waters will confirm that the design of the Mir purification system is adequate to maintain the concentrations of potentially harmful contaminants at acceptably safe levels. The information gathered by this analysis will support the development and evaluation of water purification units, water quality standards and inflight water sampling hardware for the International Space Station.

Science Objectives: The specific aim of this monitoring activity is to characterize the chemical composition of Mir source (i.e. humidity condensate) and finished waters (i.e. potable, backup potable) to support the design and operation of water purification and monitoring units and the establishment of water quality standards for the International Space Station. Condensate measured on the Mir is expected to be of similar composition as the Shuttle condensate in terms of major components (i.e. alcohols, organic acids). Variations in the composition as a variable of time are expected. Analysis of Mir potable water is expected to show that the quality of water meets established specifications set by the Russians.

Functional Objectives: Preflight studies will focus on developing and evaluating flight hardware, developing analytical methods, and training crews. Inflight samples of Mir potable water and humidity condensate will be collected. Postflight, analyses of these samples will be performed for chemical evaluation.

Sample Transfer Rqd: Yes **Hardware Transfer Rqd:** No

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
4	Mir 23	2/2/97	☒	☒
4	NASA 4	1/16/97	☒	☒
4	STS 81 (SM-05)	1/16/97	☒	☒
5	Mir 24	6/24/97	☒	☒
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	Mir 25	12/12/97	☒	☒
6	NASA 6	9/18/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒
7	Mir 26	5/30/98	☒	☒
7	NASA 7	1/15/98	☒	☒
7	STS 89 (SM-08)	1/15/98	☒	☒
7	STS 91 (SM-09)	5/29/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
OPS	SHR	Flight	390043	Camcorder System (NASA)
SMP	HSR	Flight	846687	Condensate Sampler - Russian (0.15L)
SMP	HSR	Flight	852157	Bag Assy, Chemical Archive
MG	SHR		852166	8 mm Video Tape (minutes)
SMP	HSR	Flight	853497	Kit Assy III, Water Experiment
SMP	HSR	Flight	853498	Kit Assy IV, Water Experiment

Mission: Mir 24 **Invest. ID:** 890607 **Exp. ID:** MSD053 **Russian ID:** Water

Invest. Title: Analysis of Mir Archival Water Samples

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:ENV:P:1

Session Type: Training

2. Session: Humidity Condensate Sampling Training (Russian Provided)

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: L- 180

4. Session Scenario:

The crew will be trained to collect humidity condensate samples.

5. Session Constraints:

1. Training for cosmonauts and astronauts will be provided in Russia by the Russians. No U.S. time will be scheduled.
2. Hardware is provided by the Russians

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
846687	Condensate Sampler - Russian (0.15L)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	0	0	1	0	Humidity condensate collection training session.

8. Data Processing:

1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 890607 **Exp. ID:** MSD053 **Russian ID:** Water

Invest. Title: Analysis of Mir Archival Water Samples

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:ENV:P:11

Session Type: Training

2. Session: Combined Training for Water Sample Collection (Chemical & Microbial) and MCD Processing for Water (MSD053), Micro (MSD022), and WMM

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 120

Scheduled Days: L- 90, 180, 300

4. Session Scenario:

Training to collect water samples for chemical and microbial analysis is performed. Microbial Capture Devices (MCDs) processing, incubation and documentation is also covered.

5. Session Constraints:

1. Training for Water (MSD053), Micro (MSD022), and WMM have been combined for this session.
2. Exact preflight performance days have been estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	2	0	Training for chemical water sampling
60	0	0	2	0	Training for microbial water sampling and processing of MCDs

8. Data Processing:

N/A

Mission: NASA 5 **Invest. ID:** 890607 **Exp. ID:** MSD053 **Russian ID:** Water

Invest. Title: Analysis of Mir Archival Water Samples

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:ENV:P:2

2. Session: Combined Training for Water Sample Collection (Chemical & Microbial) and MCD Processing for Water (MSD053), Micro (MSD022), and WMM

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: L- 90, 180, 300

4. Session Scenario:

Training to collect water samples for chemical and microbial analysis is performed. Microbial Capture Devices (MCDs) processing, incubation and documentation is also covered.

5. Session Constraints:

1. Training for Water (MSD053), Micro (MSD022), and WMM have been combined for this session.
2. Exact preflight performance days have been estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
846773	Kit Assy, Water Experiment	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	1	0	Training for chemical water sampling
60	0	0	1	0	Training for microbial water sampling and processing of MCDs

8. Data Processing:

N/A

Mission: Mir 24 **Invest. ID:** 890607 **Exp. ID:** MSD053 **Russian ID:** Water

Invest. Title: Analysis of Mir Archival Water Samples

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:ENV:I:1

Session Type: Inflight

2. Session: Humidity Condensate Set-up

3. Session Timeline: **Crewtime Usage (mins):** 25 **Session Time (mins):** 25

Scheduled Days: FD 115, 138

4. Session Scenario:

The Humidity Condensate system is activated and set-up for sample collection. Set-up activities are videotaped for one session only.

5. Session Constraints:

1. Russians will supply the hardware needed to collect humidity condensate samples.
2. Once the apparatus is set-up, condensate collects for 3 days unattended. The apparatus will be dismantled on the 3rd day (reference session "Humidity Condensate Dismantle").
3. The second session should be collected during the Shuttle docked phase. If condensate recovery system is not operational, sample should be collected just prior to docking.
4. No monitoring is needed during sampling period.
5. Exact performance days have been estimated.
6. Video of setup is required for one session only.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
846687	Condensate Sampler - Russian (0.15L)	1
852166	8 mm Video Tape (minutes)	20

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow condensate sampler and camcorder.
20	20	1	1	0	Set-up for collection and video activity.

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency.

Mission: Mir 24 **Invest. ID:** 890607 **Exp. ID:** MSD053 **Russian ID:** Water

Invest. Title: Analysis of Mir Archival Water Samples **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:ENV:I:2

2. Session: Humidity Condensate Dismantle **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 45 **Session Time (mins):** 25

Scheduled Days: FD 118, 141

4. Session Scenario:

The Humidity Condensate system is deactivated and sampling hardware stowed.

5. Session Constraints:

1. Russians will supply the hardware needed to collect humidity condensate samples.
2. Exact performance days have been estimated.
3. Videotape the removal of condensate sampler for one session only.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
390043	Camcorder System (NASA)	1
846687	Condensate Sampler - Russian (0.15L)	1
852166	8 mm Video Tape (minutes)	20

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
20	20	1	2	0	Remove condensate sampler. Videotape this activity.
5	5	1	1	0	Stow sampler and camcorder.

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890607 **Exp. ID:** MSD053 **Russian ID:** Water

Invest. Title: Analysis of Mir Archival Water Samples **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:ENV:I:16

Session Type: Inflight

2. Session: Docked Phase Water Collection and MCD Processing (Combined Session for Water and Micro)

3. Session Timeline: **Crewtime Usage (mins):** 195 **Session Time (mins):** 375

Scheduled Days: FD 6

4. Session Scenario:

Water samples will be collected for chemical (hot and SVO-ZV) and microbial (hot, cold, and SVO-ZV) postfight analysis. MCDs will be processed and returned for analysis.

5. Session Constraints:

1. This is a combined session for MSD053, MSD022 and ISS WMM experiment.
2. Exact performance days have been estimated. Session must be performed during shuttle docked phase.
3. The Water Experiment Kit IV contains hardware for MSD053, MSD022, and the ISS Risk Mitigation WMM experiment and must be transferred to the Mir prior to the start of this session.
4. Session should not interefere with meals or exercise.
5. The break time allotted in the session flow includes 45 mins. for refill/heatup of water in the pasteurizing unit. Once heat-up is activated, crewmember can perform other tasks during the break.
6. Meals may be prepared between hot water and cold water collections.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
853497	Kit Assy III, Water Experiment	1
853498	Kit Assy IV, Water Experiment	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow Water Experiment Kit IV and the WEK III
5	5	1	1	0	Hot water heat up activation
45	45	1	0	0	BREAK (45 min hot water refill/heat-up)
20	20	1	1	0	Flush port. Collect water sample in archive chemical bag.
5	5	1	1	0	Hot water heat-up activation
45	45	1	0	0	BREAK (45 min hot water refill/heat-up)
5	5	1	1	0	Collect hot water sample in archive chemical bag. Attach archive micro bag.
5	5	1	1	0	Hot water heat-up activation
45	45	1	0	0	BREAK (45 min hot water refill/heat-up)
5	5	1	1	0	Collect sample in archive micro bag.
5	5	1	1	0	Hot water heat-up activation
45	45	1	0	0	BREAK (45 min hot water refill/heat-up)
10	10	1	1	0	Collect sample in archive micro bag. Remove micro archive bag. Attach micro analysis bag. Collect sample for MCD processing.
30	30	1	1	0	Go to cold water port & flush port. Collect water samples in archive micro & micro analysis bags.
40	40	1	1	0	Go to SVO-ZV water port & flush port. Collect water samples in archive chemical & micro bags. Collect MCD sample in micro analysis bag.
5	5	1	1	0	Stow archive chemical and micro bags.

45	45	1	1	0	Process MCDs (9)
5	5	1	1	0	Stow MCDs in the WEK III for return
5	5	1	1	0	Stow WEK IV and WEK III on Mir.

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890607 **Exp. ID:** MSD053 **Russian ID:** Water

Invest. Title: Analysis of Mir Archival Water Samples **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:ENV:I:19

2. Session: Pre-Adsorption Bed Change-out Water Sample Collection and MCD Processing (Combined Water and WMM) **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 225 **Session Time (mins):** 225

Scheduled Days: FD 80

4. Session Scenario:

Regenerated potable water (hot) is collected just prior to routine change-out of the adsorption bed aboard the Mir for chemical analysis postflight. MCDs will also be processed using water collected for microbial analysis.

5. Session Constraints:

1. Regenerated water samples should be collected after Mir potable water processor adsorption beds are routinely changed out.
2. For purposes of scheduling, it is assumed that routine change-out will occur about halfway into the NASA mission. Session should be performed according to the schedule for adsorption bed routine change-out.
3. If adsorption bed routine change-out is not scheduled to occur during the NASA mission, then samples should be collected midway in the NASA mission.
4. The time allotted for hot water sample collection includes time waiting for refill/heatup of water in pasteurizing unit.
5. Exact performance day has been estimated.
6. Session should not interfere with meals or exercise.
7. This is a combined session for WATER (MSD053) and WMM.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
853498	Kit Assy IV, Water Experiment	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow Kit
5	5	1	1	0	Aseptic wipe and install adapter at galley hot water port
5	5	1	1	0	Collect sample of hot water in waste bag to flush port and discard bag in trash
105	105	1	1	0	Label sample bag and collect one sample of hot water for chemical analysis
10	10	1	1	0	Remove adapter and stow in kit
40	40	1	1	0	Collect water for MCD processing
45	45	1	1	0	Process MCDs and incubate
10	10	1	1	0	Stow WEK #III

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890607 **Exp. ID:** MSD053 **Russian ID:** Water

Invest. Title: Analysis of Mir Archival Water Samples **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:ENV:I:22

2. Session: Post-Adsorption Bed Change-out Water Sample Collection and MCD Processing (Combined Water and WMM) **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 225 **Session Time (mins):** 225

Scheduled Days: FD 90

4. Session Scenario:

Regenerated potable water (hot and cold) is collected post routine change-out of the adsorption bed aboard the Mir for chemical analysis postflight. MCDs will also be processed using water collected for microbial analysis.

5. Session Constraints:

1. Regenerated water samples should be collected after Mir potable water processor adsorption beds are routinely changed out.
2. For purposes of scheduling, it is assumed that routine change-out will occur about halfway into the NASA mission. Session should be performed according to the schedule for adsorption bed routine change-out.
3. If adsorption bed routine change-out is not scheduled to occur during the NASA mission, then samples should be collected midway in the NASA mission.
4. The time allotted for hot water sample collection includes time waiting for refill/heatup of water in pasteurizing unit.
5. Exact performance day has been estimated.
6. Session should not interfere with meals or exercise.
7. This is a combined session for WATER (MSD053) and WMM.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
853498	Kit Assy IV, Water Experiment	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow kit
5	5	1	1	0	Aseptic wipe and install adapter at galley hot water port
5	5	1	1	0	Collect hot water in waste bag to flush port and discard bag in trash
105	105	1	1	0	Label sample bag and collect sample of hot water for chemical analysis
5	5	1	1	0	Aseptic wipe and install adapter at galley cold water port
5	5	1	1	0	Label sample bag and collect sample of cold water for chemical analysis
40	40	1	1	0	Collect water for MCD processing
45	45	1	1	0	Process MCDs and incubate
10	10	1	1	0	Remove adapter, stow in kit and then stow WEK #III

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 890607 **Exp. ID:** MSD053 **Russian ID:** Water

Invest. Title: Analysis of Mir Archival Water Samples

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:LOG:I:16

Session Type: Down Item

2. Session: Transfer Session - Analysis of Mir Archival Water Samples

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 7

4. Session Scenario:
Humidity condensate samples collected prior to or during docking, Mir water samples collected before Shuttle docking, and Mir water samples collected during Shuttle docking will be transferred from the Mir to the Shuttle.

5. Session Constraints:
None

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
846687	Condensate Sampler - Russian (0.15L)	2
852157	Bag Assy, Chemical Archive	5

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	30	1	1	0	Transfer samples back to Shuttle and stow

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

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Investigation ID: 890608 **Experiment ID:** MSD021 **Russian ID:** Crew

Investigation Title: Crew Microbiological Assessment

US Investigators: WG-8

Russian Investigators:

Other Investigators:

Payload Category: SMP **Sub-Cat.:** MIC **Subjects Requested:**

Description: Human microbiota will undergo quantitative and qualitative changes during long (3 to 6 month) space missions. This monitoring activity is expected to provide information about the incidence and mechanisms of microbial transmission between crewmembers. A better understanding of microbial transfer during space flight will allow us to predict which areas or situations allow microbial transfer, and to direct contamination-control efforts accordingly. Information gained from this monitoring activity will be helpful in developing monitoring requirements that will minimize the risks of microbial cross-contamination and infectious disease.

Science Objectives: The objective of this activity is to thoroughly define the microbiota of the space station occupants. The specific aims are to:

a) Identify qualitative and quantitative changes in crew microbiota
b) Determine the extent of microbial transfer among crewmembers.
c) Assess the effect of microbes on crew health during long duration space flight.

Functional Objectives: Crewmember specimens will be collected from the crew before, during , and after flight and analyzed for their microbiological composition. Crewmember samples will be taken at specified intervals during the flight and archived for ground-based analysis. All Samples will be analyzed for bacteria and fungi. All target microbes isolated from any environmental or clinical sample will be analyzed genetically in order to associate the microbe with a primary source.

Sample Transfer Rqd: Yes **Hardware Transfer Rqd:** No

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
4	Mir 23	2/2/97	☒	☒
4	NASA 4	1/16/97	☒	☒
4	STS 81 (SM-05)	1/16/97	☒	☒
5	Mir 24	6/24/97	☒	☒
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	Mir 25	12/12/97	☒	☒
6	NASA 6	9/18/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒
7	Mir 26	5/30/98	☒	☒
7	NASA 7	1/15/98	☒	☒
7	STS 89 (SM-08)	1/15/98	☒	☒
7	STS 91 (SM-09)	5/29/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
SMP	SHR	Back Up	150100	Thermal Electric Freezer (TEF)
HLS	HSR	Flight	840382	Kit Assy, Crew Microbiology
SMP	HSR	Flight	848841	Tube Assy With Freezer Media (Crew)

Mission: Mir 24 **Invest. ID:** 890608 **Exp. ID:** MSD021 **Russian ID:** Crew

Invest. Title: Crew Microbiological Assessment

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:MIC:P:1

2. Session: Crew Sample Collection Training (Mir Crew)

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 30

Scheduled Days: L- 90, 210

4. Session Scenario:
Crew sample training session: Crew samples types, collection and stowage will be covered.

5. Session Constraints:
1. Exact performance days have been estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
237	Fecal Collection Kit	1
840324	Urine Collection Device w/LiCl	1
840382	Kit Assy, Crew Microbiology	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	0	0	2	0	Training for crew sample collection

8. Data Processing:
1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890608 **Exp. ID:** MSD021 **Russian ID:** Crew

Invest. Title: Crew Microbiological Assessment

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:MIC:P:2

Session Type: Training

2. Session: Crew Sample Collection Training (NASA Crew)

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: L- 90, 210

4. Session Scenario:
Crew sample training session: Crew samples types, collection and stowage will be covered.

5. Session Constraints:
1. Exact performance days have been estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
237	Fecal Collection Kit	1
840324	Urine Collection Device w/LiCl	1
840382	Kit Assy, Crew Microbiology	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	0	0	1	0	Training for crew sample collection

8. Data Processing:
1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 890608 **Exp. ID:** MSD021 **Russian ID:** Crew

Invest. Title: Crew Microbiological Assessment

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:MIC:P:3

2. Session: Crew Microbiology (Mir Crew)

Session Type: BDC

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 30

Scheduled Days: L- 10, 30, 60

4. Session Scenario:

Swab specimens from the throat, nose, ear, axilla, groin, scapula and hand as well as urine and feces samples will be requested from all crewmembers before flight.

5. Session Constraints:

1. The first BDC session at approximately L-2 months must be performed in Russia.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
237	Fecal Collection Kit	1
840324	Urine Collection Device w/LiCl	1
840382	Kit Assy, Crew Microbiology	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	0	0	0	2	Crew Microbiological BDC

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890608 **Exp. ID:** MSD021 **Russian ID:** Crew

Invest. Title: Crew Microbiological Assessment

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:MIC:P:4

Session Type: BDC

2. Session: Crew Microbiology (NASA Crew)

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: L- 10, 30, 60

4. Session Scenario:

Swab specimens from the throat, nose, ear, axilla, groin, scapula and hand as well as urine and feces samples will be requested from all crewmembers before flight.

5. Session Constraints:

1. The first BDC session at approximately L-2 months must be performed in Russia.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
237	Fecal Collection Kit	1
840324	Urine Collection Device w/LiCl	1
840382	Kit Assy, Crew Microbiology	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	0	0	0	1	Crew Microbiological BDC

8. Data Processing:

1. N/A for preflight sessions.

Mission: STS 84 (SM-06) **Invest. ID:** 890608 **Exp. ID:** MSD021 **Russian ID:** Crew

Invest. Title: Crew Microbiological Assessment **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:LOG:I:38

2. Session: Transfer Session - Crew Mirobiologial Assessment from Shuttle to Mir **Session Type:** Up Item

3. Session Timeline: **Crewtime Usage (mins):** 15 **Session Time (mins):** 15

Scheduled Days: FD 5

4. Session Scenario:

Crew microbiology sample collection kits for all performance days will be transferred from Shuttle to the Mir.

5. Session Constraints:

1. Exact performance day has been estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840382	Kit Assy, Crew Microbiology	3

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow sample collection kits.
5	5	1	1	0	Transfer sample collection kits to the Mir.
5	5	1	1	0	Return to Shuttle.

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: Mir 24 **Invest. ID:** 890608 **Exp. ID:** MSD021 **Russian ID:** Crew

Invest. Title: Crew Microbiological Assessment

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:MIC:I:1

Session Type: Inflight

2. Session: Crew Microbial Sample Collection - Mir Crew

3. Session Timeline: **Crewtime Usage (mins):** 50 **Session Time (mins):** 30

Scheduled Days: FD 15, 55, 80, 115, 135

4. Session Scenario:

Crew sample collections: Once a month, one swab specimen is collected from each of the following sites - the throat, nose, ear, axilla, groin, scapula and hand. Swabs are frozen in microbial holding medium.

5. Session Constraints:

1. Collections should occur once a month.
2. Crew sample swabs require freezing.
3. Exact performance days have been estimated.
4. Session should be performed on the same day as air, water and surface sampling, with the exception of FD 115.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150100	Thermal Electric Freezer (TEF)	1
840382	Kit Assy, Crew Microbiology	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Unstow crew sampling kit
10	10	1	1	2	Crew microbiological sampling (operator required)
10	10	1	1	0	Stow kit and stow swabs in freezer

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890608 **Exp. ID:** MSD021 **Russian ID:** Crew

Invest. Title: Crew Microbiological Assessment **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:MIC:I:2

2. Session: Crew Microbial Sample Collection - NASA Crew **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 40 **Session Time (mins):** 30

Scheduled Days: FD 15, 55, 80, 115, 135

4. Session Scenario:

Crew sample collections: Once a month, one swab specimen is collected from each of the following sites - the throat, nose, ear, axilla, groin, scapula and hand. Swabs are frozen in microbial holding medium.

5. Session Constraints:

1. Collections should occur once a month.
2. Crew sample swabs require freezing.
3. Exact performance days have been estimated.
4. Session should be performed on the same day as air, water and surface sampling, with the exception of FD 115 during NASA 4 and FDs 85 and 115 during NASA 5 and NASA 6.
5. All sessions should be scheduled prior to shuttle docking.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150100	Thermal Electric Freezer (TEF)	1
840382	Kit Assy, Crew Microbiology	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Unstow crew sampling kit
10	10	1	1	1	Crew microbiological sampling (operator required)
10	10	1	1	0	Stow kit and stow swabs in freezer

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 890608 **Exp. ID:** MSD021 **Russian ID:** Crew

Invest. Title: Crew Microbiological Assessment

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:LOG:I:39

Session Type: Down Item

2. Session: Transfer Session - Crew Microbiological Assessment from Mir to Shuttle

3. Session Timeline: **Crewtime Usage (mins):** 55 **Session Time (mins):** 55

Scheduled Days: FD 7

4. Session Scenario:
Frozen crew swabs are transferred from the TEHOF to the Shuttle freezer. The Crew Microbiology Kits are transferred to the Shuttle.

5. Session Constraints:
1. Crew swabs must be returned frozen.
2. Exact performance day has been estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
840382	Kit Assy, Crew Microbiology	3
848841	Tube Assy With Freezer Media (Crew)	105

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Unstow CMK
15	15	1	1	0	Transfer items to Shuttle.
15	15	1	1	0	Unstow crew samples from TEF or TEHOF
15	15	1	1	0	Transfer items to Shuttle freezer.

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: Mir 24 **Invest. ID:** 890608 **Exp. ID:** MSD021 **Russian ID:** Crew

Invest. Title: Crew Microbiological Assessment

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:MIC:R:1

Session Type: Postflight

2. Session: Crew Microbiology Sample Collection (Mir Crew)

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 30

Scheduled Days: R+ 0, 7

4. Session Scenario:

Swab specimens from the throat, nose, ear, axilla, groin, scapula and hand as well as urine and feces samples will be requested from all crewmembers postflight.

5. Session Constraints:

1. None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
237	Fecal Collection Kit	2
840324	Urine Collection Device w/LiCl	2
840382	Kit Assy, Crew Microbiology	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	0	0	0	2	Crew Microbiological BDC

8. Data Processing:

1. N/A for postflight sessions.

Mission: NASA 5 **Invest. ID:** 890608 **Exp. ID:** MSD021 **Russian ID:** Crew

Invest. Title: Crew Microbiological Assessment

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:MIC:R:2

Session Type: Postflight

2. Session: Crew Microbiology Sample Collection (NASA Crew)

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: R+ 0, 7

4. Session Scenario:
Swab specimens from the throat, nose, ear, axilla, groin, scapula and hand as well as urine and feces samples will be requested from all crewmembers postflight.

5. Session Constraints:
1. None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
237	Fecal Collection Kit	1
840324	Urine Collection Device w/LiCl	1
840382	Kit Assy, Crew Microbiology	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	0	0	0	1	Crew microbiological sample collection

8. Data Processing:
1. N/A for postflight sessions.

Investigation ID: 890609 **Experiment ID:** MSD022 **Russian ID:** Micro

Investigation Title: Mir Microbiological Assessment

US Investigators: WG-8

Russian Investigators:

Other Investigators:

Payload Category: SMP **Sub-Cat.:** ENV **Subjects Requested:**

Description: The microbial ecology of the Mir station will undergo quantitative and qualitative changes during long (3 to 6 month) space missions. This monitoring activity is expected to provide information about the incidence and mechanisms of microbial transmission in the environment. A better understanding of microbial transfer during space flight will allow us to predict which areas or situations allow microbial transfer, and to direct contamination-control efforts accordingly. Information gained from this monitoring activity will be helpful in designing future spacecraft and in developing monitoring requirements that will minimize the risks of microbial cross-contamination and infectious disease.

Science Objectives: The objective of this activity is to thoroughly define the microbial ecology of the Mir space station. The specific aims are to:

a) Study the dynamics of the microbial load in the Mir environment (air, water, surfaces)
b) Use the information gained from this project to contribute to defining the microbial limits required for spacecraft internal environments during long-duration space flight

Functional Objectives: Samples of air, water, and interior surfaces will be collected from the Mir before, during, and after flight and analyzed for their microbiological composition. Microbial samples will also be taken from the interior surfaces and air system of the launch and return spacecraft used to support each mission. Additional water samples will be taken from the Russian potable water ground supply tank (MITISCHI), each flight. Selected air, water, and surface samples will be taken at specified intervals during the flight and archived for ground-based analysis. All samples will be analyzed for bacteria and fungi. Water samples will be analyzed for selected viruses. All target microbes isolated from any environmental or clinical sample will be analyzed genetically in order to associate the microbe with a primary source.

Sample Transfer Rqd: Yes **Hardware Transfer Rqd:** No

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
4	Mir 23	2/2/97	☒	☒
4	NASA 4	1/16/97	☒	☒
4	STS 81 (SM-05)	1/16/97	☒	☒
5	Mir 24	6/24/97	☒	☒
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	Mir 25	12/12/97	☒	☒
6	NASA 6	9/18/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒
7	Mir 26	5/30/98	☒	☒
7	NASA 7	1/15/98	☒	☒
7	STS 89 (SM-08)	1/15/98	☒	☒
7	STS 91 (SM-09)	5/29/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
SMP	ENV	Flight	150068	Kit Assy, Surface Sampler
SMP	SHR	Back Up	150100	Thermal Electric Freezer (TEF)
SHR7	SHR	Flight	150153	Universal Battery Charger (UBC)
HLS	HSR	Flight	150174	Kit Assy, Microbial Air Sampling
ES	SHR	Flight	810236	Nikon F3 Camera System
HLS		Flight	840164	Capture Device Assy, Microbial
SMP	HSR	Flight	846685	Sampler Assy, Microbial Air
ES	SHR	Flight	852163	Camcorder (STS)
MG	SHR		852166	8 mm Video Tape (minutes)
OPS	SHR		852167	35 mm film (frames)
SMP	HSR	Flight	853499	Kit Assy V, Water Experiment
SMP	HSR	Flight	854787	Bag Assy, Micro Archival

SMP	HSR	Flight	854791	Tube Assy With Freezer Media (Surface)

Mission: Mir 24 **Invest. ID:** 890609 **Exp. ID:** MSD022 **Russian ID:** Micro

Invest. Title: Mir Microbiological Assessment

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:ENV:P:4

2. Session: Crew, Air, Surface, and Water Collection Familiarization for Crew and Micro Environmental Monitoring Activities (Mir Crew)

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 60

Scheduled Days: L- 300

4. Session Scenario:
Description of preflight, inflight, and postflight sample types and collection schedules for clinical microbiology. Description of crew, air, water, and surface bioload monitoring activities.

5. Session Constraints:
1. Exact performance days have been estimated.
2. Combined session for Crew (MSD021), Micro (MSD022), Water (MSD053), and WMM.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150068	Kit Assy, Surface Sampler	1
150174	Kit Assy, Microbial Air Sampling	1
840382	Kit Assy, Crew Microbiology	1
846685	Sampler Assy, Microbial Air	1
846773	Kit Assy, Water Experiment	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	2	0	Familiarize subject with crew, air, surface, and water sample collection.

8. Data Processing:
1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 890609 **Exp. ID:** MSD022 **Russian ID:** Micro

Invest. Title: Mir Microbiological Assessment

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:ENV:P:6

Session Type: Training

2. Session: Air Sample Collection Training (Mir Crew)

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 60

Scheduled Days: L- 90, 210

4. Session Scenario:

Air microbiology training session: Operation of the Microbial Air Sampler (MAS) is described. Collection, processing, and proper stowage of air samples for return will be described. Bacteria and fungi colony counting will be covered. In-flight collection schedules are reviewed. Training will also cover charging the MAS with the Universal Battery Charger (UBC).

5. Session Constraints:

1. Exact performance days have been estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150153	Universal Battery Charger (UBC)	1
150174	Kit Assy, Microbial Air Sampling	1
846685	Sampler Assy, Microbial Air	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	2	0	Training for air sample collection.

8. Data Processing:

1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 890609 **Exp. ID:** MSD022 **Russian ID:** Micro

Invest. Title: Mir Microbiological Assessment

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:ENV:P:8

2. Session: Surface Sample Collection Training (Mir Crew)

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 60

Scheduled Days: L- 90, 210

4. Session Scenario:

Surface sampling training session: Use of the Surface Sampler Kit (SSK) is described. Collection, processing, proper stowage, and return of samples, and in-flight sample collection schedules are reviewed. Bacteria and fungi colony counting will be covered.

5. Session Constraints:

1. None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150068	Kit Assy, Surface Sampler	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	2	0	Training for surface sample collection.

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890609 **Exp. ID:** MSD022 **Russian ID:** Micro

Invest. Title: Mir Microbiological Assessment

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:ENV:P:5

Session Type: Training

2. Session: Crew, Air, Surface, and Water Collection Familiarization for Crew and Micro Environmental Monitoring Activities (NASA Crew)

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 300

4. Session Scenario:
Description of preflight, inflight, and postflight sample types and collection schedules for clinical microbiology. Description of crew, air, water, and surface bioload monitoring activities.

5. Session Constraints:
1. Exact performance days have been estimated.
2. Combined session for Crew (MSD021), Micro (MSD022), Water (MSD053), and WMM.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150068	Kit Assy, Surface Sampler	1
150174	Kit Assy, Microbial Air Sampling	1
840382	Kit Assy, Crew Microbiology	1
846685	Sampler Assy, Microbial Air	1
846773	Kit Assy, Water Experiment	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	1	0	Familiarize subject with crew, air, surface, and water sample collection.

8. Data Processing:
1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890609 **Exp. ID:** MSD022 **Russian ID:** Micro

Invest. Title: Mir Microbiological Assessment

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:ENV:P:7

2. Session: Air Sample Collection Training (NASA Crew)

Session Type: Training

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 90, 210

4. Session Scenario:

Air microbiology training session: Operation of the Microbial Air Sampler (MAS) is described. Collection, processing, and proper stowage of air samples for return will be described. Bacteria and fungi colony counting will be covered. In-flight collection schedules are reviewed. Training will also cover charging the MAS with the Universal Battery Charger (UBC).

5. Session Constraints:

1. Exact performance days have been estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150153	Universal Battery Charger (UBC)	1
150174	Kit Assy, Microbial Air Sampling	1
846685	Sampler Assy, Microbial Air	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	1	0	Training for air sample collection

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890609 **Exp. ID:** MSD022 **Russian ID:** Micro

Invest. Title: Mir Microbiological Assessment

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:ENV:P:9

Session Type: Training

2. Session: Surface Sample Collection Training (NASA Crew)

3. Session Timeline: **Crewtime Usage (mins):** 60 **Session Time (mins):** 60

Scheduled Days: L- 90, 210

4. Session Scenario:
Surface sampling training session: Use of the Surface Sampler Kit (SSK) is described. Collection, processing, proper stowage and return of samples, and in-flight sample collections schedules are reviewed. Bacteria and fungi colony counting will be covered.

5. Session Constraints:
1. None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150068	Kit Assy, Surface Sampler	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
60	0	0	1	0	Training for surface sample collection.

8. Data Processing:
1. N/A for preflight sessions.

Mission: STS 84 (SM-06) **Invest. ID:** 890609 **Exp. ID:** MSD022 **Russian ID:** Micro

Invest. Title: Mir Microbiological Assessment **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:LOG:I:32

2. Session: Transfer Session - Surface and Air Microbial Assessment from Shuttle to Mir **Session Type:** Up Item

3. Session Timeline: **Crewtime Usage (mins):** 15 **Session Time (mins):** 15

Scheduled Days: FD 5

4. Session Scenario:

Air and Surface sample collection kits for all performance days will be transferred from Shuttle to Mir.

5. Session Constraints:

1. Exact performance day has been estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150068	Kit Assy, Surface Sampler	5
150174	Kit Assy, Microbial Air Sampling	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow sample collection kits.
5	5	1	1	0	Transfer sample collection kits to the Mir.
5	5	1	1	0	Return to Shuttle.

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890609 **Exp. ID:** MSD022 **Russian ID:** Micro

Invest. Title: Mir Microbiological Assessment

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:ENV:I:15

Session Type: Inflight

2. Session: Air & Surface Sample Collections on Mir During Docking

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 7

4. Session Scenario:

Air Samples: Microbial samples are collected in the Mir using a Microbial Air Sampler (MAS). Bacteria and fungi samples are collected from 4 locations in the Mir - 3 bacterial and 3 fungal samples in the Base Module and 1 bacterial and 1 fungal sample in the Krystal (Module T) for a total of 4 bacterial and 4 fungal samples.

Surface Sample Collection: Surface samples are collected in the Mir with a Surface Sampler Kit (SSK) containing microbial growth slides with media. A swab is passed over the surface to be sampled and used to inoculate bacterial and fungal plates. 1 bacterial and 1 fungal sample is collected at each of the following sites - Commander's cabin wall, Commander's seat (post N1 in Base Module), dinner table, right handle of the treadmill, and just inside the Krystall (Module T) hatch for a total of 5 bacterial and 5 fungal samples.

5. Session Constraints:

1. Air and surface samples should be collected as late as possible during the docked phase and returned ambient.
2. Session should be performed early enough on the scheduled sampling day so as not to interfere with transfer of items between Mir and Shuttle.
3. Exact performance days are estimated.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150068	Kit Assy, Surface Sampler	1
150174	Kit Assy, Microbial Air Sampling	1
846685	Sampler Assy, Microbial Air	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow air and surface sampler kit and MAS
20	20	1	1	0	Collect air and surface samples, stow MAS
5	5	1	1	0	Transfer and stow samples ambient aboard the Shuttle

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890609 **Exp. ID:** MSD022 **Russian ID:** Micro

Invest. Title: Mir Microbiological Assessment **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:ENV:I:7

2. Session: MAS Recharge with UBC on Mir **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 25 **Session Time (mins):** 985

Scheduled Days: FD 14, 54, 79, 114, 134

4. Session Scenario:

The Microbial Air Sampler (MAS) will be recharged using the Universal Battery Charger (UBC) 24 hrs prior to air sampling session.

5. Session Constraints:

1. Recharge must occur at 24 hrs prior to docked phase sampling (e.g. overnight). MAS maintains an estimated 10hrs of battery life after charging.
2. Crewmember may perform other duties during recharge period.
3. Exact performance day has been estimated.
4. Recharge will take a minimum of 14 hours with a discharge time of 30-90 minutes (16 hours worst case).
5. All sessions should be scheduled prior to shuttle docking.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150153	Universal Battery Charger (UBC)	1
846685	Sampler Assy, Microbial Air	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Unstow MAS and UBC
5	5	1	1	0	Connect MAS to UBC for recharging
960	960	1	0	0	BREAK - while MAS is recharging
5	5	1	1	0	Disconnect MAS from UBC
5	5	1	1	0	Stow MAS and UBC

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890609 **Exp. ID:** MSD022 **Russian ID:** Micro

Invest. Title: Mir Microbiological Assessment

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:ENV:I:8

Session Type: Inflight

2. Session: Surface and Air Sample Collection

3. Session Timeline: **Crewtime Usage (mins):** 75 **Session Time (mins):** 75

Scheduled Days: FD 15, 55, 80, 115, 135

4. Session Scenario:

Air sample collection: Microbial samples of air are collected in the Mir air using a Microbial Air Sampler (MAS). Bacteria and fungi samples are collected in four locations in the Mir: 3 bacterial and 3 fungal samples in the Base Module and 1 bacterial and 1 fungal sample in the Krystal (Module T) for a total of 4 bacterial and 4 fungal samples.

Surface sample collection: Surface samples are collected in the Mir using a Surface Sampler Kit (SSK) containing microbial growth slides with media. A swab is passed over the surface to be sampled and is used to inoculate bacterial and fungal medias. The swab is then discarded. 1 bacterial and 1 fungal sample is collected at each of following sites: Commander's seat (post N1 in Base Module), dinner table, Commander's cabin wall, right handle of treadmill, and just inside the Krystal (Module T) hatch for a total of 5 bacterial and 5 fungal samples. One swab is passed over each sampling site (for a total of 5 swabs) for postflight analysis. The five swabs are frozen for return.

All samples (bacteria and fungi) are incubated on the station for a total of 5 days. Bacteria will be counted and photographed at 48 hrs and again at 5 days during incubation. Fungi will be counted and photographed at 5 days only (ref. session "Colony Count and Video of Samples:).

5. Session Constraints:

1. Collections should occur once a month.
2. Swabs used to inoculate medias are discarded. Collected surface samples require freezing for return.
3. Air and surface bacteria samples are incubated for a total of 5 days (25C to 37C) with colony count and photography following 48 hrs and then at 5 days during incubation. Air and surface fungi samples require incubation for 5 days (25C to 30C) with colony count and photpgraphy at 5 days post collection.
4. Samples collected during the last sampling session will not be incubated before undocking. Samples will be stored ambient and returned ambient.
5. Samples will be collected on the same days as water collection for Water and WMM, with the exception of FD 115 during NASA 4, and FDs 85 and 115 during NASA 5 and NASA 6.
6. All sessions should be scheduled prior to shuttle docking.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150068	Kit Assy, Surface Sampler	1
150100	Thermal Electric Freezer (TEF)	1
150174	Kit Assy, Microbial Air Sampling	1
846685	Sampler Assy, Microbial Air	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Unstow collection kits

30	30	1	1	0	Air Sampling
20	20	1	1	0	Surface Sampling
15	15	1	1	0	Stow samples at designated temperatures

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890609 **Exp. ID:** MSD022 **Russian ID:** Micro

Invest. Title: Mir Microbiological Assessment

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:ENV:I:9

Session Type: Inflight

2. Session: Colony Count and Photo of Samples

3. Session Timeline: **Crewtime Usage (mins):** 70 **Session Time (mins):** 50

Scheduled Days: FD 17, 20, 57, 60, 82, 85, 117, 120

4. Session Scenario:
Air and surface sample colonies will be counted and photographed.

5. Session Constraints:
1. In-flight performance times are 2 days and 5 days after "Surface and Air Sample Collection" session. Bacteria cultures are observed after 2 days and 5 days. Fungi cultures are observed after 5 days.
2. Air samples and surface samples will be counted and photographed.
3. Photos are required during colony count only. Two to three photos of each air & surface plate is to be taken. Place each item at an angle which avoids glare and photograph so that the entire surface of the item is included. Quantitation may rely on photography.
4. After 5 day colony count, air and surface samples will be stowed in the kit for return.
5. All sessions should be scheduled prior to shuttle docking.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150068	Kit Assy, Surface Sampler	1
150174	Kit Assy, Microbial Air Sampling	1
810236	Nikon F3 Camera System	1
852167	35 mm film (frames)	54

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
15	15	1	1	0	Unstow air & surface samples, camera and film
20	20	1	2	0	Count and photo sample colonies
15	15	1	1	0	Stow air & surface samples and camera

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: STS 84 (SM-06) **Invest. ID:** 890609 **Exp. ID:** MSD022 **Russian ID:** Micro

Invest. Title: Mir Microbiological Assessment **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:ENV:I:10

2. Session: Shuttle Air Sample Collection **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 75 **Session Time (mins):** 50

Scheduled Days: FD 2, 5

4. Session Scenario:

Air samples will be collected aboard the Shuttle prior to docking with the Mir and during the docked phase. Air sampling sites on the Shuttle (2 sites, 4 samples):

1. Middeck (1 bacterial, 1 fungal)
2. Flight Deck (1 bacterial, 1 fungal)

5. Session Constraints:

1. Session will be performed by the astronaut.
2. First session should occur on the Shuttle prior to docking.
3. Second session should occur on the Shuttle during the docked phase. It is required that the hatch be open at least 24 hrs prior to air collection to allow adequate time for equilibration of the cabin airs.
4. Exact performance days have been estimated.
5. Air samples will be stowed ambient in the Shuttle Microbial Air Sampling (MAS) kit after collection and will remain on board the Shuttle for return.
6. The MAS is contained in the MAS kit.
7. Video will be performed on 1 air sampling day only.
   a) destow of items from the MAS kit,
   b) set-up for sampling through completion of sampling at the first sampling site
   c) restow of samples and kit
8. An operator will be required to video tape air sampling sessions.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150174	Kit Assy, Microbial Air Sampling	1
852163	Camcorder (STS)	1
852166	8 mm Video Tape (minutes)	25

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow MAS kit for Shuttle air sampling and camcorder
5	5	1	2	0	Items are removed from the MAS kit and set-up for sampling; perform video of activity
10	10	1	2	0	Collect air samples at first sampling site and perform video of activity
20	20	1	1	0	Collect samples from remaining sites
10	10	1	2	0	Stow samples in MAS kit then stow ambient aboard the Shuttle for return; perform video of activity and then stow camcorder.

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: STS 84 (SM-06) **Invest. ID:** 890609 **Exp. ID:** MSD022 **Russian ID:** Micro

Invest. Title: Mir Microbiological Assessment **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:ENV:I:11

2. Session: Shuttle Surface Sample Collection **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 75 **Session Time (mins):** 50

Scheduled Days: FD 2, 5

4. Session Scenario:

Surface samples will be collected aboard the Shuttle prior to docking with the Mir and during the docked phase. Surface sampling sites on the Shuttle (3 sites, 6 samples):

1. Half moon shaped air vent next to toilet (1 bacterial, 1 fungal)
2. Left-most round air return in crawl-through between middeck and flight deck (1 bacterial, 1 fungal)
3. Half moon shaped air vent next to Commander's seat on Flight Deck (1 bacterial, 1 fungal)

5. Session Constraints:

1. Session will be performed by the astronaut.
2. First session should occur on the Shuttle prior to docking.
3. Second session should occur on the Shuttle during the docked phase.
4. Exact performance days have been estimated.
5. Surface samples will be stowed ambient in the Surface Sampler Kit (SSK) after collection and will remain on board the Shuttle for return.
6. Video will be performed on 1 surface sampling day only.
7. Video that provides a clear view of surface sampling operations is requested, in particular:
   a.) destow of items from the Surface Sampler Kit (SSK)
   b.) set-up for sampling through completion of sampling at the first sampling site
   c.) restow of samples and kit
8. An operator will be required to video tape air sampling sessions.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150068	Kit Assy, Surface Sampler	1
852163	Camcorder (STS)	1
852166	8 mm Video Tape (minutes)	25

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow SSK for Shuttle surface sampling and camcorder
5	5	1	2	0	Items are removed from the SSK and set-up for sampling; perform video of activity
10	10	1	2	0	Collect surface samples at first sampling site and perform video of activity
20	20	1	1	0	Collect samples from remaining sites
10	10	1	2	0	Stow samples in SSK then stow ambient aboard the Shuttle for return; perform video of activity and then stow camcorder.

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 890609 **Exp. ID:** MSD022 **Russian ID:** Micro

Invest. Title: Mir Microbiological Assessment

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:ENV:I:10

Session Type: Inflight

2. Session: Shuttle Air Sample Collection

3. Session Timeline: **Crewtime Usage (mins):** 75 **Session Time (mins):** 50

Scheduled Days: FD 2, 5

4. Session Scenario:

Air samples will be collected aboard the Shuttle prior to docking with the Mir and during the docked phase. Air sampling sites on the Shuttle (2 sites, 4 samples):

1. Middeck (1 bacterial, 1 fungal)
2. Flight Deck (1 bacterial, 1 fungal)

5. Session Constraints:

1. Session will be performed by the astronaut.
2. First session should occur on the Shuttle prior to docking.
3. Second session should occur on the Shuttle during the docked phase. It is required that the hatch be open at least 24 hrs prior to air collection to allow adequate time for equilibration of the cabin airs.
4. Exact performance days have been estimated.
5. Air samples will be stowed ambient in the Shuttle Microbial Air Sampling (MAS) kit after collection and will remain on board the Shuttle for return.
6. The MAS is contained in the MAS kit.
7. Video will be performed on 1 air sampling day only.
   a) destow of items from the MAS kit,
   b) set-up for sampling through completion of sampling at the first sampling site
   c) restow of samples and kit
8. An operator will be required to video tape air sampling sessions.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150174	Kit Assy, Microbial Air Sampling	1
852163	Camcorder (STS)	1
852166	8 mm Video Tape (minutes)	25

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow MAS kit for Shuttle air sampling and camcorder
5	5	1	2	0	Items are removed from the MAS kit and set-up for sampling; perform video of activity
10	10	1	2	0	Collect air samples at first sampling site and perform video of activity
20	20	1	1	0	Collect samples from remaining sites
10	10	1	2	0	Stow samples in MAS kit then stow ambient aboard the Shuttle for return; perform video of activity and then stow camcorder.

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 890609 **Exp. ID:** MSD022 **Russian ID:** Micro

Invest. Title: Mir Microbiological Assessment **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:ENV:I:11

2. Session: Shuttle Surface Sample Collection **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 75 **Session Time (mins):** 50

Scheduled Days: FD 2, 5

4. Session Scenario:

Surface samples will be collected aboard the Shuttle prior to docking with the Mir and during the docked phase. Surface sampling sites on the Shuttle (3 sites, 6 samples):

1. Half moon shaped air vent next to toilet (1 bacterial, 1 fungal)
2. Left-most round air return in crawl-through between middeck and flight deck (1 bacterial, 1 fungal)
3. Half moon shaped air vent next to Commander's seat on Flight Deck (1 bacterial, 1 fungal)

5. Session Constraints:

1. Session will be performed by the astronaut.
2. First session should occur on the Shuttle prior to docking.
3. Second session should occur on the Shuttle during the docked phase.
4. Exact performance days have been estimated.
5. Surface samples will be stowed ambient in the Surface Sampler Kit (SSK) after collection and will remain on board the Shuttle for return.
6. Video will be performed on 1 surface sampling day only.
7. Video that provides a clear view of surface sampling operations is requested, in particular:
   a.) destow of items from the Surface Sampler Kit (SSK)
   b.) set-up for sampling through completion of sampling at the first sampling site
   c.) restow of samples and kit
8. An operator will be required to video tape air sampling sessions.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150068	Kit Assy. Surface Sampler	1
852163	Camcorder (STS)	1
852166	8 mm Video Tape (minutes)	25

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow SSK for Shuttle surface sampling and camcorder
5	5	1	2	0	Items are removed from the SSK and set-up for sampling; perform video of activity
10	10	1	2	0	Collect surface samples at first sampling site and perform video of activity
20	20	1	1	0	Collect samples from remaining sites
10	10	1	2	0	Stow samples in SSK then stow ambient aboard the Shuttle for return; perform video of activity and then stow camcorder.

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 890609 **Exp. ID:** MSD022 **Russian ID:** Micro

Invest. Title: Mir Microbiological Assessment

Prime ☒
Contingent ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:LOG:I:33

Session Type: Down Item

2. Session: Transfer Session - Surface & Air Microbial Assessment from Mir to Shuttle

3. Session Timeline: **Crewtime Usage (mins):** 55 **Session Time (mins):** 55

Scheduled Days: FD 7

4. Session Scenario:

Frozen surface swabs are transferred from the TEHOF to the Shuttle freezer. The MAS kit and Surface Sampler Kit are transferred to the Shuttle. Docked phase samples have been transferred to the Shuttle upon completion of sampling.

5. Session Constraints:

1. Surface swabs must be returned frozen.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150068	Kit Assy, Surface Sampler	5
150174	Kit Assy, Microbial Air Sampling	2
854787	Bag Assy, Micro Archival	2
854791	Tube Assy With Freezer Media (Surface)	25

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Unstow MAS kit and SSK
15	15	1	1	0	Transfer items to Shuttle
15	15	1	1	0	Unstow surface swabs from TEF or TEHOF
15	15	1	1	0	Transfer items to Shuttle freezer.

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 890609 **Exp. ID:** MSD022 **Russian ID:** Micro

Invest. Title: Mir Microbiological Assessment **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:LOG:I:41

2. Session: Transfer Session - Water, Surface and Air Microbial Assessment from Mir to Shuttle

Session Type: Down Item

3. Session Timeline: **Crewtime Usage (mins):** 70 **Session Time (mins):** 70

Scheduled Days: FD 7

4. Session Scenario:

Frozen surface swabs are transferred from the TEHOF to the Shuttle frezer. The MAS Kit, Surface Sampler Kit (SSK), and Water Experiment Kit (WEK) V are transferred to the Shuttle. Docked phase samples have been transferred to the Shuttle upoin completion of sampling. 9 MCDs are retrieved from the Mir TEF (in refrigerator mode) and transferred to the Shuttle refrigerator.

5. Session Constraints:

1. Surface swabs must be returned frozen.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150068	Kit Assy, Surface Sampler	5
150174	Kit Assy, Microbial Air Sampling	2
840164	Capture Device Assy, Microbial	9
853499	Kit Assy V, Water Experiment	1
854787	Bag Assy, Micro Archival	2
854791	Tube Assy With Freezer Media (Surface)	25

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Unstow MASS, SSK, and WEK V kits
15	15	1	1	0	Transfer items to Shuttle
15	15	1	1	0	Unstow surface swabs from TEF or TEHOF
15	15	1	1	0	Transfer items to Shuttle freezer.
15	15	1	1	0	Remove 9 MCDs from Mir TEF and transfer to Shuttle refrigerator

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

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Investigation ID: 890610 **Experiment ID:** MSD007 **Russian ID:** SSAS/GSC

Investigation Title: Toxicological Assessment of Airborne Volatile Organic Compounds

US Investigators: WG-8

Russian Investigators:

Other Investigators:

Payload Category: SMP **Sub-Cat.:** ENV **Subjects Requested:**

Description: We propose to characterize the volatile organic compounds (VOCs) in air samples collected on the Mir during the NASA/Mir program and to perform a toxicological assessment of the Mir air quality. Additionally, samples will be collected onto cartridges using the U.S. Solid Sorbent Air Sampler (SSAS). Alternately grab samples will be collected using U.S. Grab Sample Containers. The results of the analyses will include detailed information on the types and concentrations of VOCs in the Mir environment and a toxicolgical evalution of the Mir air.

Science Objectives: 1. Provide instrumental resources and analytical expertise for the characterization of the volatile organic compounds (VOCs) in the atmosphere and support of environmental science research on Mir station
2. Characterize VOCs on the Mir station through appropriate sampling and analysis strategies

Functional Objectives: Collect air samples using Solid Sorbent Air Samplers and Grab Sample Containers.

Sample Transfer Rqd: Yes **Hardware Transfer Rqd:** No

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
4	Mir 23	2/2/97	☒	☒
4	NASA 4	1/16/97	☒	☒
4	STS 81 (SM-05)	1/16/97	☒	☒
5	Mir 24	6/24/97	☒	☒
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	Mir 25	12/12/97	☒	☒
6	NASA 6	9/18/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒
7	Mir 26	5/30/98	☒	☒
7	NASA 7	1/15/98	☒	☒
7	STS 89 (SM-08)	1/15/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
SMP	ENV	Flight	150070	Assy of Solid Sorbent Air Sampler
SMP	ENV	Flight	150072	Valve Assy, Grab Sampler
ES	EO	Flight	847724	Nikon F3 Camera
OPS	SHR		852167	35 mm film (frames)

Mission: NASA 5 **Invest. ID:** 890610 **Exp. ID:** MSD007 **Russian ID:** SSAS/GS

Invest. Title: Toxicological Assessment of Airborne Volatile Organic Compounds **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:ENV:P:10

2. Session: Training - Atmosphere Sample Collection & Data Recording **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: L- 90, 300

4. Session Scenario:

A training session and a proficiency session will be performed preflight. Crewmembers will be trained to collect atmosphere samples and record relevant data.

5. Session Constraints:

1. None at this time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150070	Assy of Solid Sorbent Air Sampler	1
150072	Valve Assy, Grab Sampler	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
30	0	0	1	0	Training Session

8. Data Processing:

1. N/A for preflight sessions.

Mission: STS 84 (SM-06) **Invest. ID:** 890610 **Exp. ID:** MSD007 **Russian ID:** SSAS/GS

Invest. Title: Toxicological Assessment of Airborne Volatile Organic Compounds **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:LOG:I:19

Session Type: Up Item

2. Session: Transfer - Volatile Organic Hardware from Shuttle to Mir

3. Session Timeline: **Crewtime Usage (mins):** 25 **Session Time (mins):** 25

Scheduled Days: FD 5

4. Session Scenario:
Solid Sorbent Air Sampler and Grab Sample containers will be transferred from Shuttle to the Mir.

5. Session Constraints:
1. Can be performed any docked day and can be combined with other Up Item sessions to optimize crew time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150070	Assy of Solid Sorbent Air Sampler	2
150072	Valve Assy, Grab Sampler	12

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow SSAS & GSC
10	10	1	1	0	Transfer items to Mir
10	10	1	1	0	Return to Shuttle

8. Data Processing:
1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890610 **Exp. ID:** MSD007 **Russian ID:** SSAS/GS

Invest. Title: Toxicological Assessment of Airborne Volatile Organic Compounds **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:ENV:I:12

2. Session: Activate SSAS **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 30 **Session Time (mins):** 30

Scheduled Days: FD 10, 30, 60, 90, 130

4. Session Scenario:

Collect air samples to measure volatile organic compounds (VOCs) using the Solid Sorbent Air Sampler. The crewmember need only turn the selector switch to the next numbered tube and active the "on/off" switch for each unit. Date and time are recorded.

5. Session Constraints:

1. Careful selection of deployment locations are very important to ensure that representative samples of the cabin air have been collected.
2. Sampling locations are as follows for the listed missions:
   - NASA 4: Mir Core Command Station and Krystall Module.
   - NASA 5-7: Mir Core Command Station and Kvant-2 Module.
3. Sessions must coincide with Russian sampling sessions.
4. After initial deployment, document SSAS location with 35mm photographs (2 frames per location). This photo session is required once during the mission. All other sessions are 15 minutes in duration.
5. All sessions should be scheduled prior to shuttle docking.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150070	Assy of Solid Sorbent Air Sampler	2
847724	Nikon F3 Camera	1
852167	35 mm film (frames)	4

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow 2 SSAS units
5	5	1	1	0	Unstow Camera (first deployment only, ref. constraint #4)
5	5	1	1	0	Go to 1st location. Activate 1st SSAS for 24 hour sampling. Record date, start time, and location.
2.5	2.5	1	1	0	Photograph 1st SSAS' location (first deployment only)
5	5	1	1	0	Go to 2nd location. Activate 2nd SSAS for 24 hour sampling. Record date, start time, and location.
2.5	2.5	1	1	0	Photograph 2nd SSAS' location (first deployment only)
5	5	1	1	0	Stow camera

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation

Mission: NASA 5 **Invest. ID:** 890610 **Exp. ID:** MSD007 **Russian ID:** SSAS/GS

Invest. Title: Toxicological Assessment of Airborne Volatile Organic Compounds **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:ENV:I:13

Session Type: Inflight

2. Session: Grab Air Sampling

3. Session Timeline: **Crewtime Usage (mins):** 25 **Session Time (mins):** 22.5

Scheduled Days: FD 30, 60, 90, 130

4. Session Scenario:

Grab air samples (4) are collected near the SSAS in the Mir core command station on FD 30, 60, 90, 130. Additional grab air samples are collected in the following locations for the listed modules:

- NASA 4, FD 90: Krystal, Kvant-2, Spektr, and Priroda modules
- NASA 5-7, FD 130: Krystal, Kvant-2, Kvant, and Spektr modules

Date, time, and location are recorded on each container. Four additional grab sample containers are provided for possible contingency events.

If no contingency sampling is required during the mission, the remaining grab sample containers should be used to study the dynamic effects of the Shuttle docking and crew exchange on cabin atmosphere contamination. During this study, grab samples should be taken in the the Mir station module to which the Shuttle is docked according to the following schedule:

1. 30 minutes before opening the hatch between the Mir and Shuttle
2. 30 minutes after opening the hatch
3. 2 hours after opening the hatch
4. 12 hours after opening the hatch

5. Session Constraints:

1. Document initial GSC collection in Mir Core with 35mm photograph (2 frames). All subsequent GSC collections are 10 minutes in duration.
2. Sessions requested on FD 30, 60, 90, and 130 should be scheduled prior to shuttle docking.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150072	Valve Assy, Grab Sampler	1
847724	Nikon F3 Camera	1
852167	35 mm film (frames)	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
4	4	1	1	0	Unstow Grab Sample Containers
5	5	1	1	0	Unstow Camera
2.5	2.5	1	2	0	Photograph Sample Collection in Mir Core
4	4	1	1	0	Take air samples. Record date, time, and location
2	2	1	1	0	Stow GSC's
5	5	1	1	0	Stow Camera

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890610 **Exp. ID:** MSD007 **Russian ID:** SSAS/GS

Invest. Title: Toxicological Assessment of Airborne Volatile Organic Compounds **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:ENV:I:14

Session Type: Inflight

2. Session: Deactivate SSAS

3. Session Timeline: **Crewtime Usage (mins):** 10 **Session Time (mins):** 10

Scheduled Days: FD 11, 31, 61, 91, 131

4. Session Scenario:

Date and time are recorded. The SSAS is deactivated.

5. Session Constraints:

1. Sessions should coincide with Russian sampling sessions.
2. SSAS locations are as follows for the listed Missions:
   - NASA 4: Mir Core Command Station and Krystall Module.
   - NASA 5-7: Mir Core Command Station and Kvant-2 Module.
3. All sessions should be scheduled prior to shuttle docking.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150070	Assy of Solid Sorbent Air Sampler	2

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
7	7	1	1	0	Deactivate SSAS and record date, location, and stop time.
3	3	1	1	0	Stow SSAS.

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 890610 **Exp. ID:** MSD007 **Russian ID:** SSAS/GS

Invest. Title: Toxicological Assessment of Airborne Volatile Organic Compounds **Prime** ☒ **Contingent** ☐

US PI: WG-8 **Russian PI:**

1. Session ID: SMP:LOG:I:20

2. Session: Transfer Session - Volatile Organic Hardware from Mir to Shuttle **Session Type:** Down Item

3. Session Timeline: **Crewtime Usage (mins):** 25 **Session Time (mins):** 25

Scheduled Days: FD 5

4. Session Scenario:

Transfer Solid Sorbent Air Sampers & Grab Sample Containers from Mir to the Shuttle.

5. Session Constraints:

1. None at the time.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
150070	Assy of Solid Sorbent Air Sampler	2
150072	Valve Assy, Grab Sampler	12

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Go to Mir
5	5	1	1	0	Unstow SSAS & GSC
10	10	1	1	0	Return to Shuttle & stow items

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Investigation ID: 890613 **Experiment ID:** Defib **Russian ID:** Defib

Investigation Title: Mir Defibrillator and Crew Medical Restraint System (CMRS)

US Investigators: Flight Surgeon

Russian Investigators: Flight Surgeon

Other Investigators:

Payload Category: SMP **Sub-Cat.:** **Subjects Requested:**

Description:

Science Objectives:

Functional Objectives:

Sample Transfer Rqd: No **Hardware Transfer Rqd:** Yes

MISSION ASSIGNMENTS:

Increment	Mission	Launch Date	Included	Prime
5	Mir 24	6/24/97	☒	☒
5	NASA 5	5/15/97	☒	☒
5	STS 84 (SM-06)	5/15/97	☒	☒
6	Mir 25	12/12/97	☒	☒
6	NASA 6	9/18/97	☒	☒
6	STS 86 (SM-07)	9/18/97	☒	☒
7	Mir 26	5/30/98	☒	☒
7	NASA 7	1/15/98	☒	☒
7	STS 89 (SM-08)	1/15/98	☒	☒

Hardware Items for Investigation:

Pld. Cat.	Sub-Cat.	Hdwe. Type	Hdwe. ID	Hardware Title
SMP			854944	Mir Defibrillator
SMP			854945	Mir Crew Medical Restraint System (CMRS)
SMP			854946	Mir Defibrillator Resupply Kit

Mission: Mir 24 **Invest. ID:** 890613 **Exp. ID:** Defib **Russian ID:** Defib

Invest. Title: Mir Defibrillator and Crew Medical Restraint System (CMRS) **Prime** ☒ **Contingent** ☐

US PI: Flight Surgeon **Russian PI:** Flight Surgeon

1. Session ID: SMP:CH:P:10

2. Session: Advanced Cardiac Life Support Protocols II **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 360 **Session Time (mins):** 180

Scheduled Days: L- 90

4. Session Scenario:

Crewmember will be instructed in Advanced Cardiac Life Support (ACLS) protocols and will learn the various ACLS algorithms. Specific ACLS examples will be used to illustrate the proper algorithms necessary for unique situations.

5. Session Constraints:

1. Training sessions should be conducted in Star City or at JSC, dependent on crew schedules.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848739	MSMK-Emergency Medical Kit (EMK)	1
854944	Mir Defibrillator	1
854945	Mir Crew Medical Restraint System (CMRS)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
180	0	0	2	0	ACLS Protocols II

8. Data Processing:

1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 890613 **Exp. ID:** Defib **Russian ID:** Defib

Invest. Title: Mir Defibrillator and Crew Medical Restraint System (CMRS) **Prime** ☒ **Contingent** ☐

US PI: Flight Surgeon **Russian PI:** Flight Surgeon

1. Session ID: SMP:CH:P:12

2. Session: Advanced Cardiac Life Support Megacode **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 360 **Session Time (mins):** 180

Scheduled Days: L- 90

4. Session Scenario:

Crewmembers will use the Advanced Cardiac Life Support (ACLS) equipment, pharmacology, and protocols learned earlier, in simulated contingencies known as megacodes. Different scenarios will be used to provide a full range of possible cardiac contingencies. Each completed megacode will be followed by a debrief from the flight surgeon.

5. Session Constraints:

1. Training sessions should be conducted in Star City or at JSC, dependent on crew schedules.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848739	MSMK-Emergency Medical Kit (EMK)	1
854944	Mir Defibrillator	1
854945	Mir Crew Medical Restraint System (CMRS)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
180	0	0	2	0	ACLS Megacode

8. Data Processing:

1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 890613 **Exp. ID:** Defib **Russian ID:** Defib

Invest. Title: Mir Defibrillator and Crew Medical Restraint System (CMRS) **Prime** ☒ **Contingent** ☐

US PI: Flight Surgeon **Russian PI:** Flight Surgeon

1. Session ID: SMP:CH:P:2

2. Session: Mir Defibrillator and CMRS Familiarization **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 120

Scheduled Days: L- 120

4. Session Scenario:

Crewmember will be introduced to the Mir Defibrillator and the Mir Crew Restraint System (CMRS), including function, layout, and capabilities. Proper methods for patient and equipment configuration will be demonstrated. Training and practice in utilizing the CMRS for patient restraint will be conducted during this session.

5. Session Constraints:

1. Training sessions should be conducted in Star City or at JSC, dependent on crew schedules.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854944	Mir Defibrillator	1
854945	Mir Crew Medical Restraint System (CMRS)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	2	0	Mir Defibrillator/CMRS Fam

8. Data Processing:

1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 890613 **Exp. ID:** Defib **Russian ID:** Defib

Invest. Title: Mir Defibrillator and Crew Medical Restraint System (CMRS) **Prime** ☒ **Contingent** ☐

US PI: Flight Surgeon **Russian PI:** Flight Surgeon

1. Session ID: SMP:CH:P:4

2. Session: Mir Defibrillator Maintenance **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 240 **Session Time (mins):** 120

Scheduled Days: L- 120

4. Session Scenario:

Crewmembers will learn to perform preventative and corrective maintenance on the Mir Defibrillator including initial checkout, resupply of batteries and electrodes, and periodic checkout procedures.

5. Session Constraints:

1. Training sessions should be conducted in Star City or at JSC, dependent on crew schedules.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854944	Mir Defibrillator	1
854946	Mir Defibrillator Resupply Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	2	0	Mir Defibrillator Maintenance

8. Data Processing:

1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 890613 **Exp. ID:** Defib **Russian ID:** Defib

Invest. Title: Mir Defibrillator and Crew Medical Restraint System (CMRS) **Prime** ☒ **Contingent** ☐

US PI: Flight Surgeon **Russian PI:** Flight Surgeon

1. Session ID: SMP:CH:P:6

2. Session: Advanced Cardiac Life Support Pharmacology **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 360 **Session Time (mins):** 180

Scheduled Days: L- 90

4. Session Scenario:

Crewmembers will be exposed to the pharmacology of Advanced Cardiac Life Support (ACLS) and learn the indications and contraindications for the use of ACLS medications in the MSMK. The therapeutic side effects of the drugs will be discussed and the various ways the drugs are supplied and delivered will be shown. Location and stowage of the drugs within the MSMK will be explained.

5. Session Constraints:

1. Training sessions should be conducted in Star City or at JSC, dependent on crew schedules.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848739	MSMK-Emergency Medical Kit (EMK)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
180	0	0	2	0	ACLS Pharmacology

8. Data Processing:

1. N/A for preflight sessions.

Mission: Mir 24 **Invest. ID:** 890613 **Exp. ID:** Defib **Russian ID:** Defib

Invest. Title: Mir Defibrillator and Crew Medical Restraint System (CMRS) **Prime** ☒ **Contingent** ☐

US PI: Flight Surgeon **Russian PI:** Flight Surgeon

1. Session ID: SMP:CH:P:8

2. Session: Advanced Cardiac Life Support Protocols I **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 360 **Session Time (mins):** 180

Scheduled Days: L- 90

4. Session Scenario:

Crewmembers will be instructed in basic Advanced Cardiac Life Support (ACLS) protocols and learn the techniques involved in the Cervical, Airway, Breathing, Circulation (CABC) protocol.

5. Session Constraints:

1. Training sessions should be conducted in Star City or at JSC, dependent on crew schedules.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848739	MSMK-Emergency Medical Kit (EMK)	1
854945	Mir Crew Medical Restraint System (CMRS)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
180	0	0	2	0	ACLS Protocols I

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890613 **Exp. ID:** Defib **Russian ID:** Defib

Invest. Title: Mir Defibrillator and Crew Medical Restraint System (CMRS) **Prime** ☒ **Contingent** ☐

US PI: Flight Surgeon **Russian PI:** Flight Surgeon

1. Session ID: SMP:CH:P:1

2. Session: Mir Defibrillator and CMRS Familiarization **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: L- 120

4. Session Scenario:

Crewmember will be introduced to the Mir Defibrillator and the Mir Crew Medical Restraint System (CMRS), including function, layout, and capabilities. Proper methods for patient and equipment configuration will be demonstrated. Training and practice in utilizing the CMRS for patient restraint will be conducted during this session.

5. Session Constraints:

1. Training sessions should be conducted in Star City or at JSC, dependent on crew schedules.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854944	Mir Defibrillator	1
854945	Mir Crew Medical Restraint System (CMRS)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	1	0	Mir Defibrillator/CMRS Fam

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890613 **Exp. ID:** Defib **Russian ID:** Defib

Invest. Title: Mir Defibrillator and Crew Medical Restraint System (CMRS) **Prime** ☒ **Contingent** ☐

US PI: Flight Surgeon **Russian PI:** Flight Surgeon

1. Session ID: SMP:CH:P:11

2. Session: Advanced Cardiac Life Support Megacode **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: L- 90

4. Session Scenario:

Crewmembers will use the Advanced Cardiac Life Support (ACLS) equipment, pharmacology, and protocols learned earlier, in simulated contingencies known as megacodes. Different scenarios will be used to provide a full range of possible cardiac contingencies. Each completed megacode will be followed by a debrief from the flight surgeon.

5. Session Constraints:

1. Training sessions should be conducted in Star City or at JSC, dependent on crew schedules.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848739	MSMK-Emergency Medical Kit (EMK)	1
854944	Mir Defibrillator	1
854945	Mir Crew Medical Restraint System (CMRS)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
180	0	0	1	0	ACLS Megacode

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890613 **Exp. ID:** Defib **Russian ID:** Defib

Invest. Title: Mir Defibrillator and Crew Medical Restraint System (CMRS) **Prime** ☒ **Contingent** ☐

US PI: Flight Surgeon **Russian PI:** Flight Surgeon

1. Session ID: SMP:CH:P:3

2. Session: Mir Defibrillator Maintenance **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 120 **Session Time (mins):** 120

Scheduled Days: L- 120

4. Session Scenario:

Crewmembers will learn to perform preventative and corrective maintenance on the Mir Defibrillator including initial checkout, resupply of batteries and electrodes, and periodic checkout procedures.

5. Session Constraints:

1. Training sessions should be conducted in Star City or at JSC, dependent on crew schedules.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854944	Mir Defibrillator	1
854946	Mir Defibrillator Resupply Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
120	0	0	1	0	Mir Defibrillator Maintenance

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890613 **Exp. ID:** Defib **Russian ID:** Defib

Invest. Title: Mir Defibrillator and Crew Medical Restraint System (CMRS) **Prime** ☒ **Contingent** ☐

US PI: Flight Surgeon **Russian PI:** Flight Surgeon

1. Session ID: SMP:CH:P:5

2. Session: Advanced Cardiac Life Support Pharmacology **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: L- 90

4. Session Scenario:

Crewmembers will be exposed to the pharmacology of Advanced Cardiac Life Support (ACLS) and learn the indications and contraindications for the use of ACLS medications in the MSMK. The therpeutic side effects of the drugs will be discussed and the various ways the drugs are supplied and delivered will be shown. Location and stowage of the drugs within the MSMK will be explained.

5. Session Constraints:

1. Training sessions should be conducted in Star City or at JSC, dependent on crew schedules.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848739	MSMK-Emergency Medical Kit (EMK)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
180	0	0	1	0	ACLS Pharmacology

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890613 **Exp. ID:** Defib **Russian ID:** Defib

Invest. Title: Mir Defibrillator and Crew Medical Restraint System (CMRS) **Prime** ☒ **Contingent** ☐

US PI: Flight Surgeon **Russian PI:** Flight Surgeon

1. Session ID: SMP:CH:P:7

2. Session: Advanced Cardiac Life Support Protocols I **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: L- 90

4. Session Scenario:

Crewmembers will be instructed in basic Advanced Cardiac Life Support (ACLS) protocols and learn the techniques involved in the Cervical, Airway, Breathing, Circulation (CABC) protocol.

5. Session Constraints:

1. Training sessions should be conducted in Star City or at JSC, dependent on crew schedules.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848739	MSMK-Emergency Medical Kit (EMK)	1
854945	Mir Crew Medical Restraint System (CMRS)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
180	0	0	1	0	ACLS Protocols I

8. Data Processing:

1. N/A for preflight sessions.

Mission: NASA 5 **Invest. ID:** 890613 **Exp. ID:** Defib **Russian ID:** Defib

Invest. Title: Mir Defibrillator and Crew Medical Restraint System (CMRS) **Prime** ☒ **Contingent** ☐

US PI: Flight Surgeon **Russian PI:** Flight Surgeon

1. Session ID: SMP:CH:P:9

2. Session: Advanced Cardiac Life Support Protocols II **Session Type:** Training

3. Session Timeline: **Crewtime Usage (mins):** 180 **Session Time (mins):** 180

Scheduled Days: L- 90

4. Session Scenario:

Crewmember will be instructed in Advanced Cardiac Life Support (ACLS) protocols and will learn the various ACLS algorithms. Specific ACLS examples will be used to illustrate the proper algorithms necessary for unique situations.

5. Session Constraints:

1. Training sessions should be conducted in Star City or at JSC, dependent on crew schedules.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
848739	MSMK-Emergency Medical Kit (EMK)	1
854944	Mir Defibrillator	1
854945	Mir Crew Medical Restraint System (CMRS)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
180	0	0	1	0	ACLS Protocols II

8. Data Processing:

1. N/A for preflight sessions.

Mission: STS 84 (SM-06) **Invest. ID:** 890613 **Exp. ID:** Defib **Russian ID:** Defib

Invest. Title: Mir Defibrillator and Crew Medical Restraint System (CMRS) **Prime** ☒ **Contingent** ☐

US PI: Flight Surgeon **Russian PI:** Flight Surgeon

1. Session ID: SMP:LOG:I:35

2. Session: Transfer of Mir Defibrillator and Mir CMRS from Shuttle to Mir **Session Type:** Up Item

3. Session Timeline: **Crewtime Usage (mins):** 15 **Session Time (mins):** 15

Scheduled Days: FD 5

4. Session Scenario:

Remove Mir Defibrillator and Mir CMRS from Shuttle and transfer to Mir. Attach the Mir CMRS pack to the Mir Defibrillator pack and stow in stowage location.

5. Session Constraints:

1. Mir Defibrillator and Mir CMRS should be co-located with the MSMK.
2. Late stow on Shuttle required for Mir Defibrillator given limited life of batteries and electrodes.
3. Astronaut to perform transfer.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854944	Mir Defibrillator	1
854945	Mir Crew Medical Restraint System (CMRS)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
10	10	1	1	0	Transfer Mir Defibrillator and Mir CMRS from Shuttle to Mir.
1	1	1	1	0	Attach Mir CMRS pack to Mir Defibrillator pack
4	4	1	1	0	Stow Mir Defibrillator and Mir CMRS.

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890613 **Exp. ID:** Defib **Russian ID:** Defib

Invest. Title: Mir Defibrillator and Crew Medical Restraint System (CMRS) **Prime** ☒ **Contingent** ☐

US PI: Flight Surgeon **Russian PI:** Flight Surgeon

1. Session ID: SMP:CH:I:1

Session Type: Inflight

2. Session: Mir Defibrillator Checkout

3. Session Timeline: **Crewtime Usage (mins):** 17 **Session Time (mins):** 17

Scheduled Days: FD 10, 55, 100, 145

4. Session Scenario:

Deploy and secure Mir Defibrillator in operational location. Swap main battery with checkout battery. Perform Mir Defibrillator checkout. Return main and checkout batteries to original locations. Close Mir Defibrillator and restow.

5. Session Constraints:

1. Session to be performed approximately every 45 days of each mission.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854944	Mir Defibrillator	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Deploy Mir Defibrillator
1	1	1	1	0	Swap main and checkout batteries
5	5	1	1	0	Perform Mir Defibrillator checkout
1	1	1	1	0	Return batteries to original locations
5	5	1	1	0	Close and restow Mir Defibrillator

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: NASA 5 **Invest. ID:** 890613 **Exp. ID:** Defib **Russian ID:** Defib

Invest. Title: Mir Defibrillator and Crew Medical Restraint System (CMRS) **Prime** ☒ **Contingent** ☐

US PI: Flight Surgeon **Russian PI:** Flight Surgeon

1. Session ID: SMP:CH:I:2

2. Session: Mir CMRS Operational Checkout **Session Type:** Inflight

3. Session Timeline: **Crewtime Usage (mins):** 20 **Session Time (mins):** 20

Scheduled Days: FD 19

4. Session Scenario:

Locate and destow Mir CMRS. Deploy and secure Mir CMRS to Mir Galley Table in the Core Module. Secure Crewmember to the Mir CMRS. Verify Crewmember in Mir CMRS is isolated from the Mir Galley Table. Restow the Mir CMRS and attach to the Mir defibrillator.

5. Session Constraints:

1. Session to be performed once for each mission.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854945	Mir Crew Medical Restraint System (CMRS)	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Destow Mir CMRS
2	2	1	1	0	Deploy and secure Mir CMRS
1	1	1	1	0	Secure Crewmember to Mir CMRS
2	2	1	1	0	Verify Crewmember is isolated from Mir Table
10	10	1	1	0	Fold Mir CMRS, reaffix to Mir defibrillator, and restow.

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

Mission: STS 86 (SM-07) **Invest. ID:** 890613 **Exp. ID:** Defib **Russian ID:** Defib

Invest. Title: Mir Defibrillator and Crew Medical Restraint System (CMRS) **Prime** ☒ **Contingent** ☐

US PI: Flight Surgeon **Russian PI:** Flight Surgeon

1. Session ID: SMP:LOG:I:37

Session Type: Down Item

2. Session: Transfer of Mir Defibrillator Resupply Kit

3. Session Timeline: **Crewtime Usage (mins):** 15 **Session Time (mins):** 15

Scheduled Days: FD 6

4. Session Scenario:
After Mir defibrillator battery and electrode swap out inflight, Mir Defibrillator Resupply kit will be stowed and later returned on the down shuttle mission.

5. Session Constraints:
None.

6. Associated Hardware:

Hdw ID	Hardware Title	Quantity
854946	Mir Defibrillator Resupply Kit	1

7. Session Flow:

1g Time (mins)	0g Time (mins)	0g Factor	Operators	Subjects	Description
5	5	1	1	0	Unstow Mir Defibrillator Resupply Kit
5	5	1	1	0	Transfer to Shuttle
5	5	1	1	0	Return to Mir

8. Data Processing:

1. No data downlink required.
2. Air-to-ground voice communication may be required in the event of a contingency situation.

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Appendix A

In-flight Crewtime by Day

In-flight Crewtime Scenario (by Flight Days) - Mir 24 NASA 5

Investigation	Payload Category / Session	FD	Thu 5/15/97 1	Fri 5/16/97 2	Sat 5/17/97 3	Sun 5/18/97 4	Mon 5/19/97 5	Tue 5/20/97 6	Wed 5/21/97 7	Thu 5/22/97 8	Fri 5/23/97 9	Sat 5/24/97 10	Sun 5/25/97 11	Mon 5/26/97 12	Tue 5/27/97 13	Wed 5/28/97 14	Thu 5/29/97 15	Fri 5/30/97 16	Sat 5/31/97 17	Sun 6/1/97 18	Mon 6/2/97 19	Tue 6/3/97 20
[illegible]																						
600006	Commercial Generic Bioprocessing Ap																					
ADV:OPS:I:1	Locker Preparation for CGBA-ICM-																					
ADV:OPS:I:2	Locker Preparation for CGBA-ICM-																					
[illegible]																						
700004	Regional & Temporal Variability of Pri																					
ES:OB:I:1	EO3 - Regional & Temporal Variabi																					
700005	Calibration & Validation of Priroda Mi																					
ES:HYD:I:1	EO7-Calibration & Validation of Pri																					
700006	Watershed Hydrologic Studies																					
ES:HYD:I:2	EO4 - Watershed Hydrologic Studie																					
700007	Validation of Biosphere-Atmosphere In																					
ES:LAI:I:1	EO2-Validation of Biosphere-Atmos																					
700008	Comparison of Atmospheric Chemistry																					
ES:AC:I:1	EO8 - Comparison of Atmospheric																					
700010	Validation of Priroda Rain Observation																					
ES:MT:I:1	EO6 - Validation of Priroda Rain Ob																					
700011	Test Site Monitoring																					
ES:EO:I:10	Global Test Site Monitoring											30	30									
ES:EO:I:12	NASA - Global Test Site Monitoring																					
810525	Visual Earth Observations																					
ES:EO:I:37	Earth Observations for Visual Earth													30				30				30
ES:EO:I:38	Data Transfer for Visual Observatio											15							15			
890615	Visual Observations																					
ES:EO:I:40	Investigation of the Optical Quality																					
ES:EO:I:40	Investigation of the Optical Quality																					
[illegible]																						
110047	Effects of Gravity on Insect Circadian																					
FB:DEV:I:73	Preparation of Priroda Lockers					23																
FB:DEV:I:75	Beetle Kit Stowage and Experiment					60																
FB:DEV:I:76	Verify Beetle Kit Power Status												7							7		
FB:DEV:I:77	Beetle Kit Ventilation					15							15							15		
FB:DEV:I:78	Experiment Deactivation																					
890268	Developmental Analysis of Seeds Grow																					
FB:DEV:I:33	GEMS Assembly													240								
FB:DEV:I:34	Seed Planting																43					
FB:DEV:I:35	Video Observations and Photograph																			30		

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		5/15/97	5/16/97	5/17/97	5/18/97	5/19/97	5/20/97	5/21/97	5/22/97	5/23/97	5/24/97	5/25/97	5/26/97	5/27/97	5/28/97	5/29/97	5/30/97	5/31/97	6/1/97	6/2/97	6/3/97
Investigation	**Session FD**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
FB:DEV:I:36	Daily Operations & Data Downlink													20	20	20	20	20	20	20	20
FB:DEV:I:37	Final Harvest of Plant Samples - Firs																				
FB:DEV:I:39	Svet and GEMS Functional Check,													180							
FB:DEV:I:40	Svet Assembly and Program 1									120											
FB:DEV:I:41	Svet Root Module and Soil Moistur																				
FB:DEV:I:42	De-Install Root Module from Svet																				
FB:DEV:I:43	Final Harvest of Plant Samples - Thi																				
FB:DEV:I:80	GEMS hardware Collection and Pre									150											
FB:DEV:I:81	Svet and GEMS Inventory Check					60															
FB:DEV:I:82	Program 2													20	20	20					
FB:DEV:I:83	Program 3															10					
FB:DEV:I:84	Zeroing Differential Pressures																			5	
FB:DEV:I:85	Leaf Bag Assembly Removal																				
FB:DEV:I:86	1st Fixation																				
FB:DEV:I:87	Pollination																				
FB:DEV:I:88	Terminalization and Second Fixatio																				
FB:DEV:I:89	Hard Drive (Winchester) Replaceme																				
FB:DEV:I:90	Leaf Bag Assembly Installation, Exp																				
FB:DEV:I:91	Seed Strip Preparation													90							
FB:DEV:I:92	Processing of Mir Core Svet Teleme																				
FB:DEV:I:93	Refill Water Container																				
FB:DEV:I:94	Svet and GEMS disassembly																				
HLS																					
110019	**Sleep Investigations (639/663/710)**																				
HLS:MET:I:36	Night Headband - Presleep																				
HLS:MET:I:40	MIPS Data Download																				
HLS:MET:I:43	Blood Collection and Processing																				
HLS:MET:I:46	MSRR Recording																				
HLS:MET:I:48	Night Headband Postsleep																				
HLS:MET:I:49	Doff MSRR Hardware and Stow Ass																				
HLS:MET:I:52	MIPS Data Download																				
HLS:MET:I:77	Night Headband - Presleep																				
110028	**Frames of Reference for Sensori-motor**																				
HLS:NEU:I:23	COGNILAB Test A																				
HLS:NEU:I:24	COGNILAB Test B																				
HLS:NEU:I:40	Locate COGNILAB Equipment																				
110034	**Magnetic Resonance Imaging (MRI) Af**																				
HLS:MS:I:2	Back Pain Questionnaire - Mir Crew																				
HLS:MS:I:8	Back Pain Questionnaire - NASA Cr			10	10	10	10	10	10	10	10	10	10	10							
110037	**Crewmember and Crew-Ground Intera**																				

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		5/15/97	5/16/97	5/17/97	5/18/97	5/19/97	5/20/97	5/21/97	5/22/97	5/23/97	5/24/97	5/25/97	5/26/97	5/27/97	5/28/97	5/29/97	5/30/97	5/31/97	6/1/97	6/2/97	6/3/97
Investigation	**Session FD**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
HLS:BP:I:10	Mir Crew: Completion of Computer																				
HLS:BP:I:11	NASA Crew: Completion of Comp				25							25							25		
890091	**GASMAP Facility Operations**																				
HLS:FAC:I:1	GASMAP Check-Out														25						
HLS:FAC:I:3	GASMAP Rough-Out																				
HLS:FAC:I:4	GASMAP Full Functional Check an																				
650006	**Enhanced Dynamic Load Sensors (EDL**																				
ISS:DYN:I:2	Enhanced Dynamics Load Sensor (E																				
ISS:DYN:I:2	Enhanced Dynamics Load Sensor (E														45			45			45
ISS:DYN:I:26	Enhanced Dynamics Load Sensor U																	85			85
ISS:DYN:I:36	Enhanced Dynamics Load Sensor (E																				
650007	**Optical Properties Monitor (OPM)**																				
ISS:ENV:I:19	OPM Data Collection													30							30
650008	**Water Microbiological Monitoring (W**																				
ISS:CHS:I:13	Microbial Capture Device Processin															165					
ISS:CHS:I:15	Microbial Capture Device Colony C																	77			77
650009	**Mir Electric Field Characterization (M**																				
ISS:ENV:I:46	MEFC Experiment Set-up and Data										80										
650013	**Mir Structural Dynamics Experiment (**																				
ISS:DYN:I:11	MiSDE 4a - Mir Thruster Firing Dat																				
ISS:DYN:I:12	MiSDE E5 - Shuttle Thruster Firing																				
ISS:DYN:I:13	MiSDE 2a - Ambient Noise Data Co																				
ISS:DYN:I:14	MiSDE 2c - Ambient Noise Data Co																				
ISS:DYN:I:15	MiSDE 2d - Ambient Noise Data Co																				
ISS:DYN:I:16	MiSDE 3a - IVA Data Collection (S																				
ISS:DYN:I:37	MiSDE Equipment Visual Inspectio												40	40	40						
ISS:DYN:I:38	MiSDE Docking - Shuttle Docking																				
ISS:DYN:I:5	MiSDE 2b - Ambient Noise Data Co													95							
ISS:DYN:I:6	MiSDE 2e - Ambient Noise Data Co														80						
ISS:DYN:I:7	MiSDE 2f - Ambient Noise Data Col															90					
ISS:DYN:I:8	MiSDE 3b - IVA Data Collection (																				
ISS:DYN:I:9	MiSDE 4b - Mir Thruster Firing Dat																				
650015	**Water Quality Monitor (WQM)**																				
LSR:CHS:I:13	Reagent Mixing for TOC Analyzer																				
LSR:CHS:I:21	Mir Potable Water Collection and In						135														
LSR:CHS:I:23	Mir Potable Water Collection and In																				
LSR:CHS:I:8	Inflight TOC Analysis of Ground-Pr					65															

Investigation	Payload Category / Session	Thu 5/15/97 FD 1	Fri 5/16/97 2	Sat 5/17/97 3	Sun 5/18/97 4	Mon 5/19/97 5	Tue 5/20/97 6	Wed 5/21/97 7	Thu 5/22/97 8	Fri 5/23/97 9	Sat 5/24/97 10	Sun 5/25/97 11	Mon 5/26/97 12	Tue 5/27/97 13	Wed 5/28/97 14	Thu 5/29/97 15	Fri 5/30/97 16	Sat 5/31/97 17	Sun 6/1/97 18	Mon 6/2/97 19	Tue 6/3/97 20
750029	**Microgravity Isolation Mount (MIM) F**																				
MG:FAC:I:36	MIM Health and Status Check																				
750030	**Microgravity Glovebox (MGBX) Facilit**																				
MG:FAC:I:9	MGBX Facility Checkout and Condi														100						
750031	**Biotechnology System (BTS) Facility O**																				
MG:FAC:I:38	BTS Facility Functional Tests-EEC1																				
890043	**QUELD Furnace Experiment - MIM**																				
MG:MTS:I:2	QUELD Experiment Mounting																				
MG:MTS:I:37	QUELD Furnace Activation																			30	
MG:MTS:I:38	QUELD Furnace Experiment Operat																				
MG:MTS:I:6	QUELD Furnace Experiment Dismo																				
890079	**Space Acceleration Measurement Syste**																				
MG:ENV:I:6	SAMS Data Collection for Docking																				
MG:ENV:I:7	SAMS Data Collection for Undocki								5												
MG:FAC:I:29	SAMS Maintenance - TSH Bias Me																				
890093	**Biochemistry of 3-D Tissue Engineering**																				
MG:BT:I:16	Cell Sample Transfer, Fixation and							180							180						
MG:BT:I:18	Science Experiment Termination																				
MG:BT:I:59	Media Sample and Testing						120							120							120
MG:BT:I:60	Culture Microscopy and Photograph					120							120							120	
MG:BT:I:61	BEM/BSTC-M Engineering Evaluat																				
MG:BT:I:67	BEM/BSTC-M and BTR Continuou																				
MG:FAC:I:39	BEM/BSTC-M and BTR Facility M				10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
890252	**Canadian Protein Crystallization Exper**																				
MG:BT:I:29	CAPE Experiment Initiation								120												
MG:BT:I:33	CAPE Experiment Termination, Dis																				
MG:BT:I:34	CAPE/MIM Continuous Operations																				
MG:BT:I:62	CAPE/MIM Daily Status Checks									10	10	10	10	10	10	10	10	10	10	10	10
MG:BT:I:63	MIM Data Sampling Rate Change									30										30	
MG:BT:I:64	CAPE Video Tape Changeout													20					20		
MG:BT:I:65	MIM Data Archiving																				
MG:BT:I:66	CAPE Mounting to MIM and CAPE							230													
890255	**Ambient Diffusion Controlled Protein C**																				
MG:BT:I:28	DCAM Photography Operations																				
890265	**Colloidal Gelation**																				
MG:FP:I:72	Unstow Equipment and Setup in M					135															
MG:FP:I:73	Binary Colloidal Alloy Samples - IA																				
MG:FP:I:74	Binary Colloidal Alloy Samples - IB																				
MG:FP:I:75	GEL Properties for Colloid Polymer											90		90			90				
MG:FP:I:76	Gel Properties for Colloid Polymer																80				

Investigation	Payload Category / Session	FD	Thu 5/15/97 1	Fri 5/16/97 2	Sat 5/17/97 3	Sun 5/18/97 4	Mon 5/19/97 5	Tue 5/20/97 6	Wed 5/21/97 7	Thu 5/22/97 8	Fri 5/23/97 9	Sat 5/24/97 10	Sun 5/25/97 11	Mon 5/26/97 12	Tue 5/27/97 13	Wed 5/28/97 14	Thu 5/29/97 15	Fri 5/30/97 16	Sat 5/31/97 17	Sun 6/1/97 18	Mon 6/2/97 19	Tue 6/3/97 20
MG:FP:I:77	Three Phase Colloid Polymer Initiati																		155			
MG:FP:I:78	Three Phase Colloid Polymer Growt																				145	
MG:FP:I:79	Three Phase Colloidal Growth Vide																					
MG:FP:I:80	Long Term Colloid Polymers - IIF																					
MG:FP:I:81	Fractal Aggregation Combination Sa																					
MG:FP:I:82	Fractal Aggregation Gelation Proces																					
MG:FP:I:83	Fractal Aggregation Gel Properties -																					
MG:FP:I:84	Fractal Aggregation Gelation Proces																					
MG:FP:I:85	Deactivate and Stow Equipment																					
	OPS																					
890437	**Mir Inventory**																					
OPS:SHR:I:1	Mir Inventory Session																					
	SMP																					
890096	**Space Medicine Program - US Medical**																					
SMP:MO:I:13	MO-11 Radiation Data Download E															85						
SMP:MO:I:2	MO-1 Private Medical Conference		15	15	15	15	15	15	15							15						
SMP:MO:I:27	MO-6 Crew Status and Support Trac								30							30						
SMP:MO:I:28	MO-12 Radiation Monitoring						45															
SMP:MO:I:29	MO-9 Physical Exam																					
SMP:MO:I:31	MO:2 Install Updated BDL software							13														
SMP:MO:I:32	MO-2 Barcode Data Logger Downlo																					
SMP:MO:I:35	MO-10 Analysis of Urine Samples																					
SMP:MO:I:36	MO-11 TEPC Display Call Down								10							10						
SMP:MO:I:37	MO-14 Environmental Health Anom											30										
SMP:MO:I:38	MO-2 Barcode Data Logger Downli																					
890607	**Analysis of Mir Archival Water Sample**																					
SMP:ENV:I:1	Humidity Condensate Set-up																					
SMP:ENV:I:16	Docked Phase Water Collection and							195														
SMP:ENV:I:19	Pre-Adsorption Bed Change-out Wa																					
SMP:ENV:I:2	Humidity Condensate Dismantle																					
SMP:ENV:I:22	Post-Adsorption Bed Change-out W																					
890608	**Crew Microbiological Assessment**																					
SMP:MIC:I:1	Crew Microbial Sample Collection -																					
SMP:MIC:I:2	Crew Microbial Sample Collection -																40					
890609	**Mir Microbiological Assessment**																					
SMP:ENV:I:15	Air & Surface Sample Collections o								30													
SMP:ENV:I:7	MAS Recharge with UBC on Mir															25						
SMP:ENV:I:8	Surface and Air Sample Collection																75					
SMP:ENV:I:9	Colony Count and Photo of Samples																		70			70
890610	**Toxicological Assessment of Airborne V**																					

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		5/15/97	5/16/97	5/17/97	5/18/97	5/19/97	5/20/97	5/21/97	5/22/97	5/23/97	5/24/97	5/25/97	5/26/97	5/27/97	5/28/97	5/29/97	5/30/97	5/31/97	6/1/97	6/2/97	6/3/97
Investigation	**Session** **FD**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
SMP:ENV:I:12	Activate SSAS										30										
SMP:ENV:I:13	Grab Air Sampling																				
SMP:ENV:I:14	Deactivate SSAS											10									
890613	**Mir Defibrillator and Crew Medical Re**																				
SMP:CH:I:1	Mir Defibrillator Checkout										17										
SMP:CH:I:2	Mir CMRS Operational Checkout																			20	
Crewtime Daily Totals (in minutes)		15	15	25	158	460	498	515	145	330	232	207	460	735	695	483	240	487	137	390	497
Crewtime Daily Totals (in hours)		0.25	0.25	0.42	2.63	7.67	8.30	8.58	2.42	5.50	3.87	3.45	7.67	12.25	11.58	8.05	4.00	8.12	2.28	6.50	8.28
Daily Cum Totals (in hours)		0.25	0.50	0.92	3.55	11.22	19.52	28.10	30.52	36.02	39.88	43.33	51.00	63.25	74.83	82.88	86.88	95.00	97.28	103.78	112.07

In-flight Crewtime Scenario (by Flight Days) - Mir 24 NASA 5

PTPS

Payload Category / Investigation	Session	FD	Thu 6/4/97 21	Fri 6/5/97 22	Sat 6/6/97 23	Sun 6/7/97 24	Mon 6/8/97 25	Tue 6/9/97 26	Wed 6/10/97 27	Thu 6/11/97 28	Fri 6/12/97 29	Sat 6/13/97 30	Sun 6/14/97 31	Mon 6/15/97 32	Tue 6/16/97 33	Wed 6/17/97 34	Thu 6/18/97 35	Fri 6/19/97 36	Sat 6/20/97 37	Sun 6/21/97 38	Mon 6/22/97 39	Tue 6/23/97 40
600006 Commercial Generic Bioprocessing Ap																						
ADV:OPS:I:1	Locker Preparation for CGBA-ICM-																					
ADV:OPS:I:2	Locker Preparation for CGBA-ICM-																					
700004 Regional & Temporal Variability of Pri																						
ES:OB:I:1	EO3 - Regional & Temporal Variabi																					
700005 Calibration & Validation of Priroda Mi																						
ES:HYD:I:1	EO7-Calibration & Validation of Pri																					
700006 Watershed Hydrologic Studies																						
ES:HYD:I:2	EO4 - Watershed Hydrologic Studie																					
700007 Validation of Biosphere-Atmosphere In																						
ES:LAI:I:1	EO2-Validation of Biosphere-Atmos																					
700008 Comparison of Atmospheric Chemistry																						
ES:AC:I:1	EO8 - Comparison of Atmospheric																					
700010 Validation of Priroda Rain Observation																						
ES:MT:I:1	EO6 - Validation of Priroda Rain Ob																					
700011 Test Site Monitoring																						
ES:EO:I:10	Global Test Site Monitoring																			30	30	
ES:EO:I:12	NASA - Global Test Site Monitoring																					
810525 Visual Earth Observations																						
ES:EO:I:37	Earth Observations for Visual Earth					30				30				30				30				30
ES:EO:I:38	Data Transfer for Visual Observatio					15							15							15		
890615 Visual Observations																						
ES:EO:I:40	Investigation of the Optical Quality																					
ES:EO:I:40	Investigation of the Optical Quality																					
110047 Effects of Gravity on Insect Circadian																						
FB:DEV:I:73	Preparation of Priroda Lockers																					
FB:DEV:I:75	Beetle Kit Stowage and Experiment																					
FB:DEV:I:76	Verify Beetle Kit Power Status		7				7							7							7	
FB:DEV:I:77	Beetle Kit Ventilation						15							15							15	
FB:DEV:I:78	Experiment Deactivation																					
890268 Developmental Analysis of Seeds Grow																						
FB:DEV:I:33	GEMS Assembly																					
FB:DEV:I:34	Seed Planting																					
FB:DEV:I:35	Video Observations and Photograph			30				30				30				30				30		

Investigation	Payload Category / Session	FD	Thu 6/4/97	Fri 6/5/97	Sat 6/6/97	Sun 6/7/97	Mon 6/8/97	Tue 6/9/97	Wed 6/10/97	Thu 6/11/97	Fri 6/12/97	Sat 6/13/97	Sun 6/14/97	Mon 6/15/97	Tue 6/16/97	Wed 6/17/97	Thu 6/18/97	Fri 6/19/97	Sat 6/20/97	Sun 6/21/97	Mon 6/22/97	Tue 6/23/97
			21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
FB:DEV:I:36	Daily Operations & Data Downlink		20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
FB:DEV:I:37	Final Harvest of Plant Samples - Firs																					
FB:DEV:I:39	Svet and GEMS Functional Check,																					
FB:DEV:I:40	Svet Assembly and Program 1																					
FB:DEV:I:41	Svet Root Module and Soil Moistur																					
FB:DEV:I:42	De-Install Root Module from Svet																					
FB:DEV:I:43	Final Harvest of Plant Samples - Thi																					
FB:DEV:I:80	GEMS hardware Collection and Pre																					
FB:DEV:I:81	Svet and GEMS Inventory Check																					
FB:DEV:I:82	Program 2																					
FB:DEV:I:83	Program 3																					
FB:DEV:I:84	Zeroing Differential Pressures																					
FB:DEV:I:85	Leaf Bag Assembly Removal									60												
FB:DEV:I:86	1st Fixation									120												
FB:DEV:I:87	Pollination										60	60	60	60	60	60	60					
FB:DEV:I:88	Terminalization and Second Fixatio														120							
FB:DEV:I:89	Hard Drive (Winchester) Replaceme																					
FB:DEV:I:90	Leaf Bag Assembly Installation, Exp																					
FB:DEV:I:91	Seed Strip Preparation																					
FB:DEV:I:92	Processing of Mir Core Svet Teleme																					
FB:DEV:I:93	Refill Water Container																					
FB:DEV:I:94	Svet and GEMS disassembly																					
	HLS																					
110019	Sleep Investigations (639/663/710)																					
HLS:MET:I:36	Night Headband - Presleep																					
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HLS:MET:I:43	Blood Collection and Processing																					
HLS:MET:I:46	MSRR Recording																					
HLS:MET:I:48	Night Headband Postsleep																					
HLS:MET:I:49	Doff MSRR Hardware and Stow Ass																					
HLS:MET:I:52	MIPS Data Download								4							4						
HLS:MET:I:77	Night Headband - Presleep			28	28	28	28	28	28	28	28	28	28	28	28							
110028	Frames of Reference for Sensori-motor																					
HLS:NEU:I:23	COGNILAB Test A											55										
HLS:NEU:I:24	COGNILAB Test B												65									
HLS:NEU:I:40	Locate COGNILAB Equipment										10											
110034	Magnetic Resonance Imaging (MRI) Af																					
HLS:MS:I:2	Back Pain Questionnaire - Mir Crew																					
HLS:MS:I:8	Back Pain Questionnaire - NASA Cr																					
110037	Crewmember and Crew-Ground Intera																					

Investigation	Payload Category / Session	FD	Thu 6/4/97	Fri 6/5/97	Sat 6/6/97	Sun 6/7/97	Mon 6/8/97	Tue 6/9/97	Wed 6/10/97	Thu 6/11/97	Fri 6/12/97	Sat 6/13/97	Sun 6/14/97	Mon 6/15/97	Tue 6/16/97	Wed 6/17/97	Thu 6/18/97	Fri 6/19/97	Sat 6/20/97	Sun 6/21/97	Mon 6/22/97	Tue 6/23/97
			21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
HLS:BP:I:10	Mir Crew: Completion of Computer																					
HLS:BP:I:11	NASA Crew: Completion of Comp						25							25							25	
890091	**GASMAP Facility Operations**																					
HLS:FAC:I:1	GASMAP Check-Out																					
HLS:FAC:I:3	GASMAP Rough-Out																					
HLS:FAC:I:4	GASMAP Full Functional Check an																					
650006	**Enhanced Dynamic Load Sensors (EDL**																					
ISS:DYN:I:2	Enhanced Dynamics Load Sensor (E																					
ISS:DYN:I:2	Enhanced Dynamics Load Sensor (E				45			45			45			45			45			45		
ISS:DYN:I:26	Enhanced Dynamics Load Sensor U				85			85														
ISS:DYN:I:36	Enhanced Dynamics Load Sensor (E																					
650007	**Optical Properties Monitor (OPM)**																					
ISS:ENV:I:19	OPM Data Collection								30							30						
650008	**Water Microbiological Monitoring (W**																					
ISS:CHS:I:13	Microbial Capture Device Processin																					
ISS:CHS:I:15	Microbial Capture Device Colony C																					
650009	**Mir Electric Field Characterization (M**																					
ISS:ENV:I:46	MEFC Experiment Set-up and Data						80															80
650013	**Mir Structural Dynamics Experiment (**																					
ISS:DYN:I:11	MiSDE 4a - Mir Thruster Firing Dat																					
ISS:DYN:I:12	MiSDE E5 - Shuttle Thruster Firing																					
ISS:DYN:I:13	MiSDE 2a - Ambient Noise Data Co																					
ISS:DYN:I:14	MiSDE 2c - Ambient Noise Data Co																					
ISS:DYN:I:15	MiSDE 2d - Ambient Noise Data Co																					
ISS:DYN:I:16	MiSDE 3a - IVA Data Collection (S																					
ISS:DYN:I:37	MiSDE Equipment Visual Inspectio																					
ISS:DYN:I:38	MiSDE Docking - Shuttle Docking																					
ISS:DYN:I:5	MiSDE 2b - Ambient Noise Data Co																					
ISS:DYN:I:6	MiSDE 2e - Ambient Noise Data Co																					
ISS:DYN:I:7	MiSDE 2f - Ambient Noise Data Col																					
ISS:DYN:I:8	MiSDE 3b - IVA Data Collection (																					
ISS:DYN:I:9	MiSDE 4b - Mir Thruster Firing Dat																					
650015	**Water Quality Monitor (WQM)**																					
LSR:CHS:I:13	Reagent Mixing for TOC Analyzer																					
LSR:CHS:I:21	Mir Potable Water Collection and In																					
LSR:CHS:I:23	Mir Potable Water Collection and In																					
LSR:CHS:I:8	Inflight TOC Analysis of Ground-Pr																65					

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		6/4/97	6/5/97	6/6/97	6/7/97	6/8/97	6/9/97	6/10/97	6/11/97	6/12/97	6/13/97	6/14/97	6/15/97	6/16/97	6/17/97	6/18/97	6/19/97	6/20/97	6/21/97	6/22/97	6/23/97
Investigation	**Session FD**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
750029	**Microgravity Isolation Mount (MIM) F**																				
MG:FAC:I:36	MIM Health and Status Check																				
750030	**Microgravity Glovebox (MGBX) Facilit**																				
MG:FAC:I:9	MGBX Facility Checkout and Condi																				
750031	**Biotechnology System (BTS) Facility O**																				
MG:FAC:I:38	BTS Facility Functional Tests-EEC1																				
890043	**QUELD Furnace Experiment - MIM**																				
MG:MTS:I:2	QUELD Experiment Mounting																				
MG:MTS:I:37	QUELD Furnace Activation																				
MG:MTS:I:38	QUELD Furnace Experiment Operat																				
MG:MTS:I:6	QUELD Furnace Experiment Dismo																				
890079	**Space Acceleration Measurement Syste**																				
MG:ENV:I:6	SAMS Data Collection for Docking																				
MG:ENV:I:7	SAMS Data Collection for Undocki																				
MG:FAC:I:29	SAMS Maintenance - TSH Bias Me																				
890093	**Biochemistry of 3-D Tissue Engineering**																				
MG:BT:I:16	Cell Sample Transfer, Fixation and	180							180							180					
MG:BT:I:18	Science Experiment Termination																				
MG:BT:I:59	Media Sample and Testing							120							120						
MG:BT:I:60	Culture Microscopy and Photograph						120							120							120
MG:BT:I:61	BEM/BSTC-M Engineering Evaluat																				
MG:BT:I:67	BEM/BSTC-M and BTR Continuou																				
MG:FAC:I:39	BEM/BSTC-M and BTR Facility M	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
890252	**Canadian Protein Crystallization Exper**																				
MG:BT:I:29	CAPE Experiment Initiation																				
MG:BT:I:33	CAPE Experiment Termination, Dis																			90	
MG:BT:I:34	CAPE/MIM Continuous Operations																				
MG:BT:I:62	CAPE/MIM Daily Status Checks	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
MG:BT:I:63	MIM Data Sampling Rate Change																				
MG:BT:I:64	CAPE Video Tape Changeout			20					20					20							
MG:BT:I:65	MIM Data Archiving																			120	
MG:BT:I:66	CAPE Mounting to MIM and CAPE																				
890255	**Ambient Diffusion Controlled Protein C**																				
MG:BT:I:28	DCAM Photography Operations											245									
890265	**Colloidal Gelation**																				
MG:FP:I:72	Unstow Equipment and Setup in M																				
MG:FP:I:73	Binary Colloidal Alloy Samples - 1A																				
MG:FP:I:74	Binary Colloidal Alloy Samples - 1B																				
MG:FP:I:75	GEL Properties for Colloid Polymer																				
MG:FP:I:76	Gel Properties for Colloid Polymer																				

Investigation	Payload Category / Session	FD	Thu 6/4/97	Fri 6/5/97	Sat 6/6/97	Sun 6/7/97	Mon 6/8/97	Tue 6/9/97	Wed 6/10/97	Thu 6/11/97	Fri 6/12/97	Sat 6/13/97	Sun 6/14/97	Mon 6/15/97	Tue 6/16/97	Wed 6/17/97	Thu 6/18/97	Fri 6/19/97	Sat 6/20/97	Sun 6/21/97	Mon 6/22/97	Tue 6/23/97
			21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
MG:FP:I:77	Three Phase Colloid Polymer Initiati																					
MG:FP:I:78	Three Phase Colloid Polymer Growt				145																	
MG:FP:I:79	Three Phase Colloidal Growth Vide																					
MG:FP:I:80	Long Term Colloid Polymers - IIF																					
MG:FP:I:81	Fractal Aggregation Combination Sa																					
MG:FP:I:82	Fractal Aggregation Gelation Proces																					
MG:FP:I:83	Fractal Aggregation Gel Properties -																					
MG:FP:I:84	Fractal Aggregation Gelation Proces																					
MG:FP:I:85	Deactivate and Stow Equipment																					
890437	**Mir Inventory**																					
OPS:SHR:I:1	Mir Inventory Session																					
890096	**Space Medicine Program - US Medical**																					
SMP:MO:I:13	MO-11 Radiation Data Download E																					
SMP:MO:I:2	MO-1 Private Medical Conference		15							15							15					
SMP:MO:I:27	MO-6 Crew Status and Support Trac		30							30							30					
SMP:MO:I:28	MO-12 Radiation Monitoring																					
SMP:MO:I:29	MO-9 Physical Exam											65										
SMP:MO:I:31	MO:2 Install Updated BDL software																					
SMP:MO:I:32	MO-2 Barcode Data Logger Downlo									30												
SMP:MO:I:35	MO-10 Analysis of Urine Samples											10										
SMP:MO:I:36	MO-11 TEPC Display Call Down		10							10							10					
SMP:MO:I:37	MO-14 Environmental Health Anom																					30
SMP:MO:I:38	MO-2 Barcode Data Logger Downli									25												
890607	**Analysis of Mir Archival Water Sample**																					
SMP:ENV:I:1	Humidity Condensate Set-up																					
SMP:ENV:I:16	Docked Phase Water Collection and																					
SMP:ENV:I:19	Pre-Adsorption Bed Change-out Wa																					
SMP:ENV:I:2	Humidity Condensate Dismantle																					
SMP:ENV:I:22	Post-Adsorption Bed Change-out W																					
890608	**Crew Microbiological Assessment**																					
SMP:MIC:I:1	Crew Microbial Sample Collection -																					
SMP:MIC:I:2	Crew Microbial Sample Collection -																					
890609	**Mir Microbiological Assessment**																					
SMP:ENV:I:15	Air & Surface Sample Collections o																					
SMP:ENV:I:7	MAS Recharge with UBC on Mir																					
SMP:ENV:I:8	Surface and Air Sample Collection																					
SMP:ENV:I:9	Colony Count and Photo of Samples																					
890610	**Toxicological Assessment of Airborne V**																					

Payload Category		Thu 6/4/97	Fri 6/5/97	Sat 6/6/97	Sun 6/7/97	Mon 6/8/97	Tue 6/9/97	Wed 6/10/97	Thu 6/11/97	Fri 6/12/97	Sat 6/13/97	Sun 6/14/97	Mon 6/15/97	Tue 6/16/97	Wed 6/17/97	Thu 6/18/97	Fri 6/19/97	Sat 6/20/97	Sun 6/21/97	Mon 6/22/97	Tue 6/23/97
Investigation	**Session** **FD**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
SMP:ENV:I:12	Activate SSAS										30										
SMP:ENV:I:13	Grab Air Sampling										25										
SMP:ENV:I:14	Deactivate SSAS											10									
890613	**Mir Defibrillator and Crew Medical Re**																				
SMP:CH:I:1	Mir Defibrillator Checkout																				
SMP:CH:I:2	Mir CMRS Operational Checkout																				
Crewtime Daily Totals (in minutes)		282	98	363	113	195	348	222	588	183	343	463	250	388	284	445	70	40	160	327	290
Crewtime Daily Totals (in hours)		4.70	1.63	6.05	1.88	3.25	5.80	3.70	9.80	3.05	5.72	7.72	4.17	6.47	4.73	7.42	1.17	0.67	2.67	5.45	4.83
Daily Cum Totals (in hours)		116.77	118.40	124.45	126.33	129.58	135.38	139.08	148.88	151.93	157.65	165.37	169.53	176.00	180.73	188.15	189.32	189.98	192.65	198.10	202.93

In-flight Crewtime Scenario (by Flight Days) - Mir 24 NASA 5

Payload Category / Investigation	Session	FD	Thu 6/24/97 41	Fri 6/25/97 42	Sat 6/26/97 43	Sun 6/27/97 44	Mon 6/28/97 45	Tue 6/29/97 46	Wed 6/30/97 47	Thu 7/1/97 48	Fri 7/2/97 49	Sat 7/3/97 50	Sun 7/4/97 51	Mon 7/5/97 52	Tue 7/6/97 53	Wed 7/7/97 54	Thu 7/8/97 55	Fri 7/9/97 56	Sat 7/10/97 57	Sun 7/11/97 58	Mon 7/12/97 59	Tue 7/13/97 60
ADV																						
600006 Commercial Generic Bioprocessing Ap																						
ADV:OPS:I:1	Locker Preparation for CGBA-ICM-																					
ADV:OPS:I:2	Locker Preparation for CGBA-ICM-																					
ES																						
700004 Regional & Temporal Variability of Pri																						
ES:OB:I:1	EO3 - Regional & Temporal Variabi																					
700005 Calibration & Validation of Priroda Mi																						
ES:HYD:I:1	EO7-Calibration & Validation of Pri																					
700006 Watershed Hydrologic Studies																						
ES:HYD:I:2	EO4 - Watershed Hydrologic Studie																					
700007 Validation of Biosphere-Atmosphere In																						
ES:LAI:I:1	EO2-Validation of Biosphere-Atmos																					
700008 Comparison of Atmospheric Chemistry																						
ES:AC:I:1	EO8 - Comparison of Atmospheric																					
700010 Validation of Priroda Rain Observation																						
ES:MT:I:1	EO6 - Validation of Priroda Rain Ob																					
700011 Test Site Monitoring																						
ES:EO:I:10	Global Test Site Monitoring																					
ES:EO:I:12	NASA - Global Test Site Monitoring																					
810525 Visual Earth Observations																						
ES:EO:I:37	Earth Observations for Visual Earth				30				30				30				30					30
ES:EO:I:38	Data Transfer for Visual Observatio					15							15							15		
890615 Visual Observations																						
ES:EO:I:40	Investigation of the Optical Quality										35											35
ES:EO:I:40	Investigation of the Optical Quality																					
FB																						
110047 Effects of Gravity on Insect Circadian																						
FB:DEV:I:73	Preparation of Priroda Lockers																					
FB:DEV:I:75	Beetle Kit Stowage and Experiment																					
FB:DEV:I:76	Verify Beetle Kit Power Status							7		7					7							7
FB:DEV:I:77	Beetle Kit Ventilation							15							15							15
FB:DEV:I:78	Experiment Deactivation																					
890268 Developmental Analysis of Seeds Grow																						
FB:DEV:I:33	GEMS Assembly																					
FB:DEV:I:34	Seed Planting																					
FB:DEV:I:35	Video Observations and Photograph			30				30				30				30				30		

Investigation	Payload Category / Session	Thu 6/24/97 FD 41	Fri 6/25/97 42	Sat 6/26/97 43	Sun 6/27/97 44	Mon 6/28/97 45	Tue 6/29/97 46	Wed 6/30/97 47	Thu 7/1/97 48	Fri 7/2/97 49	Sat 7/3/97 50	Sun 7/4/97 51	Mon 7/5/97 52	Tue 7/6/97 53	Wed 7/7/97 54	Thu 7/8/97 55	Fri 7/9/97 56	Sat 7/10/97 57	Sun 7/11/97 58	Mon 7/12/97 59	Tue 7/13/97 60
FB:DEV:I:36	Daily Operations & Data Downlink	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
FB:DEV:I:37	Final Harvest of Plant Samples - Firs																				
FB:DEV:I:39	Svet and GEMS Functional Check,																				
FB:DEV:I:40	Svet Assembly and Program 1																				
FB:DEV:I:41	Svet Root Module and Soil Moistur																				
FB:DEV:I:42	De-Install Root Module from Svet																				
FB:DEV:I:43	Final Harvest of Plant Samples - Thi																				
FB:DEV:I:80	GEMS hardware Collection and Pre																				
FB:DEV:I:81	Svet and GEMS Inventory Check																				
FB:DEV:I:82	Program 2																				
FB:DEV:I:83	Program 3																				
FB:DEV:I:84	Zeroing Differential Pressures																				
FB:DEV:I:85	Leaf Bag Assembly Removal																				
FB:DEV:I:86	1st Fixation																				
FB:DEV:I:87	Pollination																				
FB:DEV:I:88	Terminalization and Second Fixatio																				
FB:DEV:I:89	Hard Drive (Winchester) Replaceme																				
FB:DEV:I:90	Leaf Bag Assembly Installation, Exp																				
FB:DEV:I:91	Seed Strip Preparation																				
FB:DEV:I:92	Processing of Mir Core Svet Teleme																				
FB:DEV:I:93	Refill Water Container																				
FB:DEV:I:94	Svet and GEMS disassembly																				
	HLS																				
110019	**Sleep Investigations (639/663/710)**																				
HLS:MET:I:36	Night Headband - Presleep																				
HLS:MET:I:40	MIPS Data Download																				
HLS:MET:I:43	Blood Collection and Processing																				
HLS:MET:I:46	MSRR Recording																				
HLS:MET:I:48	Night Headband Postsleep																				
HLS:MET:I:49	Doff MSRR Hardware and Stow Ass																				
HLS:MET:I:52	MIPS Data Download																				
HLS:MET:I:77	Night Headband - Presleep																				
110028	**Frames of Reference for Sensori-motor**																				
HLS:NEU:I:23	COGNILAB Test A																				
HLS:NEU:I:24	COGNILAB Test B																				
HLS:NEU:I:40	Locate COGNILAB Equipment																				
110034	**Magnetic Resonance Imaging (MRI) Af**																				
HLS:MS:I:2	Back Pain Questionnaire - Mir Crew			20	20	20	20	20	20	20	20	20	20	20							
HLS:MS:I:8	Back Pain Questionnaire - NASA Cr																				
110037	**Crewmember and Crew-Ground Intera**																				

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		6/24/97	6/25/97	6/26/97	6/27/97	6/28/97	6/29/97	6/30/97	7/1/97	7/2/97	7/3/97	7/4/97	7/5/97	7/6/97	7/7/97	7/8/97	7/9/97	7/10/97	7/11/97	7/12/97	7/13/97
Investigation	**Session FD**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
HLS:BP:I:10	Mir Crew: Completion of Computer							50							50						
HLS:BP:I:11	NASA Crew: Completion of Comp						25							25							25
890091	**GASMAP Facility Operations**																				
HLS:FAC:I:1	GASMAP Check-Out				25																
HLS:FAC:I:3	GASMAP Rough-Out																				
HLS:FAC:I:4	GASMAP Full Functional Check an																				
650006	**Enhanced Dynamic Load Sensors (EDL**																				
ISS:DYN:I:2	Enhanced Dynamics Load Sensor (E																				
ISS:DYN:I:2	Enhanced Dynamics Load Sensor (E	45			45			45			45			45			45			45	
ISS:DYN:I:26	Enhanced Dynamics Load Sensor U																				
ISS:DYN:I:36	Enhanced Dynamics Load Sensor (E																				
650007	**Optical Properties Monitor (OPM)**																				
ISS:ENV:I:19	OPM Data Collection	30							30							30					
650008	**Water Microbiological Monitoring (W**																				
ISS:CHS:I:13	Microbial Capture Device Processin															165					
ISS:CHS:I:15	Microbial Capture Device Colony C																	77			77
650009	**Mir Electric Field Characterization (M**																				
ISS:ENV:I:46	MEFC Experiment Set-up and Data															80					
650013	**Mir Structural Dynamics Experiment (**																				
ISS:DYN:I:11	MiSDE 4a - Mir Thruster Firing Dat																				
ISS:DYN:I:12	MiSDE E5 - Shuttle Thruster Firing																				
ISS:DYN:I:13	MiSDE 2a - Ambient Noise Data Co																				
ISS:DYN:I:14	MiSDE 2c - Ambient Noise Data Co																				
ISS:DYN:I:15	MiSDE 2d - Ambient Noise Data Co																				
ISS:DYN:I:16	MiSDE 3a - IVA Data Collection (S																				
ISS:DYN:I:37	MiSDE Equipment Visual Inspectio																				
ISS:DYN:I:38	MiSDE Docking - Shuttle Docking																				
ISS:DYN:I:5	MiSDE 2b - Ambient Noise Data Co																				
ISS:DYN:I:6	MiSDE 2e - Ambient Noise Data Co																				
ISS:DYN:I:7	MiSDE 2f - Ambient Noise Data Col																				
ISS:DYN:I:8	MiSDE 3b - IVA Data Collection (																				
ISS:DYN:I:9	MiSDE 4b - Mir Thruster Firing Dat																				
650015	**Water Quality Monitor (WQM)**																				
LSR:CHS:I:13	Reagent Mixing for TOC Analyzer																				40
LSR:CHS:I:21	Mir Potable Water Collection and In																				
LSR:CHS:I:23	Mir Potable Water Collection and In																				
LSR:CHS:I:8	Inflight TOC Analysis of Ground-Pr																				

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		6/24/97	6/25/97	6/26/97	6/27/97	6/28/97	6/29/97	6/30/97	7/1/97	7/2/97	7/3/97	7/4/97	7/5/97	7/6/97	7/7/97	7/8/97	7/9/97	7/10/97	7/11/97	7/12/97	7/13/97
Investigation	**Session** **FD**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
750029	**Microgravity Isolation Mount (MIM) F**																				
MG:FAC:I:36	MIM Health and Status Check																				
750030	**Microgravity Glovebox (MGBX) Facilit**																				
MG:FAC:I:9	MGBX Facility Checkout and Condi																				
750031	**Biotechnology System (BTS) Facility O**																				
MG:FAC:I:38	BTS Facility Functional Tests-EEC1																				
890043	**QUELD Furnace Experiment - MIM**																				
MG:MTS:I:2	QUELD Experiment Mounting																				
MG:MTS:I:37	QUELD Furnace Activation																				
MG:MTS:I:38	QUELD Furnace Experiment Operat																				
MG:MTS:I:6	QUELD Furnace Experiment Dismo																				
890079	**Space Acceleration Measurement Syste**																				
MG:ENV:I:6	SAMS Data Collection for Docking																				
MG:ENV:I:7	SAMS Data Collection for Undocki																				
MG:FAC:I:29	SAMS Maintenance - TSH Bias Me				40																
890093	**Biochemistry of 3-D Tissue Engineering**																				
MG:BT:I:16	Cell Sample Transfer, Fixation and		180														180				
MG:BT:I:18	Science Experiment Termination																				
MG:BT:I:59	Media Sample and Testing	120							120							120					
MG:BT:I:60	Culture Microscopy and Photograph							120							120						
MG:BT:I:61	BEM/BSTC-M Engineering Evaluat																				
MG:BT:I:67	BEM/BSTC-M and BTR Continuou																				
MG:FAC:I:39	BEM/BSTC-M and BTR Facility M	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
890252	**Canadian Protein Crystallization Exper**																				
MG:BT:I:29	CAPE Experiment Initiation																				
MG:BT:I:33	CAPE Experiment Termination, Dis																				
MG:BT:I:34	CAPE/MIM Continuous Operations																				
MG:BT:I:62	CAPE/MIM Daily Status Checks																				
MG:BT:I:63	MIM Data Sampling Rate Change																				
MG:BT:I:64	CAPE Video Tape Changeout																				
MG:BT:I:65	MIM Data Archiving																				
MG:BT:I:66	CAPE Mounting to MIM and CAPE																				
890255	**Ambient Diffusion Controlled Protein C**																				
MG:BT:I:28	DCAM Photography Operations																				
890265	**Colloidal Gelation**																				
MG:FP:I:72	Unstow Equipment and Setup in M																				
MG:FP:I:73	Binary Colloidal Alloy Samples - 1A							215													
MG:FP:I:74	Binary Colloidal Alloy Samples - 1B									255						255					
MG:FP:I:75	GEL Properties for Colloid Polymer																				
MG:FP:I:76	Gel Properties for Colloid Polymer																				

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		6/24/97	6/25/97	6/26/97	6/27/97	6/28/97	6/29/97	6/30/97	7/1/97	7/2/97	7/3/97	7/4/97	7/5/97	7/6/97	7/7/97	7/8/97	7/9/97	7/10/97	7/11/97	7/12/97	7/13/97
Investigation	**Session FD**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
MG:FP:I:77	Three Phase Colloid Polymer Initiati																				
MG:FP:I:78	Three Phase Colloid Polymer Growt					145															
MG:FP:I:79	Three Phase Colloidal Growth Vide					10															
MG:FP:I:80	Long Term Colloid Polymers - IIF										220	220									
MG:FP:I:81	Fractal Aggregation Combination Sa																		100	100	
MG:FP:I:82	Fractal Aggregation Gelation Proces																				
MG:FP:I:83	Fractal Aggregation Gel Properties -																				
MG:FP:I:84	Fractal Aggregation Gelation Proces																				
MG:FP:I:85	Deactivate and Stow Equipment																				
890437 Mir Inventory																					
OPS:SHR:I:1	Mir Inventory Session															90	90	90	90	90	90
890096 Space Medicine Program - US Medical																					
SMP:MO:I:13	MO-11 Radiation Data Download E		85																		
SMP:MO:I:2	MO-1 Private Medical Conference		15							15							15				
SMP:MO:I:27	MO-6 Crew Status and Support Trac		30							30							30				
SMP:MO:I:28	MO-12 Radiation Monitoring																				
SMP:MO:I:29	MO-9 Physical Exam																				65
SMP:MO:I:31	MO:2 Install Updated BDL software																				
SMP:MO:I:32	MO-2 Barcode Data Logger Downlo																30				
SMP:MO:I:35	MO-10 Analysis of Urine Samples																				10
SMP:MO:I:36	MO-11 TEPC Display Call Down		10							10							10				
SMP:MO:I:37	MO-14 Environmental Health Anom																				
SMP:MO:I:38	MO-2 Barcode Data Logger Downli																25				
890607 Analysis of Mir Archival Water Sample																					
SMP:ENV:I:1	Humidity Condensate Set-up																				
SMP:ENV:I:16	Docked Phase Water Collection and																				
SMP:ENV:I:19	Pre-Adsorption Bed Change-out Wa																				
SMP:ENV:I:2	Humidity Condensate Dismantle																				
SMP:ENV:I:22	Post-Adsorption Bed Change-out W																				
890608 Crew Microbiological Assessment																					
SMP:MIC:I:1	Crew Microbial Sample Collection -															50					
SMP:MIC:I:2	Crew Microbial Sample Collection -															40					
890609 Mir Microbiological Assessment																					
SMP:ENV:I:15	Air & Surface Sample Collections o																				
SMP:ENV:I:7	MAS Recharge with UBC on Mir														25						
SMP:ENV:I:8	Surface and Air Sample Collection															75					
SMP:ENV:I:9	Colony Count and Photo of Samples																	70			70
890610 Toxicological Assessment of Airborne V																					

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		6/24/97	6/25/97	6/26/97	6/27/97	6/28/97	6/29/97	6/30/97	7/1/97	7/2/97	7/3/97	7/4/97	7/5/97	7/6/97	7/7/97	7/8/97	7/9/97	7/10/97	7/11/97	7/12/97	7/13/97
Investigation	**Session** **FD**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
SMP:ENV:I:12	Activate SSAS																				30
SMP:ENV:I:13	Grab Air Sampling																				25
SMP:ENV:I:14	Deactivate SSAS																				
890613	**Mir Defibrillator and Crew Medical Re**																				
SMP:CH:I:1	Mir Defibrillator Checkout															17					
SMP:CH:I:2	Mir CMRS Operational Checkout																				
Crewtime Daily Totals (in minutes)		225	380	50	190	220	127	480	237	360	380	270	95	142	255	952	485	267	250	280	549
Crewtime Daily Totals (in hours)		3.75	6.33	0.83	3.17	3.67	2.12	8.00	3.95	6.00	6.33	4.50	1.58	2.37	4.25	15.87	8.08	4.45	4.17	4.67	9.15
Daily Cum Totals (in hours)		206.68	213.02	213.85	217.02	220.68	222.80	230.80	234.75	240.75	247.08	251.58	253.17	255.53	259.78	275.65	283.73	288.18	292.35	297.02	306.17

In-flight Crewtime Scenario (by Flight Days) - Mir 24 NASA 5

Payload Category / Investigation	Session	FD	Thu 7/14/97 61	Fri 7/15/97 62	Sat 7/16/97 63	Sun 7/17/97 64	Mon 7/18/97 65	Tue 7/19/97 66	Wed 7/20/97 67	Thu 7/21/97 68	Fri 7/22/97 69	Sat 7/23/97 70	Sun 7/24/97 71	Mon 7/25/97 72	Tue 7/26/97 73	Wed 7/27/97 74	Thu 7/28/97 75	Fri 7/29/97 76	Sat 7/30/97 77	Sun 7/31/97 78	Mon 8/1/97 79	Tue 8/2/97 80
600006 Commercial Generic Bioprocessing Ap																						
ADV:OPS:I:1	Locker Preparation for CGBA-ICM-																					
ADV:OPS:I:2	Locker Preparation for CGBA-ICM-																					
700004 Regional & Temporal Variability of Pri																						
ES:OB:I:1	EO3 - Regional & Temporal Variabi																					
700005 Calibration & Validation of Priroda Mi																						
ES:HYD:I:1	EO7-Calibration & Validation of Pri																					
700006 Watershed Hydrologic Studies																						
ES:HYD:I:2	EO4 - Watershed Hydrologic Studie																					
700007 Validation of Biosphere-Atmosphere In																						
ES:LAI:I:1	EO2-Validation of Biosphere-Atmos																					
700008 Comparison of Atmospheric Chemistry																						
ES:AC:I:1	EO8 - Comparison of Atmospheric																					
700010 Validation of Priroda Rain Observation																						
ES:MT:I:1	EO6 - Validation of Priroda Rain Ob																					
700011 Test Site Monitoring																						
ES:EO:I:10	Global Test Site Monitoring							30	30													
ES:EO:I:12	NASA - Global Test Site Monitoring																					
810525 Visual Earth Observations																						
ES:EO:I:37	Earth Observations for Visual Earth					30				30				30				30				30
ES:EO:I:38	Data Transfer for Visual Observatio							15							15							15
890615 Visual Observations																						
ES:EO:I:40	Investigation of the Optical Quality											35										35
ES:EO:I:40	Investigation of the Optical Quality																					
110047 Effects of Gravity on Insect Circadian																						
FB:DEV:I:73	Preparation of Priroda Lockers																					
FB:DEV:I:75	Beetle Kit Stowage and Experiment																					
FB:DEV:I:76	Verify Beetle Kit Power Status								7							7	7					
FB:DEV:I:77	Beetle Kit Ventilation								15						15							
FB:DEV:I:78	Experiment Deactivation																					
890268 Developmental Analysis of Seeds Grow																						
FB:DEV:I:33	GEMS Assembly																					
FB:DEV:I:34	Seed Planting							43														
FB:DEV:I:35	Video Observations and Photograph			30							30				30				30			

Investigation	Payload Category / Session	FD	Thu 7/14/97	Fri 7/15/97	Sat 7/16/97	Sun 7/17/97	Mon 7/18/97	Tue 7/19/97	Wed 7/20/97	Thu 7/21/97	Fri 7/22/97	Sat 7/23/97	Sun 7/24/97	Mon 7/25/97	Tue 7/26/97	Wed 7/27/97	Thu 7/28/97	Fri 7/29/97	Sat 7/30/97	Sun 7/31/97	Mon 8/1/97	Tue 8/2/97
			61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
FB:DEV:I:36	Daily Operations & Data Downlink		20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
FB:DEV:I:37	Final Harvest of Plant Samples - Firs				180																	
FB:DEV:I:39	Svet and GEMS Functional Check,																					
FB:DEV:I:40	Svet Assembly and Program 1																					
FB:DEV:I:41	Svet Root Module and Soil Moistur					90																
FB:DEV:I:42	De-Install Root Module from Svet				80																	
FB:DEV:I:43	Final Harvest of Plant Samples - Thi																					
FB:DEV:I:80	GEMS hardware Collection and Prc																					
FB:DEV:I:81	Svet and GEMS Inventory Check																					
FB:DEV:I:82	Program 2					20	20	20														
FB:DEV:I:83	Program 3							10														
FB:DEV:I:84	Zeroing Differential Pressures									5												
FB:DEV:I:85	Leaf Bag Assembly Removal																				60	
FB:DEV:I:86	1st Fixation																				120	
FB:DEV:I:87	Pollination																					60
FB:DEV:I:88	Terminalization and Second Fixatio																					
FB:DEV:I:89	Hard Drive (Winchester) Replaceme																					
FB:DEV:I:90	Leaf Bag Assembly Installation, Exp					30																
FB:DEV:I:91	Seed Strip Preparation					90																
FB:DEV:I:92	Processing of Mir Core Svet Teleme																					
FB:DEV:I:93	Refill Water Container					30																
FB:DEV:I:94	Svet and GEMS disassembly																					
HLS																						
110019	**Sleep Investigations (639/663/710)**																					
HLS:MET:I:36	Night Headband - Presleep			38	38	38	38	38	38	38	38	38	38	38	38							
HLS:MET:I:40	MIPS Data Download								8							8						
HLS:MET:I:43	Blood Collection and Processing																					
HLS:MET:I:46	MSRR Recording																					
HLS:MET:I:48	Night Headband Postsleep				74	74	74	74	74	74	74	74	74	74	74	74						
HLS:MET:I:49	Doff MSRR Hardware and Stow Ass																					
HLS:MET:I:52	MIPS Data Download																					
HLS:MET:I:77	Night Headband - Presleep																			28	28	28
110028	**Frames of Reference for Sensori-motor**																					
HLS:NEU:I:23	COGNILAB Test A																55					
HLS:NEU:I:24	COGNILAB Test B																	65				
HLS:NEU:I:40	Locate COGNILAB Equipment															10						
110034	**Magnetic Resonance Imaging (MRI) Af**																					
HLS:MS:I:2	Back Pain Questionnaire - Mir Crew																					
HLS:MS:I:8	Back Pain Questionnaire - NASA Cr																					
110037	**Crewmember and Crew-Ground Intera**																					

Payload Category / Investigation	Session	FD	Thu 7/14/97 61	Fri 7/15/97 62	Sat 7/16/97 63	Sun 7/17/97 64	Mon 7/18/97 65	Tue 7/19/97 66	Wed 7/20/97 67	Thu 7/21/97 68	Fri 7/22/97 69	Sat 7/23/97 70	Sun 7/24/97 71	Mon 7/25/97 72	Tue 7/26/97 73	Wed 7/27/97 74	Thu 7/28/97 75	Fri 7/29/97 76	Sat 7/30/97 77	Sun 7/31/97 78	Mon 8/1/97 79	Tue 8/2/97 80
HLS:BP:I:10	Mir Crew: Completion of Computer		50							50							50					
HLS:BP:I:11	NASA Crew: Completion of Comp								25							25						
890091	**GASMAP Facility Operations**																					
HLS:FAC:I:1	GASMAP Check-Out															25						
HLS:FAC:I:3	GASMAP Rough-Out																					
HLS:FAC:I:4	GASMAP Full Functional Check an																					
650006	**Enhanced Dynamic Load Sensors (EDL**																					
ISS:DYN:I:2	Enhanced Dynamics Load Sensor (E											45				45				45		
ISS:DYN:I:2	Enhanced Dynamics Load Sensor (E			45			45			45			45			45			45			45
ISS:DYN:I:26	Enhanced Dynamics Load Sensor U																					85
ISS:DYN:I:36	Enhanced Dynamics Load Sensor (E															85				85		
650007	**Optical Properties Monitor (OPM)**																					
ISS:ENV:I:19	OPM Data Collection			30							30							30				
650008	**Water Microbiological Monitoring (W**																					
ISS:CHS:I:13	Microbial Capture Device Processin																					
ISS:CHS:I:15	Microbial Capture Device Colony C											77			77							77
650009	**Mir Electric Field Characterization (M**																					
ISS:ENV:I:46	MEFC Experiment Set-up and Data											80										
650013	**Mir Structural Dynamics Experiment (**																					
ISS:DYN:I:11	MiSDE 4a - Mir Thruster Firing Dat																					
ISS:DYN:I:12	MiSDE E5 - Shuttle Thruster Firing																					
ISS:DYN:I:13	MiSDE 2a - Ambient Noise Data Co																					
ISS:DYN:I:14	MiSDE 2c - Ambient Noise Data Co																					
ISS:DYN:I:15	MiSDE 2d - Ambient Noise Data Co																					
ISS:DYN:I:16	MiSDE 3a - IVA Data Collection (S																					
ISS:DYN:I:37	MiSDE Equipment Visual Inspectio															40						
ISS:DYN:I:38	MiSDE Docking - Shuttle Docking																					
ISS:DYN:I:5	MiSDE 2b - Ambient Noise Data Co																					
ISS:DYN:I:6	MiSDE 2e - Ambient Noise Data Co																					
ISS:DYN:I:7	MiSDE 2f - Ambient Noise Data Col																					
ISS:DYN:I:8	MiSDE 3b - IVA Data Collection (																170					
ISS:DYN:I:9	MiSDE 4b - Mir Thruster Firing Dat																					
650015	**Water Quality Monitor (WQM)**																					
LSR:CHS:I:13	Reagent Mixing for TOC Analyzer																					
LSR:CHS:I:21	Mir Potable Water Collection and In																					
LSR:CHS:I:23	Mir Potable Water Collection and In																150					
LSR:CHS:I:8	Inflight TOC Analysis of Ground-Pr											65										

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		7/14/97	7/15/97	7/16/97	7/17/97	7/18/97	7/19/97	7/20/97	7/21/97	7/22/97	7/23/97	7/24/97	7/25/97	7/26/97	7/27/97	7/28/97	7/29/97	7/30/97	7/31/97	8/1/97	8/2/97
Investigation	**Session** **FD**	**61**	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**	**71**	**72**	**73**	**74**	**75**	**76**	**77**	**78**	**79**	**80**
750029	**Microgravity Isolation Mount (MIM) F**																				
MG:FAC:I:36	MIM Health and Status Check									20											
750030	**Microgravity Glovebox (MGBX) Facilit**																				
MG:FAC:I:9	MGBX Facility Checkout and Condi																				
750031	**Biotechnology System (BTS) Facility O**																				
MG:FAC:I:38	BTS Facility Functional Tests-EEC1																				
890043	**QUELD Furnace Experiment - MIM**																				
MG:MTS:I:2	QUELD Experiment Mounting			40																	
MG:MTS:I:37	QUELD Furnace Activation																				
MG:MTS:I:38	QUELD Furnace Experiment Operat						70	70	70	70	70			70							
MG:MTS:I:6	QUELD Furnace Experiment Dismo														20						
890079	**Space Acceleration Measurement Syste**																				
MG:ENV:I:6	SAMS Data Collection for Docking																				
MG:ENV:I:7	SAMS Data Collection for Undocki																				
MG:FAC:I:29	SAMS Maintenance - TSH Bias Me														40						
890093	**Biochemistry of 3-D Tissue Engineering**																				
MG:BT:I:16	Cell Sample Transfer, Fixation and			180							180							180			
MG:BT:I:18	Science Experiment Termination																				
MG:BT:I:59	Media Sample and Testing		120							120							120				
MG:BT:I:60	Culture Microscopy and Photograph	120							120							120					
MG:BT:I:61	BEM/BSTC-M Engineering Evaluat																				
MG:BT:I:67	BEM/BSTC-M and BTR Continuou																				
MG:FAC:I:39	BEM/BSTC-M and BTR Facility M	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
890252	**Canadian Protein Crystallization Exper**																				
MG:BT:I:29	CAPE Experiment Initiation																				
MG:BT:I:33	CAPE Experiment Termination, Dis																				
MG:BT:I:34	CAPE/MIM Continuous Operations																				
MG:BT:I:62	CAPE/MIM Daily Status Checks																				
MG:BT:I:63	MIM Data Sampling Rate Change																				
MG:BT:I:64	CAPE Video Tape Changeout																				
MG:BT:I:65	MIM Data Archiving																				
MG:BT:I:66	CAPE Mounting to MIM and CAPE																				
890255	**Ambient Diffusion Controlled Protein C**																				
MG:BT:I:28	DCAM Photography Operations	245																			
890265	**Colloidal Gelation**																				
MG:FP:I:72	Unstow Equipment and Setup in M																				
MG:FP:I:73	Binary Colloidal Alloy Samples - IA																				
MG:FP:I:74	Binary Colloidal Alloy Samples - IB																			255	
MG:FP:I:75	GEL Properties for Colloid Polymer																				
MG:FP:I:76	Gel Properties for Colloid Polymer																				

Investigation	Payload Category / Session	Thu 7/14/97 FD 61	Fri 7/15/97 62	Sat 7/16/97 63	Sun 7/17/97 64	Mon 7/18/97 65	Tue 7/19/97 66	Wed 7/20/97 67	Thu 7/21/97 68	Fri 7/22/97 69	Sat 7/23/97 70	Sun 7/24/97 71	Mon 7/25/97 72	Tue 7/26/97 73	Wed 7/27/97 74	Thu 7/28/97 75	Fri 7/29/97 76	Sat 7/30/97 77	Sun 7/31/97 78	Mon 8/1/97 79	Tue 8/2/97 80
MG:FP:I:77	Three Phase Colloid Polymer Initiati																				
MG:FP:I:78	Three Phase Colloid Polymer Growt																				
MG:FP:I:79	Three Phase Colloidal Growth Vide																				
MG:FP:I:80	Long Term Colloid Polymers - IIF																				
MG:FP:I:81	Fractal Aggregation Combination Sa	100	100		100	100			100												
MG:FP:I:82	Fractal Aggregation Gelation Proces											65							65		
MG:FP:I:83	Fractal Aggregation Gel Properties -																				200
MG:FP:I:84	Fractal Aggregation Gelation Proces																		75		
MG:FP:I:85	Deactivate and Stow Equipment																				
890437	**Mir Inventory**																				
OPS:SHR:I:1	Mir Inventory Session																				
890096	**Space Medicine Program - US Medical**																				
SMP:MO:I:13	MO-11 Radiation Data Download E										85										
SMP:MO:I:2	MO-1 Private Medical Conference			15							15							15			
SMP:MO:I:27	MO-6 Crew Status and Support Trac			30							30							30			
SMP:MO:I:28	MO-12 Radiation Monitoring																				
SMP:MO:I:29	MO-9 Physical Exam																				
SMP:MO:I:31	MO:2 Install Updated BDL software																				
SMP:MO:I:32	MO-2 Barcode Data Logger Downlo																				
SMP:MO:I:35	MO-10 Analysis of Urine Samples																				
SMP:MO:I:36	MO-11 TEPC Display Call Down			10							10							10			
SMP:MO:I:37	MO-14 Environmental Health Anom																				30
SMP:MO:I:38	MO-2 Barcode Data Logger Downli																				
890607	**Analysis of Mir Archival Water Sample**																				
SMP:ENV:I:1	Humidity Condensate Set-up																				
SMP:ENV:I:16	Docked Phase Water Collection and																				
SMP:ENV:I:19	Pre-Adsorption Be[illegible]ange-out Wa																				225
SMP:ENV:I:2	Humidity Condensate Dismantle																				
SMP:ENV:I:22	Post-Adsorption Bed Change-out W																				
890608	**Crew Microbiological Assessment**																				
SMP:MIC:I:1	Crew Microbial Sample Collection -																				
SMP:MIC:I:2	Crew Microbial Sample Collection -																				40
890609	**Mir Microbiological Assessment**																				
SMP:ENV:I:15	Air & Surface Sample Collections o																				
SMP:ENV:I:7	MAS Recharge with UBC on Mir																			25	
SMP:ENV:I:8	Surface and Air Sample Collection																				75
SMP:ENV:I:9	Colony Count and Photo of Samples																				
890610	**Toxicological Assessment of Airborne V**																				

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		7/14/97	7/15/97	7/16/97	7/17/97	7/18/97	7/19/97	7/20/97	7/21/97	7/22/97	7/23/97	7/24/97	7/25/97	7/26/97	7/27/97	7/28/97	7/29/97	7/30/97	7/31/97	8/1/97	8/2/97
Investigation	**Session** **FD**	**61**	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**	**71**	**72**	**73**	**74**	**75**	**76**	**77**	**78**	**79**	**80**
SMP:ENV:I:12	Activate SSAS																				
SMP:ENV:I:13	Grab Air Sampling																				
SMP:ENV:I:14	Deactivate SSAS	10																			
890613	**Mir Defibrillator and Crew Medical Re**																				
SMP:CH:I:1	Mir Defibrillator Checkout																				
SMP:CH:I:2	Mir CMRS Operational Checkout																				
Crewtime Daily Totals (in minutes)		555	393	677	532	307	330	297	562	412	834	252	172	349	454	582	275	340	328	518	975
Crewtime Daily Totals (in hours)		9.25	6.55	11.28	8.87	5.12	5.50	4.95	9.37	6.87	13.90	4.20	2.87	5.82	7.57	9.70	4.58	5.67	5.47	8.63	16.25
Daily Cum Totals (in hours)		315.42	321.97	333.25	342.12	347.23	352.73	357.68	367.05	373.92	387.82	392.02	394.88	400.70	408.27	417.97	422.55	428.22	433.68	442.32	458.57

In-flight Crewtime Scenario (by Flight Days) - Mir 24 NASA 5

PIPS

Payload Category / Investigation	Session	FD	Thu 8/3/97 81	Fri 8/4/97 82	Sat 8/5/97 83	Sun 8/6/97 84	Mon 8/7/97 85	Tue 8/8/97 86	Wed 8/9/97 87	Thu 8/10/97 88	Fri 8/11/97 89	Sat 8/12/97 90	Sun 8/13/97 91	Mon 8/14/97 92	Tue 8/15/97 93	Wed 8/16/97 94	Thu 8/17/97 95	Fri 8/18/97 96	Sat 8/19/97 97	Sun 8/20/97 98	Mon 8/21/97 99	Tue 8/22/97 100
600006 Commercial Generic Bioprocessing Ap																						
ADV:OPS:I:1	Locker Preparation for CGBA-ICM-																					
ADV:OPS:I:2	Locker Preparation for CGBA-ICM-																					
700004 Regional & Temporal Variability of Pri																						
ES:OB:I:1	EO3 - Regional & Temporal Variabi																					
700005 Calibration & Validation of Priroda Mi																						
ES:HYD:I:1	EO7-Calibration & Validation of Pri																					
700006 Watershed Hydrologic Studies																						
ES:HYD:I:2	EO4 - Watershed Hydrologic Studie																					
700007 Validation of Biosphere-Atmosphere In																						
ES:LAI:I:1	EO2-Validation of Biosphere-Atmos																					
700008 Comparison of Atmospheric Chemistry																						
ES:AC:I:1	EO8 - Comparison of Atmospheric																					
700010 Validation of Priroda Rain Observation																						
ES:MT:I:1	EO6 - Validation of Priroda Rain Ob																					
700011 Test Site Monitoring																						
ES:EO:I:10	Global Test Site Monitoring											30	30									
ES:EO:I:12	NASA - Global Test Site Monitoring																					
810525 Visual Earth Observations																						
ES:EO:I:37	Earth Observations for Visual Earth				30				30					30				30				30
ES:EO:I:38	Data Transfer for Visual Observatio								15							15						
890615 Visual Observations																						
ES:EO:I:40	Investigation of the Optical Quality											35										
ES:EO:I:40	Investigation of the Optical Quality											35										35
110047 Effects of Gravity on Insect Circadian																						
FB:DEV:I:73	Preparation of Priroda Lockers																					
FB:DEV:I:75	Beetle Kit Stowage and Experiment																					
FB:DEV:I:76	Verify Beetle Kit Power Status		7							7							7					
FB:DEV:I:77	Beetle Kit Ventilation		15							15							15					15
FB:DEV:I:78	Experiment Deactivation																					
890268 Developmental Analysis of Seeds Grow																						
FB:DEV:I:33	GEMS Assembly																					
FB:DEV:I:34	Seed Planting																					
FB:DEV:I:35	Video Observations and Photograph		30				30				30				30				30			

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		8/3/97	8/4/97	8/5/97	8/6/97	8/7/97	8/8/97	8/9/97	8/10/97	8/11/97	8/12/97	8/13/97	8/14/97	8/15/97	8/16/97	8/17/97	8/18/97	8/19/97	8/20/97	8/21/97	8/22/97
Investigation	**Session FD**	**81**	**82**	**83**	**84**	**85**	**86**	**87**	**88**	**89**	**90**	**91**	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**	**100**
FB:DEV:I:36	Daily Operations & Data Downlink	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
FB:DEV:I:37	Final Harvest of Plant Samples - Firs																				
FB:DEV:I:39	Svet and GEMS Functional Check,																				
FB:DEV:I:40	Svet Assembly and Program 1																				
FB:DEV:I:41	Svet Root Module and Soil Moistur																				
FB:DEV:I:42	De-Install Root Module from Svet																				
FB:DEV:I:43	Final Harvest of Plant Samples - Thi																				
FB:DEV:I:80	GEMS hardware Collection and Pre																				
FB:DEV:I:81	Svet and GEMS Inventory Check																				
FB:DEV:I:82	Program 2																				
FB:DEV:I:83	Program 3																				
FB:DEV:I:84	Zeroing Differential Pressures																				
FB:DEV:I:85	Leaf Bag Assembly Removal																				
FB:DEV:I:86	1st Fixation																				
FB:DEV:I:87	Pollination	60	60	60	60	60	60														
FB:DEV:I:88	Terminalization and Second Fixatio				120																
FB:DEV:I:89	Hard Drive (Winchester) Replaceme																				
FB:DEV:I:90	Leaf Bag Assembly Installation, Exp																				
FB:DEV:I:91	Seed Strip Preparation																				
FB:DEV:I:92	Processing of Mir Core Svet Teleme																				
FB:DEV:I:93	Refill Water Container																				
FB:DEV:I:94	Svet and GEMS disassembly																				
HLS																					
110019	**Sleep Investigations (639/663/710)**																				
HLS:MET:I:36	Night Headband - Presleep																				
HLS:MET:I:40	MIPS Data Download																				
HLS:MET:I:43	Blood Collection and Processing																				
HLS:MET:I:46	MSRR Recording																				
HLS:MET:I:48	Night Headband Postsleep																				
HLS:MET:I:49	Doff MSRR Hardware and Stow Ass																				
HLS:MET:I:52	MIPS Data Download			4							4										
HLS:MET:I:77	Night Headband - Presleep	28	28	28	28	28	28	28	28	28											
110028	**Frames of Reference for Sensori-motor**																				
HLS:NEU:I:23	COGNILAB Test A																				
HLS:NEU:I:24	COGNILAB Test B																				
HLS:NEU:I:40	Locate COGNILAB Equipment																				
110034	**Magnetic Resonance Imaging (MRI) Af**																				
HLS:MS:I:2	Back Pain Questionnaire - Mir Crew																				
HLS:MS:I:8	Back Pain Questionnaire - NASA Cr																				
110037	**Crewmember and Crew-Ground Intera**																				

Investigation	Payload Category / Session	Thu 8/3/97 FD 81	Fri 8/4/97 82	Sat 8/5/97 83	Sun 8/6/97 84	Mon 8/7/97 85	Tue 8/8/97 86	Wed 8/9/97 87	Thu 8/10/97 88	Fri 8/11/97 89	Sat 8/12/97 90	Sun 8/13/97 91	Mon 8/14/97 92	Tue 8/15/97 93	Wed 8/16/97 94	Thu 8/17/97 95	Fri 8/18/97 96	Sat 8/19/97 97	Sun 8/20/97 98	Mon 8/21/97 99	Tue 8/22/97 100
HLS:BP:I:10	Mir Crew: Completion of Computer		50							50							50				
HLS:BP:I:11	NASA Crew: Completion of Comp	25							25							25					
890091	**GASMAP Facility Operations**																				
HLS:FAC:I:1	GASMAP Check-Out																				
HLS:FAC:I:3	GASMAP Rough-Out																				
HLS:FAC:I:4	GASMAP Full Functional Check an															35					
	HLS																				
650006	**Enhanced Dynamic Load Sensors (EDL**																				
ISS:DYN:I:2	Enhanced Dynamics Load Sensor (E		45				45				45				45				45		
ISS:DYN:I:2	Enhanced Dynamics Load Sensor (E			45			45			45			45			45			45		
ISS:DYN:I:26	Enhanced Dynamics Load Sensor U			85			85														
ISS:DYN:I:36	Enhanced Dynamics Load Sensor (E		85				85														
650007	**Optical Properties Monitor (OPM)**																				
ISS:ENV:I:19	OPM Data Collection			30							30							30			
650008	**Water Microbiological Monitoring (W**																				
ISS:CHS:I:13	Microbial Capture Device Processin																				
ISS:CHS:I:15	Microbial Capture Device Colony C			77																	
650009	**Mir Electric Field Characterization (M**																				
ISS:ENV:I:46	MEFC Experiment Set-up and Data					80															80
650013	**Mir Structural Dynamics Experiment (**																				
ISS:DYN:I:11	MiSDE 4a - Mir Thruster Firing Dat																				
ISS:DYN:I:12	MiSDE E5 - Shuttle Thruster Firing																				
ISS:DYN:I:13	MiSDE 2a - Ambient Noise Data Co																				
ISS:DYN:I:14	MiSDE 2c - Ambient Noise Data Co																				
ISS:DYN:I:15	MiSDE 2d - Ambient Noise Data Co																				
ISS:DYN:I:16	MiSDE 3a - IVA Data Collection (S																				
ISS:DYN:I:37	MiSDE Equipment Visual Inspectio				40										40						
ISS:DYN:I:38	MiSDE Docking - Shuttle Docking																				
ISS:DYN:I:5	MiSDE 2b - Ambient Noise Data Co																				
ISS:DYN:I:6	MiSDE 2e - Ambient Noise Data Co																				
ISS:DYN:I:7	MiSDE 2f - Ambient Noise Data Col																				
ISS:DYN:I:8	MiSDE 3b - IVA Data Collection (					170										170					
ISS:DYN:I:9	MiSDE 4b - Mir Thruster Firing Dat															90					
	ISS																				
650015	**Water Quality Monitor (WQM)**																				
LSR:CHS:I:13	Reagent Mixing for TOC Analyzer																				
LSR:CHS:I:21	Mir Potable Water Collection and In																				
LSR:CHS:I:23	Mir Potable Water Collection and In																				
LSR:CHS:I:8	Inflight TOC Analysis of Ground-Pr																				
	MG																				

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		8/3/97	8/4/97	8/5/97	8/6/97	8/7/97	8/8/97	8/9/97	8/10/97	8/11/97	8/12/97	8/13/97	8/14/97	8/15/97	8/16/97	8/17/97	8/18/97	8/19/97	8/20/97	8/21/97	8/22/97
Investigation	**Session FD**	**81**	**82**	**83**	**84**	**85**	**86**	**87**	**88**	**89**	**90**	**91**	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**	**100**
750029	**Microgravity Isolation Mount (MIM) F**																				
MG:FAC:I:36	MIM Health and Status Check																			20	
750030	**Microgravity Glovebox (MGBX) Facilit**																				
MG:FAC:I:9	MGBX Facility Checkout and Condi																				
750031	**Biotechnology System (BTS) Facility O**																				
MG:FAC:I:38	BTS Facility Functional Tests-EEC1																				
890043	**QUELD Furnace Experiment - MIM**																				
MG:MTS:I:2	QUELD Experiment Mounting																				
MG:MTS:I:37	QUELD Furnace Activation																				
MG:MTS:I:38	QUELD Furnace Experiment Operat																				
MG:MTS:I:6	QUELD Furnace Experiment Dismo																				
890079	**Space Acceleration Measurement Syste**																				
MG:ENV:I:6	SAMS Data Collection for Docking																				
MG:ENV:I:7	SAMS Data Collection for Undocki																				
MG:FAC:I:29	SAMS Maintenance - TSH Bias Me																				
890093	**Biochemistry of 3-D Tissue Engineering**																				
MG:BT:I:16	Cell Sample Transfer, Fixation and				180																
MG:BT:I:18	Science Experiment Termination																				
MG:BT:I:59	Media Sample and Testing			120							120							120			
MG:BT:I:60	Culture Microscopy and Photograph		120							120							120				
MG:BT:I:61	BEM/BSTC-M Engineering Evaluat																				
MG:BT:I:67	BEM/BSTC-M and BTR Continuou																				
MG:FAC:I:39	BEM/BSTC-M and BTR Facility M	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
890252	**Canadian Protein Crystallization Exper**																				
MG:BT:I:29	CAPE Experiment Initiation																				
MG:BT:I:33	CAPE Experiment Termination, Dis																				
MG:BT:I:34	CAPE/MIM Continuous Operations																				
MG:BT:I:62	CAPE/MIM Daily Status Checks																				
MG:BT:I:63	MIM Data Sampling Rate Change																				
MG:BT:I:64	CAPE Video Tape Changeout																				
MG:BT:I:65	MIM Data Archiving																				
MG:BT:I:66	CAPE Mounting to MIM and CAPE																				
890255	**Ambient Diffusion Controlled Protein C**																				
MG:BT:I:28	DCAM Photography Operations											245									
890265	**Colloidal Gelation**																				
MG:FP:I:72	Unstow Equipment and Setup in M																				
MG:FP:I:73	Binary Colloidal Alloy Samples - 1A																				
MG:FP:I:74	Binary Colloidal Alloy Samples - 1B																				
MG:FP:I:75	GEL Properties for Colloid Polymer																				
MG:FP:I:76	Gel Properties for Colloid Polymer																				

Payload Category		Thu 8/3/97	Fri 8/4/97	Sat 8/5/97	Sun 8/6/97	Mon 8/7/97	Tue 8/8/97	Wed 8/9/97	Thu 8/10/97	Fri 8/11/97	Sat 8/12/97	Sun 8/13/97	Mon 8/14/97	Tue 8/15/97	Wed 8/16/97	Thu 8/17/97	Fri 8/18/97	Sat 8/19/97	Sun 8/20/97	Mon 8/21/97	Tue 8/22/97
Investigation	**Session FD**	**81**	**82**	**83**	**84**	**85**	**86**	**87**	**88**	**89**	**90**	**91**	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**	**100**
MG:FP:I:77	Three Phase Colloid Polymer Initiati																				
MG:FP:I:78	Three Phase Colloid Polymer Growt																				
MG:FP:I:79	Three Phase Colloidal Growth Vide																				
MG:FP:I:80	Long Term Colloid Polymers - IIF																				
MG:FP:I:81	Fractal Aggregation Combination Sa																				
MG:FP:I:82	Fractal Aggregation Gelation Proces																				
MG:FP:I:83	Fractal Aggregation Gel Properties -	200																			
MG:FP:I:84	Fractal Aggregation Gelation Proces																				
MG:FP:I:85	Deactivate and Stow Equipment																				
890437	**Mir Inventory**																				
OPS:SHR:I:1	Mir Inventory Session																				
890096	**Space Medicine Program - US Medical**																				
SMP:MO:I:13	MO-11 Radiation Data Download E																		85		
SMP:MO:I:2	MO-1 Private Medical Conference				15							15							15		
SMP:MO:I:27	MO-6 Crew Status and Support Trac				30							30							30		
SMP:MO:I:28	MO-12 Radiation Monitoring																				
SMP:MO:I:29	MO-9 Physical Exam										65										
SMP:MO:I:31	MO:2 Install Updated BDL software																				
SMP:MO:I:32	MO-2 Barcode Data Logger Downlo				30																
SMP:MO:I:35	MO-10 Analysis of Urine Samples										10										
SMP:MO:I:36	MO-11 TEPC Display Call Down				10							10							10		
SMP:MO:I:37	MO-14 Environmental Health Anom																				
SMP:MO:I:38	MO-2 Barcode Data Logger Downli				25																
890607	**Analysis of Mir Archival Water Sample**																				
SMP:ENV:I:1	Humidity Condensate Set-up																				
SMP:ENV:I:16	Docked Phase Water Collection and																				
SMP:ENV:I:19	Pre-Adsorption Bed Change-out Wa																				
SMP:ENV:I:2	Humidity C[illegible]ntle																				
SMP:ENV:I:22	Post-Adsorpti[illegible]ge-out W										225										
890608	**Crew Microbiological Assessment**																				
SMP:MIC:I:1	Crew Microbial Sample Collection -															50					
SMP:MIC:I:2	Crew Microbial Sample Collection -																				
890609	**Mir Microbiological Assessment**																				
SMP:ENV:I:15	Air & Surface Sample Collections o																				
SMP:ENV:I:7	MAS Recharge with UBC on Mir																				
SMP:ENV:I:8	Surface and Air Sample Collection																				
SMP:ENV:I:9	Colony Count and Photo of Samples		70			70															
890610	**Toxicological Assessment of Airborne V**																				

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		8/3/97	8/4/97	8/5/97	8/6/97	8/7/97	8/8/97	8/9/97	8/10/97	8/11/97	8/12/97	8/13/97	8/14/97	8/15/97	8/16/97	8/17/97	8/18/97	8/19/97	8/20/97	8/21/97	8/22/97
Investigation	**Session** **FD**	**81**	**82**	**83**	**84**	**85**	**86**	**87**	**88**	**89**	**90**	**91**	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**	**100**
SMP:ENV:I:12	Activate SSAS										30										
SMP:ENV:I:13	Grab Air Sampling										25										
SMP:ENV:I:14	Deactivate SSAS											10									
890613	**Mir Defibrillator and Crew Medical Re**																				
SMP:CH:I:1	Mir Defibrillator Checkout																				17
SMP:CH:I:2	Mir CMRS Operational Checkout																				
Crewtime Daily Totals (in minutes)		395	488	479	598	468	378	73	135	303	684	370	105	60	130	467	230	210	260	50	207
Crewtime Daily Totals (in hours)		6.58	8.13	7.98	9.97	7.80	6.30	1.22	2.25	5.05	11.40	6.17	1.75	1.00	2.17	7.78	3.83	3.50	4.33	0.83	3.45
Daily Cum Totals (in hours)		465.15	473.28	481.27	491.23	499.03	505.33	506.55	508.80	513.85	525.25	531.42	533.17	534.17	536.33	544.12	547.95	551.45	555.78	556.62	560.07

In-flight Crewtime Scenario (by Flight Days) - Mir 24 NASA 5

IPTPS

Payload Category / Investigation	Session	FD	Thu 8/23/97 101	Fri 8/24/97 102	Sat 8/25/97 103	Sun 8/26/97 104	Mon 8/27/97 105	Tue 8/28/97 106	Wed 8/29/97 107	Thu 8/30/97 108	Fri 8/31/97 109	Sat 9/1/97 110	Sun 9/2/97 111	Mon 9/3/97 112	Tue 9/4/97 113	Wed 9/5/97 114	Thu 9/6/97 115	Fri 9/7/97 116	Sat 9/8/97 117	Sun 9/9/97 118	Mon 9/10/97 119	Tue 9/11/97 120
ADV																						
600006 Commercial Generic Bioprocessing Ap																						
ADV:OPS:I:1	Locker Preparation for CGBA-ICM-																					46
ADV:OPS:I:2	Locker Preparation for CGBA-ICM-																					46
ES																						
700004 Regional & Temporal Variability of Pri																						
ES:OB:I:1	EO3 - Regional & Temporal Variabi																					
700005 Calibration & Validation of Priroda Mi																						
ES:HYD:I:1	EO7-Calibration & Validation of Pri																					
700006 Watershed Hydrologic Studies																						
ES:HYD:I:2	EO4 - Watershed Hydrologic Studie																					
700007 Validation of Biosphere-Atmosphere In																						
ES:LAI:I:1	EO2-Validation of Biosphere-Atmos																					
700008 Comparison of Atmospheric Chemistry																						
ES:AC:I:1	EO8 - Comparison of Atmospheric																					
700010 Validation of Priroda Rain Observation																						
ES:MT:I:1	EO6 - Validation of Priroda Rain Ob																					
700011 Test Site Monitoring																						
ES:EO:I:10	Global Test Site Monitoring																					
ES:EO:I:12	NASA - Global Test Site Monitoring																					
810525 Visual Earth Observations																						
ES:EO:I:37	Earth Observations for Visual Earth					30				30				30				30				30
ES:EO:I:38	Data Transfer for Visual Observatio		15							15							15					
890615 Visual Observations																						
ES:EO:I:40	Investigation of the Optical Quality																					
ES:EO:I:40	Investigation of the Optical Quality											35										35
FB																						
110047 Effects of Gravity on Insect Circadian																						
FB:DEV:I:73	Preparation of Priroda Lockers																					
FB:DEV:I:75	Beetle Kit Stowage and Experiment																					
FB:DEV:I:76	Verify Beetle Kit Power Status			7							7							7				
FB:DEV:I:77	Beetle Kit Ventilation										15							15				
FB:DEV:I:78	Experiment Deactivation																					
890268 Developmental Analysis of Seeds Grow																						
FB:DEV:I:33	GEMS Assembly																					
FB:DEV:I:34	Seed Planting																		43			
FB:DEV:I:35	Video Observations and Photograph		30				30				30				30							30

Investigation	Payload Category / Session	FD	Thu 8/23/97	Fri 8/24/97	Sat 8/25/97	Sun 8/26/97	Mon 8/27/97	Tue 8/28/97	Wed 8/29/97	Thu 8/30/97	Fri 8/31/97	Sat 9/1/97	Sun 9/2/97	Mon 9/3/97	Tue 9/4/97	Wed 9/5/97	Thu 9/6/97	Fri 9/7/97	Sat 9/8/97	Sun 9/9/97	Mon 9/10/97	Tue 9/11/97
			101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
FB:DEV:I:36	Daily Operations & Data Downlink		20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
FB:DEV:I:37	Final Harvest of Plant Samples - Firs															180						
FB:DEV:I:39	Svet and GEMS Functional Check,																					
FB:DEV:I:40	Svet Assembly and Program 1																					
FB:DEV:I:41	Svet Root Module and Soil Moistur															90						
FB:DEV:I:42	De-Install Root Module from Svet															80						
FB:DEV:I:43	Final Harvest of Plant Samples - Thi																					
FB:DEV:I:80	GEMS hardware Collection and Pre																					
FB:DEV:I:81	Svet and GEMS Inventory Check																					
FB:DEV:I:82	Program 2																20	20	20			
FB:DEV:I:83	Program 3																		10			
FB:DEV:I:84	Zeroing Differential Pressures																					5
FB:DEV:I:85	Leaf Bag Assembly Removal																					
FB:DEV:I:86	1st Fixation																					
FB:DEV:I:87	Pollination																					
FB:DEV:I:88	Terminalization and Second Fixatio																					
FB:DEV:I:89	Hard Drive (Winchester) Replaceme													10								
FB:DEV:I:90	Leaf Bag Assembly Installation, Exp															30						
FB:DEV:I:91	Seed Strip Preparation																	90				
FB:DEV:I:92	Processing of Mir Core Svet Teleme																					
FB:DEV:I:93	Refill Water Container															30						
FB:DEV:I:94	Svet and GEMS disassembly																					
	HLS																					
110019	**Sleep Investigations (639/663/710)**																					
HLS:MET:I:36	Night Headband - Presleep																			38	38	38
HLS:MET:I:40	MIPS Data Download																					
HLS:MET:I:43	Blood Collection and Processing																					
HLS:MET:I:46	MSRR Recording																					
HLS:MET:I:48	Night Headband Postsleep																				74	74
HLS:MET:I:49	Doff MSRR Hardware and Stow Ass																					
HLS:MET:I:52	MIPS Data Download																					
HLS:MET:I:77	Night Headband - Presleep																				28	28
110028	**Frames of Reference for Sensori-motor**																					
HLS:NEU:I:23	COGNILAB Test A																					55
HLS:NEU:I:24	COGNILAB Test B																					
HLS:NEU:I:40	Locate COGNILAB Equipment																				10	
110034	**Magnetic Resonance Imaging (MRI) Af**																					
HLS:MS:I:2	Back Pain Questionnaire - Mir Crew																					
HLS:MS:I:8	Back Pain Questionnaire - NASA Cr																					
110037	**Crewmember and Crew-Ground Intera**																					

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		8/23/97	8/24/97	8/25/97	8/26/97	8/27/97	8/28/97	8/29/97	8/30/97	8/31/97	9/1/97	9/2/97	9/3/97	9/4/97	9/5/97	9/6/97	9/7/97	9/8/97	9/9/97	9/10/97	9/11/97
Investigation	**Session FD**	**101**	**102**	**103**	**104**	**105**	**106**	**107**	**108**	**109**	**110**	**111**	**112**	**113**	**114**	**115**	**116**	**117**	**118**	**119**	**120**
HLS:BP:I:10	Mir Crew: Completion of Computer			50							50							50			
HLS:BP:I:11	NASA Crew: Completion of Comp		25							25							25				
890091	**GASMAP Facility Operations**																				
HLS:FAC:I:1	GASMAP Check-Out				25																
HLS:FAC:I:3	GASMAP Rough-Out																				
HLS:FAC:I:4	GASMAP Full Functional Check an																				
650006	**Enhanced Dynamic Load Sensors (EDL**																				
ISS:DYN:I:2	Enhanced Dynamics Load Sensor (E		45				45				45				45				45		
ISS:DYN:I:2	Enhanced Dynamics Load Sensor (E	45			45			45			45			45			45			45	
ISS:DYN:I:26	Enhanced Dynamics Load Sensor U																				
ISS:DYN:I:36	Enhanced Dynamics Load Sensor (E																				
650007	**Optical Properties Monitor (OPM)**																				
ISS:ENV:I:19	OPM Data Collection				30							30							30		
650008	**Water Microbiological Monitoring (W**																				
ISS:CHS:I:13	Microbial Capture Device Processin																				
ISS:CHS:I:15	Microbial Capture Device Colony C																				
650009	**Mir Electric Field Characterization (M**																				
ISS:ENV:I:46	MEFC Experiment Set-up and Data															80					
650013	**Mir Structural Dynamics Experiment (**																				
ISS:DYN:I:11	MiSDE 4a - Mir Thruster Firing Dat																				
ISS:DYN:I:12	MiSDE E5 - Shuttle Thruster Firing																				
ISS:DYN:I:13	MiSDE 2a - Ambient Noise Data Co																				
ISS:DYN:I:14	MiSDE 2c - Ambient Noise Data Co																				
ISS:DYN:I:15	MiSDE 2d - Ambient Noise Data Co																				
ISS:DYN:I:16	MiSDE 3a - IVA Data Collection (S																				
ISS:DYN:I:37	MiSDE Equipment Visual Inspectio									40											40
ISS:DYN:I:38	MiSDE Docking - Shuttle Docking																				
ISS:DYN:I:5	MiSDE 2b - Ambient Noise Data Co																				
ISS:DYN:I:6	MiSDE 2e - Ambient Noise Data Co																				
ISS:DYN:I:7	MiSDE 2f - Ambient Noise Data Col																				
ISS:DYN:I:8	MiSDE 3b - IVA Data Collection (																				
ISS:DYN:I:9	MiSDE 4b - Mir Thruster Firing Dat										90										
650015	**Water Quality Monitor (WQM)**																				
LSR:CHS:I:13	Reagent Mixing for TOC Analyzer																				
LSR:CHS:I:21	Mir Potable Water Collection and In																				
LSR:CHS:I:23	Mir Potable Water Collection and In																				
LSR:CHS:I:8	Inflight TOC Analysis of Ground-Pr					65															

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		8/23/97	8/24/97	8/25/97	8/26/97	8/27/97	8/28/97	8/29/97	8/30/97	8/31/97	9/1/97	9/2/97	9/3/97	9/4/97	9/5/97	9/6/97	9/7/97	9/8/97	9/9/97	9/10/97	9/11/97
Investigation	**Session** **FD**	**101**	**102**	**103**	**104**	**105**	**106**	**107**	**108**	**109**	**110**	**111**	**112**	**113**	**114**	**115**	**116**	**117**	**118**	**119**	**120**
750029	**Microgravity Isolation Mount (MIM) F**																				
MG:FAC:I:36	MIM Health and Status Check																				
750030	**Microgravity Glovebox (MGBX) Facilit**																				
MG:FAC:I:9	MGBX Facility Checkout and Condi																				
750031	**Biotechnology System (BTS) Facility O**																				
MG:FAC:I:38	BTS Facility Functional Tests-EEC1					175															
890043	**QUELD Furnace Experiment - MIM**																				
MG:MTS:I:2	QUELD Experiment Mounting																				
MG:MTS:I:37	QUELD Furnace Activation																				
MG:MTS:I:38	QUELD Furnace Experiment Operat																				
MG:MTS:I:6	QUELD Furnace Experiment Dismo																				
890079	**Space Acceleration Measurement Syste**																				
MG:ENV:I:6	SAMS Data Collection for Docking																				
MG:ENV:I:7	SAMS Data Collection for Undocki																				
MG:FAC:I:29	SAMS Maintenance - TSH Bias Me				40																
890093	**Biochemistry of 3-D Tissue Engineering**																				
MG:BT:I:16	Cell Sample Transfer, Fixation and					180															
MG:BT:I:18	Science Experiment Termination					10															
MG:BT:I:59	Media Sample and Testing				120																
MG:BT:I:60	Culture Microscopy and Photograph			120																	
MG:BT:I:61	BEM/BSTC-M Engineering Evaluat					30															
MG:BT:I:67	BEM/BSTC-M and BTR Continuou																				
MG:FAC:I:39	BEM/BSTC-M and BTR Facility M	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
890252	**Canadian Protein Crystallization Exper**																				
MG:BT:I:29	CAPE Experiment Initiation																				
MG:BT:I:33	CAPE Experiment Termination, Dis																				
MG:BT:I:34	CAPE/MIM Continuous Operations																				
MG:BT:I:62	CAPE/MIM Daily Status Checks																				
MG:BT:I:63	MIM Data Sampling Rate Change																				
MG:BT:I:64	CAPE Video Tape Changeout																				
MG:BT:I:65	MIM Data Archiving																				
MG:BT:I:66	CAPE Mounting to MIM and CAPE																				
890255	**Ambient Diffusion Controlled Protein C**																				
MG:BT:I:28	DCAM Photography Operations																				
890265	**Colloidal Gelation**																				
MG:FP:I:72	Unstow Equipment and Setup in M																				
MG:FP:I:73	Binary Colloidal Alloy Samples - IA																				
MG:FP:I:74	Binary Colloidal Alloy Samples - IB											255									
MG:FP:I:75	GEL Properties for Colloid Polymer																				
MG:FP:I:76	Gel Properties for Colloid Polymer																				

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		8/23/97	8/24/97	8/25/97	8/26/97	8/27/97	8/28/97	8/29/97	8/30/97	8/31/97	9/1/97	9/2/97	9/3/97	9/4/97	9/5/97	9/6/97	9/7/97	9/8/97	9/9/97	9/10/97	9/11/97
Investigation	Session FD	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
MG:FP:I:77	Three Phase Colloid Polymer Initiati																				
MG:FP:I:78	Three Phase Colloid Polymer Growt																				
MG:FP:I:79	Three Phase Colloidal Growth Vide																				
MG:FP:I:80	Long Term Colloid Polymers - IIF																				
MG:FP:I:81	Fractal Aggregation Combination Sa																				
MG:FP:I:82	Fractal Aggregation Gelation Proces																				
MG:FP:I:83	Fractal Aggregation Gel Properties -																				
MG:FP:I:84	Fractal Aggregation Gelation Proces																				
MG:FP:I:85	Deactivate and Stow Equipment																				50
890437 Mir Inventory																					
OPS:SHR:I:1	Mir Inventory Session																				
890096 Space Medicine Program - US Medical																					
SMP:MO:I:13	MO-11 Radiation Data Download E																				
SMP:MO:I:2	MO-1 Private Medical Conference					15							15							15	
SMP:MO:I:27	MO-6 Crew Status and Support Trac					30							30							30	
SMP:MO:I:28	MO-12 Radiation Monitoring																				
SMP:MO:I:29	MO-9 Physical Exam																				65
SMP:MO:I:31	MO:2 Install Updated BDL software																				
SMP:MO:I:32	MO-2 Barcode Data Logger Downlo												30								
SMP:MO:I:35	MO-10 Analysis of Urine Samples																				10
SMP:MO:I:36	MO-11 TEPC Display Call Down					10							10							10	
SMP:MO:I:37	MO-14 Environmental Health Anom																				30
SMP:MO:I:38	MO-2 Barcode Data Logger Downli												25								
890607 Analysis of Mir Archival Water Sample																					
SMP:ENV:I:1	Humidity Condensate Set-up																				
SMP:ENV:I:16	Docked Phase Water Collection and																				
SMP:ENV:I:19	Pre-Adsorption Bed Change-out Wa																				
SMP:ENV:I:2	Humidity Condensate Dismantle																				
SMP:ENV:I:22	Post-Adsorption Bed Change-out W																				
890608 Crew Microbiological Assessment																					
SMP:MIC:I:1	Crew Microbial Sample Collection -																				50
SMP:MIC:I:2	Crew Microbial Sample Collection -															40					
890609 Mir Microbiological Assessment																					
SMP:ENV:I:15	Air & Surface Sample Collections o																				
SMP:ENV:I:7	MAS Recharge with UBC on Mir														25						
SMP:ENV:I:8	Surface and Air Sample Collection															75					
SMP:ENV:I:9	Colony Count and Photo of Samples																	70			70
890610 Toxicological Assessment of Airborne V																					

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		8/23/97	8/24/97	8/25/97	8/26/97	8/27/97	8/28/97	8/29/97	8/30/97	8/31/97	9/1/97	9/2/97	9/3/97	9/4/97	9/5/97	9/6/97	9/7/97	9/8/97	9/9/97	9/10/97	9/11/97
Investigation	**Session** **FD**	**101**	**102**	**103**	**104**	**105**	**106**	**107**	**108**	**109**	**110**	**111**	**112**	**113**	**114**	**115**	**116**	**117**	**118**	**119**	**120**
SMP:ENV:I:12	Activate SSAS																				
SMP:ENV:I:13	Grab Air Sampling																				
SMP:ENV:I:14	Deactivate SSAS																				
890613	**Mir Defibrillator and Crew Medical Re**																				
SMP:CH:I:1	Mir Defibrillator Checkout																				
SMP:CH:I:2	Mir CMRS Operational Checkout																				
Crewtime Daily Totals (in minutes)		120	107	200	320	575	75	75	75	147	295	315	180	105	510	260	262	223	143	280	732
Crewtime Daily Totals (in hours)		2.00	1.78	3.33	5.33	9.58	1.25	1.25	1.25	2.45	4.92	5.25	3.00	1.75	8.50	4.33	4.37	3.72	2.38	4.67	12.20
Daily Cum Totals (in hours)		562.07	563.85	567.18	572.52	582.10	583.35	584.60	585.85	588.30	593.22	598.47	601.47	603.22	611.72	616.05	620.42	624.13	626.52	631.18	643.38

In-flight Crewtime Scenario (by Flight Days) - Mir 24 NASA 5

Investigation	Session	FD	Thu 9/12/97 121	Fri 9/13/97 122	Sat 9/14/97 123	Sun 9/15/97 124	Mon 9/16/97 125	Tue 9/17/97 126	Wed 9/18/97 127	Thu 9/19/97 128	Fri 9/20/97 129	Sat 9/21/97 130	Sun 9/22/97 131	Mon 9/23/97 132	Tue 9/24/97 133	Wed 9/25/97 134	Thu 9/26/97 135	Fri 9/27/97 136	Sat 9/28/97 137	Sun 9/29/97 138	Mon 9/30/97 139	Tue 10/1/97 140
600006	**Commercial Generic Bioprocessing Ap**																					
ADV:OPS:I:1	Locker Preparation for CGBA-ICM-																					
ADV:OPS:I:2	Locker Preparation for CGBA-ICM-																					
700004	**Regional & Temporal Variability of Pri**																					
ES:OB:I:1	EO3 - Regional & Temporal Variabi																					
700005	**Calibration & Validation of Priroda Mi**																					
ES:HYD:I:1	EO7-Calibration & Validation of Pri																					
700006	**Watershed Hydrologic Studies**																					
ES:HYD:I:2	EO4 - Watershed Hydrologic Studie																					
700007	**Validation of Biosphere-Atmosphere In**																					
ES:LAI:I:1	EO2-Validation of Biosphere-Atmos																					
700008	**Comparison of Atmospheric Chemistry**																					
ES:AC:I:1	EO8 - Comparison of Atmospheric																					
700010	**Validation of Priroda Rain Observation**																					
ES:MT:I:1	EO6 - Validation of Priroda Rain Ob																					
700011	**Test Site Monitoring**																					
ES:EO:I:10	Global Test Site Monitoring		30	30											30							
ES:EO:I:12	NASA - Global Test Site Monitoring																					
810525	**Visual Earth Observations**																					
ES:EO:I:37	Earth Observations for Visual Earth				30				30				30									
ES:EO:I:38	Data Transfer for Visual Observatio		15							15							15					
890615	**Visual Observations**																					
ES:EO:I:40	Investigation of the Optical Quality																					
ES:EO:I:40	Investigation of the Optical Quality										35											
110047	**Effects of Gravity on Insect Circadian**																					
FB:DEV:I:73	Preparation of Priroda Lockers																					
FB:DEV:I:75	Beetle Kit Stowage and Experiment																					
FB:DEV:I:76	Verify Beetle Kit Power Status			7						7	7							7				
FB:DEV:I:77	Beetle Kit Ventilation			15					15									15				
FB:DEV:I:78	Experiment Deactivation																					35
890268	**Developmental Analysis of Seeds Grow**																					
FB:DEV:I:33	GEMS Assembly																					
FB:DEV:I:34	Seed Planting																					
FB:DEV:I:35	Video Observations and Photograph					30				30				30								

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		9/12/97	9/13/97	9/14/97	9/15/97	9/16/97	9/17/97	9/18/97	9/19/97	9/20/97	9/21/97	9/22/97	9/23/97	9/24/97	9/25/97	9/26/97	9/27/97	9/28/97	9/29/97	9/30/97	10/1/97
Investigation	**Session FD**	**121**	**122**	**123**	**124**	**125**	**126**	**127**	**128**	**129**	**130**	**131**	**132**	**133**	**134**	**135**	**136**	**137**	**138**	**139**	**140**
FB:DEV:I:36	Daily Operations & Data Downlink	20	20	20	20	20	20	20	20	20	20	20	20	20							
FB:DEV:I:37	Final Harvest of Plant Samples - Firs																				
FB:DEV:I:39	Svet and GEMS Functional Check,																				
FB:DEV:I:40	Svet Assembly and Program 1																				
FB:DEV:I:41	Svet Root Module and Soil Moistur																				
FB:DEV:I:42	De-Install Root Module from Svet													80							
FB:DEV:I:43	Final Harvest of Plant Samples - Thi													200							
FB:DEV:I:80	GEMS hardware Collection and Pre																				
FB:DEV:I:81	Svet and GEMS Inventory Check																				
FB:DEV:I:82	Program 2																				
FB:DEV:I:83	Program 3																				
FB:DEV:I:84	Zeroing Differential Pressures																				
FB:DEV:I:85	Leaf Bag Assembly Removal										60										
FB:DEV:I:86	1st Fixation										120										
FB:DEV:I:87	Pollination											60	60								
FB:DEV:I:88	Terminalization and Second Fixatio																				
FB:DEV:I:89	Hard Drive (Winchester) Replaceme																				
FB:DEV:I:90	Leaf Bag Assembly Installation, Exp																				
FB:DEV:I:91	Seed Strip Preparation																				
FB:DEV:I:92	Processing of Mir Core Svet Teleme																				
FB:DEV:I:93	Refill Water Container																				
FB:DEV:I:94	Svet and GEMS disassembly																240				
	HLS																				
110019	**Sleep Investigations (639/663/710)**																				
HLS:MET:I:36	Night Headband - Presleep	38	38	38	38	38	38	38	38	38											
HLS:MET:I:40	MIPS Data Download			8							8										
HLS:MET:I:43	Blood Collection and Processing	160	160																		
HLS:MET:I:46	MSRR Recording	80	80																		
HLS:MET:I:48	Night Headband Postsleep	74	74	74	74	74	74	74	74	74	74										
HLS:MET:I:49	Doff MSRR Hardware and Stow Ass		35	35																	
HLS:MET:I:52	MIPS Data Download																				
HLS:MET:I:77	Night Headband - Presleep	28	28	28	28	28	28	28	28	28	28										
110028	**Frames of Reference for Sensori-motor**																				
HLS:NEU:I:23	COGNILAB Test A																				
HLS:NEU:I:24	COGNILAB Test B	65																			
HLS:NEU:I:40	Locate COGNILAB Equipment																				
110034	**Magnetic Resonance Imaging (MRI) Af**																				
HLS:MS:I:2	Back Pain Questionnaire - Mir Crew																				
HLS:MS:I:8	Back Pain Questionnaire - NASA Cr																				
110037	**Crewmember and Crew-Ground Intera**																				

Investigation	Payload Category / Session	FD	Thu 9/12/97 121	Fri 9/13/97 122	Sat 9/14/97 123	Sun 9/15/97 124	Mon 9/16/97 125	Tue 9/17/97 126	Wed 9/18/97 127	Thu 9/19/97 128	Fri 9/20/97 129	Sat 9/21/97 130	Sun 9/22/97 131	Mon 9/23/97 132	Tue 9/24/97 133	Wed 9/25/97 134	Thu 9/26/97 135	Fri 9/27/97 136	Sat 9/28/97 137	Sun 9/29/97 138	Mon 9/30/97 139	Tue 10/1/97 140
HLS:BP:I:10	Mir Crew: Completion of Computer					50							50							50		
HLS:BP:I:11	NASA Crew: Completion of Comp				25							25							25			
890091	**GASMAP Facility Operations**																					
HLS:FAC:I:1	GASMAP Check-Out																					
HLS:FAC:I:3	GASMAP Rough-Out																					
HLS:FAC:I:4	GASMAP Full Functional Check an																					
650006	**Enhanced Dynamic Load Sensors (EDL**																					
ISS:DYN:I:2	Enhanced Dynamics Load Sensor (E			45				45				45				45				45		
ISS:DYN:I:2	Enhanced Dynamics Load Sensor (E			45			45			45			45			45						
ISS:DYN:I:26	Enhanced Dynamics Load Sensor U									85			85			85						
ISS:DYN:I:36	Enhanced Dynamics Load Sensor (E											85				85						
650007	**Optical Properties Monitor (OPM)**																					
ISS:ENV:I:19	OPM Data Collection						30							30								
650008	**Water Microbiological Monitoring (W**																					
ISS:CHS:I:13	Microbial Capture Device Processin																165					
ISS:CHS:I:15	Microbial Capture Device Colony C																					
650009	**Mir Electric Field Characterization (M**																					
ISS:ENV:I:46	MEFC Experiment Set-up and Data																					
650013	**Mir Structural Dynamics Experiment (**																					
ISS:DYN:I:11	MiSDE 4a - Mir Thruster Firing Dat																			60		
ISS:DYN:I:12	MiSDE E5 - Shuttle Thruster Firing																			55		
ISS:DYN:I:13	MiSDE 2a - Ambient Noise Data Co														80							
ISS:DYN:I:14	MiSDE 2c - Ambient Noise Data Co														60							
ISS:DYN:I:15	MiSDE 2d - Ambient Noise Data Co														70							
ISS:DYN:I:16	MiSDE 3a - IVA Data Collection (S													110								
ISS:DYN:I:37	MiSDE Equipment Visual Inspectio					40								40					40			
ISS:DYN:I:38	MiSDE Docking - Shuttle Docking																			75		
ISS:DYN:I:5	MiSDE 2b - Ambient Noise Data Co																					
ISS:DYN:I:6	MiSDE 2e - Ambient Noise Data Co																					
ISS:DYN:I:7	MiSDE 2f - Ambient Noise Data Col																					
ISS:DYN:I:8	MiSDE 3b - IVA Data Collection (																					
ISS:DYN:I:9	MiSDE 4b - Mir Thruster Firing Dat						90															
650015	**Water Quality Monitor (WQM)**																					
LSR:CHS:I:13	Reagent Mixing for TOC Analyzer																					
LSR:CHS:I:21	Mir Potable Water Collection and In										135											
LSR:CHS:I:23	Mir Potable Water Collection and In																					
LSR:CHS:I:8	Inflight TOC Analysis of Ground-Pr						65															

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		9/12/97	9/13/97	9/14/97	9/15/97	9/16/97	9/17/97	9/18/97	9/19/97	9/20/97	9/21/97	9/22/97	9/23/97	9/24/97	9/25/97	9/26/97	9/27/97	9/28/97	9/29/97	9/30/97	10/1/97
Investigation	**Session** **FD**	**121**	**122**	**123**	**124**	**125**	**126**	**127**	**128**	**129**	**130**	**131**	**132**	**133**	**134**	**135**	**136**	**137**	**138**	**139**	**140**
750029	**Microgravity Isolation Mount (MIM) F**																				
MG:FAC:I:36	MIM Health and Status Check									20											
750030	**Microgravity Glovebox (MGBX) Facilit**																				
MG:FAC:I:9	MGBX Facility Checkout and Condi																				
750031	**Biotechnology System (BTS) Facility O**																				
MG:FAC:I:38	BTS Facility Functional Tests-EEC1																				
890043	**QUELD Furnace Experiment - MIM**																				
MG:MTS:I:2	QUELD Experiment Mounting																				
MG:MTS:I:37	QUELD Furnace Activation																				
MG:MTS:I:38	QUELD Furnace Experiment Operat																				
MG:MTS:I:6	QUELD Furnace Experiment Dismo																				
890079	**Space Acceleration Measurement Syste**																				
MG:ENV:I:6	SAMS Data Collection for Docking								50												
MG:ENV:I:7	SAMS Data Collection for Undocki																				
MG:FAC:I:29	SAMS Maintenance - TSH Bias Me														40						
890093	**Biochemistry of 3-D Tissue Engineering**																				
MG:BT:I:16	Cell Sample Transfer, Fixation and																				
MG:BT:I:18	Science Experiment Termination																				
MG:BT:I:59	Media Sample and Testing																				
MG:BT:I:60	Culture Microscopy and Photograph																				
MG:BT:I:61	BEM/BSTC-M Engineering Evaluat																				
MG:BT:I:67	BEM/BSTC-M and BTR Continuou																				
MG:FAC:I:39	BEM/BSTC-M and BTR Facility M	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10				
890252	**Canadian Protein Crystallization Exper**																				
MG:BT:I:29	CAPE Experiment Initiation																				
MG:BT:I:33	CAPE Experiment Termination, Dis																				
MG:BT:I:34	CAPE/MIM Continuous Operations																				
MG:BT:I:62	CAPE/MIM Daily Status Checks																				
MG:BT:I:63	MIM Data Sampling Rate Change																				
MG:BT:I:64	CAPE Video Tape Changeout																				
MG:BT:I:65	MIM Data Archiving																				
MG:BT:I:66	CAPE Mounting to MIM and CAPE																				
890255	**Ambient Diffusion Controlled Protein C**																				
MG:BT:I:28	DCAM Photography Operations	245																			
890265	**Colloidal Gelation**																				
MG:FP:I:72	Unstow Equipment and Setup in M																				
MG:FP:I:73	Binary Colloidal Alloy Samples - IA																				
MG:FP:I:74	Binary Colloidal Alloy Samples - IB																				
MG:FP:I:75	GEL Properties for Colloid Polymer																				
MG:FP:I:76	Gel Properties for Colloid Polymer																				

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		9/12/97	9/13/97	9/14/97	9/15/97	9/16/97	9/17/97	9/18/97	9/19/97	9/20/97	9/21/97	9/22/97	9/23/97	9/24/97	9/25/97	9/26/97	9/27/97	9/28/97	9/29/97	9/30/97	10/1/97
Investigation	**Session FD**	**121**	**122**	**123**	**124**	**125**	**126**	**127**	**128**	**129**	**130**	**131**	**132**	**133**	**134**	**135**	**136**	**137**	**138**	**139**	**140**
MG:FP:I:77	Three Phase Colloid Polymer Initiati																				
MG:FP:I:78	Three Phase Colloid Polymer Growt																				
MG:FP:I:79	Three Phase Colloidal Growth Vide																				
MG:FP:I:80	Long Term Colloid Polymers - IIF																				
MG:FP:I:81	Fractal Aggregation Combination Sa																				
MG:FP:I:82	Fractal Aggregation Gelation Proces																				
MG:FP:I:83	Fractal Aggregation Gel Properties -																				
MG:FP:I:84	Fractal Aggregation Gelation Proces																				
MG:FP:I:85	Deactivate and Stow Equipment																				
890437	**Mir Inventory**																				
OPS:SHR:I:1	Mir Inventory Session																				
890096	**Space Medicine Program - US Medical**																				
SMP:MO:I:13	MO-11 Radiation Data Download E						85													85	
SMP:MO:I:2	MO-1 Private Medical Conference						15							15							15
SMP:MO:I:27	MO-6 Crew Status and Support Trac						30							30							
SMP:MO:I:28	MO-12 Radiation Monitoring																				
SMP:MO:I:29	MO-9 Physical Exam																				65
SMP:MO:I:31	MO:2 Install Updated BDL software																				
SMP:MO:I:32	MO-2 Barcode Data Logger Downlo																				30
SMP:MO:I:35	MO-10 Analysis of Urine Samples																				
SMP:MO:I:36	MO-11 TEPC Display Call Down						10							10							10
SMP:MO:I:37	MO-14 Environmental Health Anom																				
SMP:MO:I:38	MO-2 Barcode Data Logger Downli																				25
890607	**Analysis of Mir Archival Water Sample**																				
SMP:ENV:I:1	Humidity Condensate Set-up																				
SMP:ENV:I:16	Docked Phase Water Collection and																				
SMP:ENV:I:19	Pre-Adsorption Bed Change-out Wa																				
SMP:ENV:I:2	Humidity Condensate Dismantle																				
SMP:ENV:I:22	Post-Adsorption Bed Change-out W																				
890608	**Crew Microbiological Assessment**																				
SMP:MIC:I:1	Crew Microbial Sample Collection -																				
SMP:MIC:I:2	Crew Microbial Sample Collection -															40					
890609	**Mir Microbiological Assessment**																				
SMP:ENV:I:15	Air & Surface Sample Collections o																				
SMP:ENV:I:7	MAS Recharge with UBC on Mir														25						
SMP:ENV:I:8	Surface and Air Sample Collection															75					
SMP:ENV:I:9	Colony Count and Photo of Samples																				
890610	**Toxicological Assessment of Airborne V**																				

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		9/12/97	9/13/97	9/14/97	9/15/97	9/16/97	9/17/97	9/18/97	9/19/97	9/20/97	9/21/97	9/22/97	9/23/97	9/24/97	9/25/97	9/26/97	9/27/97	9/28/97	9/29/97	9/30/97	10/1/97
Investigation	**Session FD**	**121**	**122**	**123**	**124**	**125**	**126**	**127**	**128**	**129**	**130**	**131**	**132**	**133**	**134**	**135**	**136**	**137**	**138**	**139**	**140**
SMP:ENV:I:12	Activate SSAS										30										
SMP:ENV:I:13	Grab Air Sampling										25										
SMP:ENV:I:14	Deactivate SSAS											10									
890613	**Mir Defibrillator and Crew Medical Re**																				
SMP:CH:I:1	Mir Defibrillator Checkout																				
SMP:CH:I:2	Mir CMRS Operational Checkout																				
Crewtime Daily Totals (in minutes)		720	580	290	320	400	355	170	425	347	572	280	330	575	365	290	265	87	285	85	180
Crewtime Daily Totals (in hours)		12.00	9.67	4.83	5.33	6.67	5.92	2.83	7.08	5.78	9.53	4.67	5.50	9.58	6.08	4.83	4.42	1.45	4.75	1.42	3.00
Daily Cum Totals (in hours)		655.38	665.05	669.88	675.22	681.88	687.80	690.63	697.72	703.50	713.03	717.70	723.20	732.78	738.87	743.70	748.12	749.57	754.32	755.73	758.73

In-flight Crewtime Scenario (by Flight Days) - Mir 24 NASA 5

Payload Category / Investigation	Session	FD	Thu 10/2/97 141	Fri 10/3/97 142	Sat 10/4/97 143	Sun 10/5/97 144	Mon 10/6/97 145	Tue 10/7/97 146	Wed 10/8/97 147	Thu 10/9/97 148	Fri 0/10/97 149	Sat 0/11/97 150	Sun 0/12/97 151	Mon 0/13/97 152	Tue 0/14/97 153	Wed 0/15/97 154	Thu 0/16/97 155	Fri 0/17/97 156	Sat 0/18/97 157	Sun 0/19/97 158	Mon 0/20/97 159	Tue 0/21/97 160
600006	**Commercial Generic Bioprocessing Ap**																					
ADV:OPS:I:1	Locker Preparation for CGBA-ICM-																					
ADV:OPS:I:2	Locker Preparation for CGBA-ICM-																					
700004	**Regional & Temporal Variability of Pri**																					
ES:OB:I:1	EO3 - Regional & Temporal Variabi																					
700005	**Calibration & Validation of Priroda Mi**																					
ES:HYD:I:1	EO7-Calibration & Validation of Pri																					
700006	**Watershed Hydrologic Studies**																					
ES:HYD:I:2	EO4 - Watershed Hydrologic Studie																					
700007	**Validation of Biosphere-Atmosphere In**																					
ES:LAI:I:1	EO2-Validation of Biosphere-Atmos																					
700008	**Comparison of Atmospheric Chemistry**																					
ES:AC:I:1	EO8 - Comparison of Atmospheric																					
700010	**Validation of Priroda Rain Observation**																					
ES:MT:I:1	EO6 - Validation of Priroda Rain Ob																					
700011	**Test Site Monitoring**																					
ES:EO:I:10	Global Test Site Monitoring										30											
ES:EO:I:12	NASA - Global Test Site Monitoring																					
810525	**Visual Earth Observations**																					
ES:EO:I:37	Earth Observations for Visual Earth																					
ES:EO:I:38	Data Transfer for Visual Observatio				15																	
890615	**Visual Observations**																					
ES:EO:I:40	Investigation of the Optical Quality																					
ES:EO:I:40	Investigation of the Optical Quality																					
110047	**Effects of Gravity on Insect Circadian**																					
FB:DEV:I:73	Preparation of Priroda Lockers																					
FB:DEV:I:75	Beetle Kit Stowage and Experiment																					
FB:DEV:I:76	Verify Beetle Kit Power Status																	7				
FB:DEV:I:77	Beetle Kit Ventilation																					
FB:DEV:I:78	Experiment Deactivation																					
890268	**Developmental Analysis of Seeds Grow**																					
FB:DEV:I:33	GEMS Assembly																					
FB:DEV:I:34	Seed Planting																					
FB:DEV:I:35	Video Observations and Photograph																					

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		10/2/97	10/3/97	10/4/97	10/5/97	10/6/97	10/7/97	10/8/97	10/9/97	0/10/97	0/11/97	0/12/97	0/13/97	0/14/97	0/15/97	0/16/97	0/17/97	0/18/97	0/19/97	0/20/97	0/21/97
Investigation	**Session FD**	**141**	**142**	**143**	**144**	**145**	**146**	**147**	**148**	**149**	**150**	**151**	**152**	**153**	**154**	**155**	**156**	**157**	**158**	**159**	**160**
FB:DEV:I:36	Daily Operations & Data Downlink																				
FB:DEV:I:37	Final Harvest of Plant Samples - Firs																				
FB:DEV:I:39	Svet and GEMS Functional Check,																				
FB:DEV:I:40	Svet Assembly and Program 1																				
FB:DEV:I:41	Svet Root Module and Soil Moistur																				
FB:DEV:I:42	De-Install Root Module from Svet																				
FB:DEV:I:43	Final Harvest of Plant Samples - Thi																				
FB:DEV:I:80	GEMS hardware Collection and Pre																				
FB:DEV:I:81	Svet and GEMS Inventory Check																				
FB:DEV:I:82	Program 2																				
FB:DEV:I:83	Program 3																				
FB:DEV:I:84	Zeroing Differential Pressures																				
FB:DEV:I:85	Leaf Bag Assembly Removal																				
FB:DEV:I:86	1st Fixation																				
FB:DEV:I:87	Pollination																				
FB:DEV:I:88	Terminalization and Second Fixatio																				
FB:DEV:I:89	Hard Drive (Winchester) Replaceme																				
FB:DEV:I:90	Leaf Bag Assembly Installation, Exp																				
FB:DEV:I:91	Seed Strip Preparation																				
FB:DEV:I:92	Processing of Mir Core Svet Teleme																				
FB:DEV:I:93	Refill Water Container																				
FB:DEV:I:94	Svet and GEMS disassembly																				
	HLS																				
110019	**Sleep Investigations (639/663/710)**																				
HLS:MET:I:36	Night Headband - Presleep																				
HLS:MET:I:40	MIPS Data Download																				
HLS:MET:I:43	Blood Collection and Processing																				
HLS:MET:I:46	MSRR Recording																				
HLS:MET:I:48	Night Headband Postsleep																				
HLS:MET:I:49	Doff MSRR Hardware and Stow Ass																				
HLS:MET:I:52	MIPS Data Download					4							4								
HLS:MET:I:77	Night Headband - Presleep																				
110028	**Frames of Reference for Sensori-motor**																				
HLS:NEU:I:23	COGNILAB Test A																				
HLS:NEU:I:24	COGNILAB Test B																				
HLS:NEU:I:40	Locate COGNILAB Equipment																				
110034	**Magnetic Resonance Imaging (MRI) Af**																				
HLS:MS:I:2	Back Pain Questionnaire - Mir Crew																				
HLS:MS:I:8	Back Pain Questionnaire - NASA Cr																				
110037	**Crewmember and Crew-Ground Intera**																				

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		10/2/97	10/3/97	10/4/97	10/5/97	10/6/97	10/7/97	10/8/97	10/9/97	0/10/97	0/11/97	0/12/97	0/13/97	0/14/97	0/15/97	0/16/97	0/17/97	0/18/97	0/19/97	0/20/97	0/21/97
Investigation	**Session FD**	**141**	**142**	**143**	**144**	**145**	**146**	**147**	**148**	**149**	**150**	**151**	**152**	**153**	**154**	**155**	**156**	**157**	**158**	**159**	**160**
HLS:BP:I:10	Mir Crew: Completion of Computer					50							50							50	
HLS:BP:I:11	NASA Crew: Completion of Comp				25																
890091	**GASMAP Facility Operations**																				
HLS:FAC:I:1	GASMAP Check-Out																				
HLS:FAC:I:3	GASMAP Rough-Out																				
HLS:FAC:I:4	GASMAP Full Functional Check an																				
650006	**Enhanced Dynamic Load Sensors (EDL**																				
ISS:DYN:I:2	Enhanced Dynamics Load Sensor (E		45				45				45				45				45		
ISS:DYN:I:2	Enhanced Dynamics Load Sensor (E																				
ISS:DYN:I:26	Enhanced Dynamics Load Sensor U																				
ISS:DYN:I:36	Enhanced Dynamics Load Sensor (E																		85		
650007	**Optical Properties Monitor (OPM)**																				
ISS:ENV:I:19	OPM Data Collection																				
650008	**Water Microbiological Monitoring (W**																				
ISS:CHS:I:13	Microbial Capture Device Processin																				
ISS:CHS:I:15	Microbial Capture Device Colony C																				
650009	**Mir Electric Field Characterization (M**																				
ISS:ENV:I:46	MEFC Experiment Set-up and Data																				
650013	**Mir Structural Dynamics Experiment (**																				
ISS:DYN:I:11	MiSDE 4a - Mir Thruster Firing Dat																				
ISS:DYN:I:12	MiSDE E5 - Shuttle Thruster Firing																				
ISS:DYN:I:13	MiSDE 2a - Ambient Noise Data Co																				
ISS:DYN:I:14	MiSDE 2c - Ambient Noise Data Co																				
ISS:DYN:I:15	MiSDE 2d - Ambient Noise Data Co																				
ISS:DYN:I:16	MiSDE 3a - IVA Data Collection (S																				
ISS:DYN:I:37	MiSDE Equipment Visual Inspectio																				
ISS:DYN:I:38	MiSDE Docking - Shuttle Docking																				
ISS:DYN:I:5	MiSDE 2b - Ambient Noise Data Co																				
ISS:DYN:I:6	MiSDE 2e - Ambient Noise Data Co																				
ISS:DYN:I:7	MiSDE 2f - Ambient Noise Data Col																				
ISS:DYN:I:8	MiSDE 3b - IVA Data Collection (																				
ISS:DYN:I:9	MiSDE 4b - Mir Thruster Firing Dat																				
650015	**Water Quality Monitor (WQM)**																				
LSR:CHS:I:13	Reagent Mixing for TOC Analyzer																				
LSR:CHS:I:21	Mir Potable Water Collection and In																				
LSR:CHS:I:23	Mir Potable Water Collection and In																				
LSR:CHS:I:8	Inflight TOC Analysis of Ground-Pr																				

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		10/2/97	10/3/97	10/4/97	10/5/97	10/6/97	10/7/97	10/8/97	10/9/97	0/10/97	0/11/97	0/12/97	0/13/97	0/14/97	0/15/97	0/16/97	0/17/97	0/18/97	0/19/97	0/20/97	0/21/97
Investigation	**Session** **FD**	**141**	**142**	**143**	**144**	**145**	**146**	**147**	**148**	**149**	**150**	**151**	**152**	**153**	**154**	**155**	**156**	**157**	**158**	**159**	**160**
750029	**Microgravity Isolation Mount (MIM) F**																				
MG:FAC:I:36	MIM Health and Status Check																				
750030	**Microgravity Glovebox (MGBX) Facilit**																				
MG:FAC:I:9	MGBX Facility Checkout and Condi																				
750031	**Biotechnology System (BTS) Facility O**																				
MG:FAC:I:38	BTS Facility Functional Tests-EEC1																				
890043	**QUELD Furnace Experiment - MIM**																				
MG:MTS:I:2	QUELD Experiment Mounting																				
MG:MTS:I:37	QUELD Furnace Activation																				
MG:MTS:I:38	QUELD Furnace Experiment Operat																				
MG:MTS:I:6	QUELD Furnace Experiment Dismo																				
890079	**Space Acceleration Measurement Syste**																				
MG:ENV:I:6	SAMS Data Collection for Docking																				
MG:ENV:I:7	SAMS Data Collection for Undocki																				
MG:FAC:I:29	SAMS Maintenance - TSH Bias Me																				
890093	**Biochemistry of 3-D Tissue Engineering**																				
MG:BT:I:16	Cell Sample Transfer, Fixation and																				
MG:BT:I:18	Science Experiment Termination																				
MG:BT:I:59	Media Sample and Testing																				
MG:BT:I:60	Culture Microscopy and Photograph																				
MG:BT:I:61	BEM/BSTC-M Engineering Evaluat																				
MG:BT:I:67	BEM/BSTC-M and BTR Continuou																				
MG:FAC:I:39	BEM/BSTC-M and BTR Facility M																				
890252	**Canadian Protein Crystallization Exper**																				
MG:BT:I:29	CAPE Experiment Initiation																				
MG:BT:I:33	CAPE Experiment Termination, Dis																				
MG:BT:I:34	CAPE/MIM Continuous Operations																				
MG:BT:I:62	CAPE/MIM Daily Status Checks																				
MG:BT:I:63	MIM Data Sampling Rate Change																				
MG:BT:I:64	CAPE Video Tape Changeout																				
MG:BT:I:65	MIM Data Archiving																				
MG:BT:I:66	CAPE Mounting to MIM and CAPE																				
890255	**Ambient Diffusion Controlled Protein C**																				
MG:BT:I:28	DCAM Photography Operations																				
890265	**Colloidal Gelation**																				
MG:FP:I:72	Unstow Equipment and Setup in M																				
MG:FP:I:73	Binary Colloidal Alloy Samples - IA																				
MG:FP:I:74	Binary Colloidal Alloy Samples - IB																				
MG:FP:I:75	GEL Properties for Colloid Polymer																				
MG:FP:I:76	Gel Properties for Colloid Polymer																				

Investigation	Payload Category / Session	Thu 10/2/97 FD 141	Fri 10/3/97 142	Sat 10/4/97 143	Sun 10/5/97 144	Mon 10/6/97 145	Tue 10/7/97 146	Wed 10/8/97 147	Thu 10/9/97 148	Fri 0/10/97 149	Sat 0/11/97 150	Sun 0/12/97 151	Mon 0/13/97 152	Tue 0/14/97 153	Wed 0/15/97 154	Thu 0/16/97 155	Fri 0/17/97 156	Sat 0/18/97 157	Sun 0/19/97 158	Mon 0/20/97 159	Tue 0/21/97 160
MG:FP:I:77	Three Phase Colloid Polymer Initiati																				
MG:FP:I:78	Three Phase Colloid Polymer Growt																				
MG:FP:I:79	Three Phase Colloidal Growth Vide																				
MG:FP:I:80	Long Term Colloid Polymers - IIF																				
MG:FP:I:81	Fractal Aggregation Combination Sa																				
MG:FP:I:82	Fractal Aggregation Gelation Proces																				
MG:FP:I:83	Fractal Aggregation Gel Properties -																				
MG:FP:I:84	Fractal Aggregation Gelation Proces																				
MG:FP:I:85	Deactivate and Stow Equipment																				
[illegible]	[illegible]																				
890437	**Mir Inventory**																				
OPS:SHR:I:1	Mir Inventory Session																				
[illegible]	[illegible]																				
890096	**Space Medicine Program - US Medical**																				
SMP:MO:I:13	MO-11 Radiation Data Download E																				
SMP:MO:I:2	MO-1 Private Medical Conference																				
SMP:MO:I:27	MO-6 Crew Status and Support Trac																				
SMP:MO:I:28	MO-12 Radiation Monitoring																				
SMP:MO:I:29	MO-9 Physical Exam																				
SMP:MO:I:31	MO:2 Install Updated BDL software																				
SMP:MO:I:32	MO-2 Barcode Data Logger Downlo																				
SMP:MO:I:35	MO-10 Analysis of Urine Samples																				
SMP:MO:I:36	MO-11 TEPC Display Call Down																				
SMP:MO:I:37	MO-14 Environmental Health Anom										30										
SMP:MO:I:38	MO-2 Barcode Data Logger Downli																				
890607	**Analysis of Mir Archival Water Sample**																				
SMP:ENV:I:1	Humidity Condensate Set-up															25					
SMP:ENV:I:16	Docked Phase Water Collection and																				
SMP:ENV:I:19	Pre-Adsorption Bed Change-out Wa																				
SMP:ENV:I:2	Humidity Condensate Dismantle																		45		
SMP:ENV:I:22	Post-Adsorption Bed Change-out W																				
890608	**Crew Microbiological Assessment**																				
SMP:MIC:I:1	Crew Microbial Sample Collection -															50					
SMP:MIC:I:2	Crew Microbial Sample Collection -																				
890609	**Mir Microbiological Assessment**																				
SMP:ENV:I:15	Air & Surface Sample Collections o																				
SMP:ENV:I:7	MAS Recharge with UBC on Mir																				
SMP:ENV:I:8	Surface and Air Sample Collection																				
SMP:ENV:I:9	Colony Count and Photo of Samples																				
890610	**Toxicological Assessment of Airborne V**																				

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		10/2/97	10/3/97	10/4/97	10/5/97	10/6/97	10/7/97	10/8/97	10/9/97	0/10/97	0/11/97	0/12/97	0/13/97	0/14/97	0/15/97	0/16/97	0/17/97	0/18/97	0/19/97	0/20/97	0/21/97
Investigation	**Session FD**	**141**	**142**	**143**	**144**	**145**	**146**	**147**	**148**	**149**	**150**	**151**	**152**	**153**	**154**	**155**	**156**	**157**	**158**	**159**	**160**
SMP:ENV:I:12	Activate SSAS																				
SMP:ENV:I:13	Grab Air Sampling																				
SMP:ENV:I:14	Deactivate SSAS																				
890613	**Mir Defibrillator and Crew Medical Re**																				
SMP:CH:I:1	Mir Defibrillator Checkout					17															
SMP:CH:I:2	Mir CMRS Operational Checkout																				
Crewtime Daily Totals (in minutes)		0	45	15	25	71	45	0	0	30	75	0	54	0	45	75	7	0	175	50	0
Crewtime Daily Totals (in hours)		0.00	0.75	0.25	0.42	1.18	0.75	0.00	0.00	0.50	1.25	0.00	0.90	0.00	0.75	1.25	0.12	0.00	2.92	0.83	0.00
Daily Cum Totals (in hours)		758.73	759.48	759.73	760.15	761.33	762.08	762.08	762.08	762.58	763.83	763.83	764.73	764.73	765.48	766.73	766.85	766.85	769.77	770.60	770.60

In-flight Crewtime Scenario (by Flight Days) - Mir 24 NASA 5

Payload Category / Investigation	Session	FD	Thu 0/22/97 161	Fri 0/23/97 162	Sat 0/24/97 163	Sun 0/25/97 164	Mon 0/26/97 165	Tue 0/27/97 166	Wed 0/28/97 167	Thu 0/29/97 168	Fri 0/30/97 169	Sat 0/31/97 170	Sun 11/1/97 171	Mon 11/2/97 172	Tue 11/3/97 173	Wed 11/4/97 174	Thu 11/5/97 175	Fri 11/6/97 176	Sat 11/7/97 177	Sun 11/8/97 178	Mon 11/9/97 179	Tue 1/10/97 180
600006	**Commercial Generic Bioprocessing Ap**																					
ADV:OPS:I:1	Locker Preparation for CGBA-ICM-																					
ADV:OPS:I:2	Locker Preparation for CGBA-ICM-																					
700004	**Regional & Temporal Variability of Pri**																					
ES:OB:I:1	EO3 - Regional & Temporal Variabi																					
700005	**Calibration & Validation of Priroda Mi**																					
ES:HYD:I:1	EO7-Calibration & Validation of Pri																					
700006	**Watershed Hydrologic Studies**																					
ES:HYD:I:2	EO4 - Watershed Hydrologic Studie																					
700007	**Validation of Biosphere-Atmosphere In**																					
ES:LAI:I:1	EO2-Validation of Biosphere-Atmos																					
700008	**Comparison of Atmospheric Chemistry**																					
ES:AC:I:1	EO8 - Comparison of Atmospheric																					
700010	**Validation of Priroda Rain Observation**																					
ES:MT:I:1	EO6 - Validation of Priroda Rain Ob																					
700011	**Test Site Monitoring**																					
ES:EO:I:10	Global Test Site Monitoring																					
ES:EO:I:12	NASA - Global Test Site Monitoring																					
810525	**Visual Earth Observations**																					
ES:EO:I:37	Earth Observations for Visual Earth																					
ES:EO:I:38	Data Transfer for Visual Observatio																					
890615	**Visual Observations**																					
ES:EO:I:40	Investigation of the Optical Quality																					
ES:EO:I:40	Investigation of the Optical Quality																					
110047	**Effects of Gravity on Insect Circadian**																					
FB:DEV:I:73	Preparation of Priroda Lockers																					
FB:DEV:I:75	Beetle Kit Stowage and Experiment																					
FB:DEV:I:76	Verify Beetle Kit Power Status																					
FB:DEV:I:77	Beetle Kit Ventilation																					
FB:DEV:I:78	Experiment Deactivation																					
890268	**Developmental Analysis of Seeds Grow**																					
FB:DEV:I:33	GEMS Assembly																					
FB:DEV:I:34	Seed Planting																					
FB:DEV:I:35	Video Observations and Photograph																					

Investigation	Payload Category / Session	FD	Thu 0/22/97	Fri 0/23/97	Sat 0/24/97	Sun 0/25/97	Mon 0/26/97	Tue 0/27/97	Wed 0/28/97	Thu 0/29/97	Fri 0/30/97	Sat 0/31/97	Sun 11/1/97	Mon 11/2/97	Tue 11/3/97	Wed 11/4/97	Thu 11/5/97	Fri 11/6/97	Sat 11/7/97	Sun 11/8/97	Mon 11/9/97	Tue 1/10/97
			161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
FB:DEV:I:36	Daily Operations & Data Downlink																					
FB:DEV:I:37	Final Harvest of Plant Samples - Firs																					
FB:DEV:I:39	Svet and GEMS Functional Check,																					
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FB:DEV:I:41	Svet Root Module and Soil Moistur																					
FB:DEV:I:42	De-Install Root Module from Svet																					
FB:DEV:I:43	Final Harvest of Plant Samples - Thi																					
FB:DEV:I:80	GEMS hardware Collection and Pre																					
FB:DEV:I:81	Svet and GEMS Inventory Check																					
FB:DEV:I:82	Program 2																					
FB:DEV:I:83	Program 3																					
FB:DEV:I:84	Zeroing Differential Pressures																					
FB:DEV:I:85	Leaf Bag Assembly Removal																					
FB:DEV:I:86	1st Fixation																					
FB:DEV:I:87	Pollination																					
FB:DEV:I:88	Terminalization and Second Fixatio																					
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FB:DEV:I:93	Refill Water Container																					
FB:DEV:I:94	Svet and GEMS disassembly																					
	HLS																					
110019	**Sleep Investigations (639/663/710)**																					
HLS:MET:I:36	Night Headband - Presleep																					38
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HLS:MET:I:46	MSRR Recording																					
HLS:MET:I:48	Night Headband Postsleep																					
HLS:MET:I:49	Doff MSRR Hardware and Stow Ass																					
HLS:MET:I:52	MIPS Data Download																					
HLS:MET:I:77	Night Headband - Presleep																					
110028	**Frames of Reference for Sensori-motor**																					
HLS:NEU:I:23	COGNILAB Test A																					
HLS:NEU:I:24	COGNILAB Test B																					
HLS:NEU:I:40	Locate COGNILAB Equipment																					
110034	**Magnetic Resonance Imaging (MRI) Af**																					
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HLS:MS:I:8	Back Pain Questionnaire - NASA Cr																					
110037	**Crewmember and Crew-Ground Intera**																					

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		0/22/97	0/23/97	0/24/97	0/25/97	0/26/97	0/27/97	0/28/97	0/29/97	0/30/97	0/31/97	11/1/97	11/2/97	11/3/97	11/4/97	11/5/97	11/6/97	11/7/97	11/8/97	11/9/97	1/10/97
Investigation	**Session FD**	**161**	**162**	**163**	**164**	**165**	**166**	**167**	**168**	**169**	**170**	**171**	**172**	**173**	**174**	**175**	**176**	**177**	**178**	**179**	**180**
HLS:BP:I:10	Mir Crew: Completion of Computer						50							50							50
HLS:BP:I:11	NASA Crew: Completion of Comp																				
890091	**GASMAP Facility Operations**																				
HLS:FAC:I:1	GASMAP Check-Out																				
HLS:FAC:I:3	GASMAP Rough-Out																				
HLS:FAC:I:4	GASMAP Full Functional Check an																				
650006	**Enhanced Dynamic Load Sensors (EDL**																				
ISS:DYN:I:2	Enhanced Dynamics Load Sensor (E		45				45				45				45						
ISS:DYN:I:2	Enhanced Dynamics Load Sensor (E																				
ISS:DYN:I:26	Enhanced Dynamics Load Sensor U																				
ISS:DYN:I:36	Enhanced Dynamics Load Sensor (E		85				85				85										
650007	**Optical Properties Monitor (OPM)**																				
ISS:ENV:I:19	OPM Data Collection																				
650008	**Water Microbiological Monitoring (W**																				
ISS:CHS:I:13	Microbial Capture Device Processin																				
ISS:CHS:I:15	Microbial Capture Device Colony C																				
650009	**Mir Electric Field Characterization (M**																				
ISS:ENV:I:46	MEFC Experiment Set-up and Data																				
650013	**Mir Structural Dynamics Experiment (**																				
ISS:DYN:I:11	MiSDE 4a - Mir Thruster Firing Dat																				
ISS:DYN:I:12	MiSDE E5 - Shuttle Thruster Firing																				
ISS:DYN:I:13	MiSDE 2a - Ambient Noise Data Co																				
ISS:DYN:I:14	MiSDE 2c - Ambient Noise Data Co																				
ISS:DYN:I:15	MiSDE 2d - Ambient Noise Data Co																				
ISS:DYN:I:16	MiSDE 3a - IVA Data Collection (S																				
ISS:DYN:I:37	MiSDE Equipment Visual Inspectio																				
ISS:DYN:I:38	MiSDE Docking - Shuttle Docking																				
ISS:DYN:I:5	MiSDE 2b - Ambient Noise Data Co																				
ISS:DYN:I:6	MiSDE 2e - Ambient Noise Data Co																				
ISS:DYN:I:7	MiSDE 2f - Ambient Noise Data Col																				
ISS:DYN:I:8	MiSDE 3b - IVA Data Collection (																				
ISS:DYN:I:9	MiSDE 4b - Mir Thruster Firing Dat																				
650015	**Water Quality Monitor (WQM)**																				
LSR:CHS:I:13	Reagent Mixing for TOC Analyzer																				
LSR:CHS:I:21	Mir Potable Water Collection and In																				
LSR:CHS:I:23	Mir Potable Water Collection and In																				
LSR:CHS:I:8	Inflight TOC Analysis of Ground-Pr																				

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		0/22/97	0/23/97	0/24/97	0/25/97	0/26/97	0/27/97	0/28/97	0/29/97	0/30/97	0/31/97	11/1/97	11/2/97	11/3/97	11/4/97	11/5/97	11/6/97	11/7/97	11/8/97	11/9/97	1/10/97
Investigation	**Session** **FD**	**161**	**162**	**163**	**164**	**165**	**166**	**167**	**168**	**169**	**170**	**171**	**172**	**173**	**174**	**175**	**176**	**177**	**178**	**179**	**180**
750029	**Microgravity Isolation Mount (MIM) F**																				
MG:FAC:I:36	MIM Health and Status Check																				
750030	**Microgravity Glovebox (MGBX) Facilit**																				
MG:FAC:I:9	MGBX Facility Checkout and Condi																				
750031	**Biotechnology System (BTS) Facility O**																				
MG:FAC:I:38	BTS Facility Functional Tests-EEC1																				
890043	**QUELD Furnace Experiment - MIM**																				
MG:MTS:I:2	QUELD Experiment Mounting																				
MG:MTS:I:37	QUELD Furnace Activation																				
MG:MTS:I:38	QUELD Furnace Experiment Operat																				
MG:MTS:I:6	QUELD Furnace Experiment Dismo																				
890079	**Space Acceleration Measurement Syste**																				
MG:ENV:I:6	SAMS Data Collection for Docking																				
MG:ENV:I:7	SAMS Data Collection for Undocki																				
MG:FAC:I:29	SAMS Maintenance - TSH Bias Me				40																
890093	**Biochemistry of 3-D Tissue Engineering**																				
MG:BT:I:16	Cell Sample Transfer, Fixation and																				
MG:BT:I:18	Science Experiment Termination																				
MG:BT:I:59	Media Sample and Testing																				
MG:BT:I:60	Culture Microscopy and Photograph																				
MG:BT:I:61	BEM/BSTC-M Engineering Evaluat																				
MG:BT:I:67	BEM/BSTC-M and BTR Continuou																				
MG:FAC:I:39	BEM/BSTC-M and BTR Facility M																				
890252	**Canadian Protein Crystallization Exper**																				
MG:BT:I:29	CAPE Experiment Initiation																				
MG:BT:I:33	CAPE Experiment Termination, Dis																				
MG:BT:I:34	CAPE/MIM Continuous Operations																				
MG:BT:I:62	CAPE/MIM Daily Status Checks																				
MG:BT:I:63	MIM Data Sampling Rate Change																				
MG:BT:I:64	CAPE Video Tape Changeout																				
MG:BT:I:65	MIM Data Archiving																				
MG:BT:I:66	CAPE Mounting to MIM and CAPE																				
890255	**Ambient Diffusion Controlled Protein C**																				
MG:BT:I:28	DCAM Photography Operations																				
890265	**Colloidal Gelation**																				
MG:FP:I:72	Unstow Equipment and Setup in M																				
MG:FP:I:73	Binary Colloidal Alloy Samples - IA																				
MG:FP:I:74	Binary Colloidal Alloy Samples - IB																				
MG:FP:I:75	GEL Properties for Colloid Polymer																				
MG:FP:I:76	Gel Properties for Colloid Polymer																				

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		0/22/97	0/23/97	0/24/97	0/25/97	0/26/97	0/27/97	0/28/97	0/29/97	0/30/97	0/31/97	11/1/97	11/2/97	11/3/97	11/4/97	11/5/97	11/6/97	11/7/97	11/8/97	11/9/97	1/10/97
Investigation	**Session FD**	**161**	**162**	**163**	**164**	**165**	**166**	**167**	**168**	**169**	**170**	**171**	**172**	**173**	**174**	**175**	**176**	**177**	**178**	**179**	**180**
MG:FP:I:77	Three Phase Colloid Polymer Initiati																				
MG:FP:I:78	Three Phase Colloid Polymer Growt																				
MG:FP:I:79	Three Phase Colloidal Growth Vide																				
MG:FP:I:80	Long Term Colloid Polymers - IIF																				
MG:FP:I:81	Fractal Aggregation Combination Sa																				
MG:FP:I:82	Fractal Aggregation Gelation Proces																				
MG:FP:I:83	Fractal Aggregation Gel Properties -																				
MG:FP:I:84	Fractal Aggregation Gelation Proces																				
MG:FP:I:85	Deactivate and Stow Equipment																				
	OPS																				
890437	**Mir Inventory**																				
OPS:SHR:I:1	Mir Inventory Session																				
890096	**Space Medicine Program - US Medical**																				
SMP:MO:I:13	MO-11 Radiation Data Download E																				
SMP:MO:I:2	MO-1 Private Medical Conference																				
SMP:MO:I:27	MO-6 Crew Status and Support Trac																				
SMP:MO:I:28	MO-12 Radiation Monitoring																				
SMP:MO:I:29	MO-9 Physical Exam																				
SMP:MO:I:31	MO:2 Install Updated BDL software																				
SMP:MO:I:32	MO-2 Barcode Data Logger Downlo																				
SMP:MO:I:35	MO-10 Analysis of Urine Samples																				
SMP:MO:I:36	MO-11 TEPC Display Call Down																				
SMP:MO:I:37	MO-14 Environmen' ılth Anom																				
SMP:MO:I:38	MO-2 Barcode Data Logger Downli																				
890607	**Analysis of Mir Archival Water Sample**																				
SMP:ENV:I:1	Humidity Condensate Set-up																		25		
SMP:ENV:I:16	Docked Phase Water Collection and																				
SMP:ENV:I:19	Pre-Adsorption Bed Change-out Wa																				
SMP:ENV:I:2	Humidity Condensate Dismantle																				
SMP:ENV:I:22	Post-Adsorption Bed Change-out W																				
890608	**Crew Microbiological Assessment**																				
SMP:MIC:I:1	Crew Microbial Sample Collection -															50					
SMP:MIC:I:2	Crew Microbial Sample Collection -																				
890609	**Mir Microbiological Assessment**																				
SMP:ENV:I:15	Air & Surface Sample Collections o																				
SMP:ENV:I:7	MAS Recharge with UBC on Mir																				
SMP:ENV:I:8	Surface and Air Sample Collection																				
SMP:ENV:I:9	Colony Count and Photo of Samples																				
890610	**Toxicological Assessment of Airborne V**																				

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		0/22/97	0/23/97	0/24/97	0/25/97	0/26/97	0/27/97	0/28/97	0/29/97	0/30/97	0/31/97	11/1/97	11/2/97	11/3/97	11/4/97	11/5/97	11/6/97	11/7/97	11/8/97	11/9/97	1/10/97
Investigation	**Session** **FD**	**161**	**162**	**163**	**164**	**165**	**166**	**167**	**168**	**169**	**170**	**171**	**172**	**173**	**174**	**175**	**176**	**177**	**178**	**179**	**180**
SMP:ENV:I:12	Activate SSAS																				
SMP:ENV:I:13	Grab Air Sampling																				
SMP:ENV:I:14	Deactivate SSAS																				
890613	**Mir Defibrillator and Crew Medical Re**																				
SMP:CH:I:1	Mir Defibrillator Checkout																				
SMP:CH:I:2	Mir CMRS Operational Checkout																				
Crewtime Daily Totals (in minutes)		0	130	0	40	0	180	0	0	0	130	0	0	50	45	50	0	0	25	0	88
Crewtime Daily Totals (in hours)		0.00	2.17	0.00	0.67	0.00	3.00	0.00	0.00	0.00	2.17	0.00	0.00	0.83	0.75	0.83	0.00	0.00	0.42	0.00	1.47
Daily Cum Totals (in hours)		770.60	772.77	772.77	773.43	773.43	776.43	776.43	776.43	776.43	778.60	778.60	778.60	779.43	780.18	781.02	781.02	781.02	781.43	781.43	782.90

In-flight Crewtime Scenario (by Flight Days) - Mir 24 NASA 5

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		1/11/97	1/12/97	1/13/97	1/14/97	1/15/97	1/16/97	1/17/97	1/18/97	1/19/97	1/20/97	1/21/97	1/22/97	1/23/97	1/24/97	1/25/97	1/26/97	1/27/97	1/28/97	1/29/97	1/30/97
Investigation / Session	FD	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
600006 Commercial Generic Bioprocessing Ap																					
ADV:OPS:I:1	Locker Preparation for CGBA-ICM-																				
ADV:OPS:I:2	Locker Preparation for CGBA-ICM-																				
700004 Regional & Temporal Variability of Pri																					
ES:OB:I:1	EO3 - Regional & Temporal Variabi																				
700005 Calibration & Validation of Priroda Mi																					
ES:HYD:I:1	EO7-Calibration & Validation of Pri																				
700006 Watershed Hydrologic Studies																					
ES:HYD:I:2	EO4 - Watershed Hydrologic Studie																				
700007 Validation of Biosphere-Atmosphere In																					
ES:LAI:I:1	EO2-Validation of Biosphere-Atmos																				
700008 Comparison of Atmospheric Chemistry																					
ES:AC:I:1	EO8 - Comparison of Atmospheric																				
700010 Validation of Priroda Rain Observation																					
ES:MT:I:1	EO6 - Validation of Priroda Rain Ob																				
700011 Test Site Monitoring																					
ES:EO:I:10	Global Test Site Monitoring																				
ES:EO:I:12	NASA - Global Test Site Monitoring																				
810525 Visual Earth Observations																					
ES:EO:I:37	Earth Observations for Visual Earth																				
ES:EO:I:38	Data Transfer for Visual Observatio																				
890615 Visual Observations																					
ES:EO:I:40	Investigation of the Optical Quality																				
ES:EO:I:40	Investigation of the Optical Quality																				
110047 Effects of Gravity on Insect Circadian																					
FB:DEV:I:73	Preparation of Priroda Lockers																				
FB:DEV:I:75	Beetle Kit Stowage and Experiment																				
FB:DEV:I:76	Verify Beetle Kit Power Status																				
FB:DEV:I:77	Beetle Kit Ventilation																				
FB:DEV:I:78	Experiment Deactivation																				
890268 Developmental Analysis of Seeds Grow																					
FB:DEV:I:33	GEMS Assembly																				
FB:DEV:I:34	Seed Planting																				
FB:DEV:I:35	Video Observations and Photograph																				

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		1/11/97	1/12/97	1/13/97	1/14/97	1/15/97	1/16/97	1/17/97	1/18/97	1/19/97	1/20/97	1/21/97	1/22/97	1/23/97	1/24/97	1/25/97	1/26/97	1/27/97	1/28/97	1/29/97	1/30/97
Investigation	**Session FD**	**181**	**182**	**183**	**184**	**185**	**186**	**187**	**188**	**189**	**190**	**191**	**192**	**193**	**194**	**195**	**196**	**197**	**198**	**199**	**200**
FB:DEV:I:36	Daily Operations & Data Downlink																				
FB:DEV:I:37	Final Harvest of Plant Samples - Firs																				
FB:DEV:I:39	Svet and GEMS Functional Check,																				
FB:DEV:I:40	Svet Assembly and Program 1																				
FB:DEV:I:41	Svet Root Module and Soil Moistur																				
FB:DEV:I:42	De-Install Root Module from Svet																				
FB:DEV:I:43	Final Harvest of Plant Samples - Thi																				
FB:DEV:I:80	GEMS hardware Collection and Pre																				
FB:DEV:I:81	Svet and GEMS Inventory Check																				
FB:DEV:I:82	Program 2																				
FB:DEV:I:83	Program 3																				
FB:DEV:I:84	Zeroing Differential Pressures																				
FB:DEV:I:85	Leaf Bag Assembly Removal																				
FB:DEV:I:86	1st Fixation																				
FB:DEV:I:87	Pollination																				
FB:DEV:I:88	Terminalization and Second Fixatio																				
FB:DEV:I:89	Hard Drive (Winchester) Replaceme																				
FB:DEV:I:90	Leaf Bag Assembly Installation, Exp																				
FB:DEV:I:91	Seed Strip Preparation																				
FB:DEV:I:92	Processing of Mir Core Svet Teleme																				
FB:DEV:I:93	Refill Water Container																				
FB:DEV:I:94	Svet and GEMS disassembly																				
	HLS																				
110019	**Sleep Investigations (639/663/710)**																				
HLS:MET:I:36	Night Headband - Presleep	38	38	38	38	38	38	38	38	38	38	38									
HLS:MET:I:40	MIPS Data Download					8							8								
HLS:MET:I:43	Blood Collection and Processing			160	160																
HLS:MET:I:46	MSRR Recording			80	80																
HLS:MET:I:48	Night Headband Postsleep	74	74	74	74	74	74	74	74	74	74	74	74								
HLS:MET:I:49	Doff MSRR Hardware and Stow Ass				35	35															
HLS:MET:I:52	MIPS Data Download																				
HLS:MET:I:77	Night Headband - Presleep																				
110028	**Frames of Reference for Sensori-motor**																				
HLS:NEU:I:23	COGNILAB Test A																				
HLS:NEU:I:24	COGNILAB Test B																				
HLS:NEU:I:40	Locate COGNILAB Equipment																				
110034	**Magnetic Resonance Imaging (MRI) Af**																				
HLS:MS:I:2	Back Pain Questionnaire - Mir Crew																				
HLS:MS:I:8	Back Pain Questionnaire - NASA Cr																				
110037	**Crewmember and Crew-Ground Intera**																				

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		1/11/97	1/12/97	1/13/97	1/14/97	1/15/97	1/16/97	1/17/97	1/18/97	1/19/97	1/20/97	1/21/97	1/22/97	1/23/97	1/24/97	1/25/97	1/26/97	1/27/97	1/28/97	1/29/97	1/30/97
Investigation	**Session FD**	**181**	**182**	**183**	**184**	**185**	**186**	**187**	**188**	**189**	**190**	**191**	**192**	**193**	**194**	**195**	**196**	**197**	**198**	**199**	**200**
HLS:BP:I:10	Mir Crew: Completion of Computer							50							50						
HLS:BP:I:11	NASA Crew: Completion of Comp																				
890091	**GASMAP Facility Operations**																				
HLS:FAC:I:1	GASMAP Check-Out																				
HLS:FAC:I:3	GASMAP Rough-Out																				
HLS:FAC:I:4	GASMAP Full Functional Check an																				
	ISS																				
650006	**Enhanced Dynamic Load Sensors (EDL**																				
ISS:DYN:I:2	Enhanced Dynamics Load Sensor (E																				
ISS:DYN:I:2	Enhanced Dynamics Load Sensor (E																				
ISS:DYN:I:26	Enhanced Dynamics Load Sensor U																				
ISS:DYN:I:36	Enhanced Dynamics Load Sensor (E																				
650007	**Optical Properties Monitor (OPM)**																				
ISS:ENV:I:19	OPM Data Collection																				
650008	**Water Microbiological Monitoring (W**																				
ISS:CHS:I:13	Microbial Capture Device Processin																				
ISS:CHS:I:15	Microbial Capture Device Colony C																				
650009	**Mir Electric Field Characterization (M**																				
ISS:ENV:I:46	MEFC Experiment Set-up and Data																				
650013	**Mir Structural Dynamics Experiment (**																				
ISS:DYN:I:11	MiSDE 4a - Mir Thruster Firing Dat																				
ISS:DYN:I:12	MiSDE E5 - Shuttle Thruster Firing																				
ISS:DYN:I:13	MiSDE 2a - Ambient Noise Data Co																				
ISS:DYN:I:14	MiSDE 2c - Ambient Noise Data Co																				
ISS:DYN:I:15	MiSDE 2d - Ambient Noise Data Co																				
ISS:DYN:I:16	MiSDE 3a - IVA Data Collection (S																				
ISS:DYN:I:37	MiSDE Equipment Visual Inspectio																				
ISS:DYN:I:38	MiSDE Docking - Shuttle Docking																				
ISS:DYN:I:5	MiSDE 2b - Ambient Noise Data Co																				
ISS:DYN:I:6	MiSDE 2e - Ambient Noise Data Co																				
ISS:DYN:I:7	MiSDE 2f - Ambient Noise Data Col																				
ISS:DYN:I:8	MiSDE 3b - IVA Data Collection (																				
ISS:DYN:I:9	MiSDE 4b - Mir Thruster Firing Dat																				
	LSR																				
650015	**Water Quality Monitor (WQM)**																				
LSR:CHS:I:13	Reagent Mixing for TOC Analyzer																				
LSR:CHS:I:21	Mir Potable Water Collection and In																				
LSR:CHS:I:23	Mir Potable Water Collection and In																				
LSR:CHS:I:8	Inflight TOC Analysis of Ground-Pr																				

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		1/11/97	1/12/97	1/13/97	1/14/97	1/15/97	1/16/97	1/17/97	1/18/97	1/19/97	1/20/97	1/21/97	1/22/97	1/23/97	1/24/97	1/25/97	1/26/97	1/27/97	1/28/97	1/29/97	1/30/97
Investigation	**Session** **FD**	**181**	**182**	**183**	**184**	**185**	**186**	**187**	**188**	**189**	**190**	**191**	**192**	**193**	**194**	**195**	**196**	**197**	**198**	**199**	**200**
750029	**Microgravity Isolation Mount (MIM) F**																				
MG:FAC:I:36	MIM Health and Status Check																				
750030	**Microgravity Glovebox (MGBX) Facilit**																				
MG:FAC:I:9	MGBX Facility Checkout and Condi																				
750031	**Biotechnology System (BTS) Facility O**																				
MG:FAC:I:38	BTS Facility Functional Tests-EEC1																				
890043	**QUELD Furnace Experiment - MIM**																				
MG:MTS:I:2	QUELD Experiment Mounting																				
MG:MTS:I:37	QUELD Furnace Activation																				
MG:MTS:I:38	QUELD Furnace Experiment Operat																				
MG:MTS:I:6	QUELD Furnace Experiment Dismo																				
890079	**Space Acceleration Measurement Syste**																				
MG:ENV:I:6	SAMS Data Collection for Docking																				
MG:ENV:I:7	SAMS Data Collection for Undocki																				
MG:FAC:I:29	SAMS Maintenance - TSH Bias Me																				
890093	**Biochemistry of 3-D Tissue Engineering**																				
MG:BT:I:16	Cell Sample Transfer, Fixation and																				
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MG:FAC:I:39	BEM/BSTC-M and BTR Facility M																				
890252	**Canadian Protein Crystallization Exper**																				
MG:BT:I:29	CAPE Experiment Initiation																				
MG:BT:I:33	CAPE Experiment Termination, Dis																				
MG:BT:I:34	CAPE/MIM Continuous Operations																				
MG:BT:I:62	CAPE/MIM Daily Status Checks																				
MG:BT:I:63	MIM Data Sampling Rate Change																				
MG:BT:I:64	CAPE Video Tape Changeout																				
MG:BT:I:65	MIM Data Archiving																				
MG:BT:I:66	CAPE Mounting to MIM and CAPE																				
890255	**Ambient Diffusion Controlled Protein C**																				
MG:BT:I:28	DCAM Photography Operations																				
890265	**Colloidal Gelation**																				
MG:FP:I:72	Unstow Equipment and Setup in M																				
MG:FP:I:73	Binary Colloidal Alloy Samples - IA																				
MG:FP:I:74	Binary Colloidal Alloy Samples - IB																				
MG:FP:I:75	GEL Properties for Colloid Polymer																				
MG:FP:I:76	Gel Properties for Colloid Polymer																				

Investigation	Payload Category / Session	FD	Thu 1/11/97 181	Fri 1/12/97 182	Sat 1/13/97 183	Sun 1/14/97 184	Mon 1/15/97 185	Tue 1/16/97 186	Wed 1/17/97 187	Thu 1/18/97 188	Fri 1/19/97 189	Sat 1/20/97 190	Sun 1/21/97 191	Mon 1/22/97 192	Tue 1/23/97 193	Wed 1/24/97 194	Thu 1/25/97 195	Fri 1/26/97 196	Sat 1/27/97 197	Sun 1/28/97 198	Mon 1/29/97 199	Tue 1/30/97 200
MG:FP:I:77	Three Phase Colloid Polymer Initiati																					
MG:FP:I:78	Three Phase Colloid Polymer Growt																					
MG:FP:I:79	Three Phase Colloidal Growth Vide																					
MG:FP:I:80	Long Term Colloid Polymers - IIF																					
MG:FP:I:81	Fractal Aggregation Combination Sa																					
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MG:FP:I:83	Fractal Aggregation Gel Properties -																					
MG:FP:I:84	Fractal Aggregation Gelation Proces																					
MG:FP:I:85	Deactivate and Stow Equipment																					
890437	**Mir Inventory**																					
OPS:SHR:I:1	Mir Inventory Session																					
890096	**Space Medicine Program - US Medical**																					
SMP:MO:I:13	MO-11 Radiation Data Download E																					
SMP:MO:I:2	MO-1 Private Medical Conference																					
SMP:MO:I:27	MO-6 Crew Status and Support Trac																					
SMP:MO:I:28	MO-12 Radiation Monitoring																					
SMP:MO:I:29	MO-9 Physical Exam																					
SMP:MO:I:31	MO:2 Install Updated BDL software																					
SMP:MO:I:32	MO-2 Barcode Data Logger Downlo																					
SMP:MO:I:35	MO-10 Analysis of Urine Samples																					
SMP:MO:I:36	MO-11 TEPC Display Call Down																					
SMP:MO:I:37	MO-14 Environmental Health Anom																					
SMP:MO:I:38	MO-2 Barcode Data Logger Downli																					
890607	**Analysis of Mir Archival Water Sample**																					
SMP:ENV:I:1	Humidity Condensate Set-up																					
SMP:ENV:I:16	Docked Phase Water Collection and																					
SMP:ENV:I:19	Pre-Adsorption Bed Change-out Wa																					
SMP:ENV:I:2	Humidity Condensate Dismantle		45																			
SMP:ENV:I:22	Post-Adsorption Bed Change-out W																					
890608	**Crew Microbiological Assessment**																					
SMP:MIC:I:1	Crew Microbial Sample Collection -																					
SMP:MIC:I:2	Crew Microbial Sample Collection -																					
890609	**Mir Microbiological Assessment**																					
SMP:ENV:I:15	Air & Surface Sample Collections o																					
SMP:ENV:I:7	MAS Recharge with UBC on Mir																					
SMP:ENV:I:8	Surface and Air Sample Collection																					
SMP:ENV:I:9	Colony Count and Photo of Samples																					
890610	**Toxicological Assessment of Airborne V**																					

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		1/11/97	1/12/97	1/13/97	1/14/97	1/15/97	1/16/97	1/17/97	1/18/97	1/19/97	1/20/97	1/21/97	1/22/97	1/23/97	1/24/97	1/25/97	1/26/97	1/27/97	1/28/97	1/29/97	1/30/97
Investigation	**Session** **FD**	**181**	**182**	**183**	**184**	**185**	**186**	**187**	**188**	**189**	**190**	**191**	**192**	**193**	**194**	**195**	**196**	**197**	**198**	**199**	**200**
SMP:ENV:I:12	Activate SSAS																				
SMP:ENV:I:13	Grab Air Sampling																				
SMP:ENV:I:14	Deactivate SSAS																				
890613	**Mir Defibrillator and Crew Medical Re**																				
SMP:CH:I:1	Mir Defibrillator Checkout																				
SMP:CH:I:2	Mir CMRS Operational Checkout																				
Crewtime Daily Totals (in minutes)		157	112	352	387	155	112	162	112	112	112	112	82	0	50	0	0	0	0	0	0
Crewtime Daily Totals (in hours)		2.62	1.87	5.87	6.45	2.58	1.87	2.70	1.87	1.87	1.87	1.87	1.37	0.00	0.83	0.00	0.00	0.00	0.00	0.00	0.00
Daily Cum Totals (in hours)		785.52	787.38	793.25	799.70	802.28	804.15	806.85	808.72	810.58	812.45	814.32	815.68	815.68	816.52	816.52	816.52	816.52	816.52	816.52	816.52

In-flight Crewtime Scenario (by Flight Days) - Mir 24 NASA 5

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		12/1/97	12/2/97	12/3/97	12/4/97	12/5/97	12/6/97	12/7/97	12/8/97	12/9/97	2/10/97	2/11/97	2/12/97	2/13/97	2/14/97	2/15/97	2/16/97	2/17/97	2/18/97	2/19/97	2/20/97
Investigation / Session	FD	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220
ADV																					
600006 Commercial Generic Bioprocessing Ap																					
ADV:OPS:I:1	Locker Preparation for CGBA-ICM-																				
ADV:OPS:I:2	Locker Preparation for CGBA-ICM-																				
ES																					
700004 Regional & Temporal Variability of Pri																					
ES:OB:I:1	EO3 - Regional & Temporal Variabi																				
700005 Calibration & Validation of Priroda Mi																					
ES:HYD:I:1	EO7-Calibration & Validation of Pri																				
700006 Watershed Hydrologic Studies																					
ES:HYD:I:2	EO4 - Watershed Hydrologic Studie																				
700007 Validation of Biosphere-Atmosphere In																					
ES:LAI:I:1	EO2-Validation of Biosphere-Atmos																				
700008 Comparison of Atmospheric Chemistry																					
ES:AC:I:1	EO8 - Comparison of Atmospheric																				
700010 Validation of Priroda Rain Observation																					
ES:MT:I:1	EO6 - Validation of Priroda Rain Ob																				
700011 Test Site Monitoring																					
ES:EO:I:10	Global Test Site Monitoring																				
ES:EO:I:12	NASA - Global Test Site Monitoring																				
810525 Visual Earth Observations																					
ES:EO:I:37	Earth Observations for Visual Earth																				
ES:EO:I:38	Data Transfer for Visual Observatio																				
890615 Visual Observations																					
ES:EO:I:40	Investigation of the Optical Quality																				
ES:EO:I:40	Investigation of the Optical Quality																				
FB																					
110047 Effects of Gravity on Insect Circadian																					
FB:DEV:I:73	Preparation of Priroda Lockers																				
FB:DEV:I:75	Beetle Kit Stowage and Experiment																				
FB:DEV:I:76	Verify Beetle Kit Power Status																				
FB:DEV:I:77	Beetle Kit Ventilation																				
FB:DEV:I:78	Experiment Deactivation																				
890268 Developmental Analysis of Seeds Grow																					
FB:DEV:I:33	GEMS Assembly																				
FB:DEV:I:34	Seed Planting																				
FB:DEV:I:35	Video Observations and Photograph																				

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		12/1/97	12/2/97	12/3/97	12/4/97	12/5/97	12/6/97	12/7/97	12/8/97	12/9/97	2/10/97	2/11/97	2/12/97	2/13/97	2/14/97	2/15/97	2/16/97	2/17/97	2/18/97	2/19/97	2/20/97
Investigation	**Session FD**	**201**	**202**	**203**	**204**	**205**	**206**	**207**	**208**	**209**	**210**	**211**	**212**	**213**	**214**	**215**	**216**	**217**	**218**	**219**	**220**
FB:DEV:I:36	Daily Operations & Data Downlink																				
FB:DEV:I:37	Final Harvest of Plant Samples - Firs																				
FB:DEV:I:39	Svet and GEMS Functional Check,																				
FB:DEV:I:40	Svet Assembly and Program 1																				
FB:DEV:I:41	Svet Root Module and Soil Moistur																				
FB:DEV:I:42	De-Install Root Module from Svet																				
FB:DEV:I:43	Final Harvest of Plant Samples - Thi																				
FB:DEV:I:80	GEMS hardware Collection and Pre																				
FB:DEV:I:81	Svet and GEMS Inventory Check																				
FB:DEV:I:82	Program 2																				
FB:DEV:I:83	Program 3																				
FB:DEV:I:84	Zeroing Differential Pressures																				
FB:DEV:I:85	Leaf Bag Assembly Removal																				
FB:DEV:I:86	1st Fixation																				
FB:DEV:I:87	Pollination																				
FB:DEV:I:88	Terminalization and Second Fixatio																				
FB:DEV:I:89	Hard Drive (Winchester) Replaceme																				
FB:DEV:I:90	Leaf Bag Assembly Installation, Exp																				
FB:DEV:I:91	Seed Strip Preparation																				
FB:DEV:I:92	Processing of Mir Core Svet Teleme																				
FB:DEV:I:93	Refill Water Container																				
FB:DEV:I:94	Svet and GEMS disassembly																				
HLS																					
110019	**Sleep Investigations (639/663/710)**																				
HLS:MET:I:36	Night Headband - Presleep																				
HLS:MET:I:40	MIPS Data Download																				
HLS:MET:I:43	Blood Collection and Processing																				
HLS:MET:I:46	MSRR Recording																				
HLS:MET:I:48	Night Headband Postsleep																				
HLS:MET:I:49	Doff MSRR Hardware and Stow Ass																				
HLS:MET:I:52	MIPS Data Download																				
HLS:MET:I:77	Night Headband - Presleep																				
110028	**Frames of Reference for Sensori-motor**																				
HLS:NEU:I:23	COGNILAB Test A																				
HLS:NEU:I:24	COGNILAB Test B																				
HLS:NEU:I:40	Locate COGNILAB Equipment																				
110034	**Magnetic Resonance Imaging (MRI) Af**																				
HLS:MS:I:2	Back Pain Questionnaire - Mir Crew																				
HLS:MS:I:8	Back Pain Questionnaire - NASA Cr																				
110037	**Crewmember and Crew-Ground Intera**																				

Investigation	Payload Category / Session	FD	Thu 12/1/97	Fri 12/2/97	Sat 12/3/97	Sun 12/4/97	Mon 12/5/97	Tue 12/6/97	Wed 12/7/97	Thu 12/8/97	Fri 12/9/97	Sat 2/10/97	Sun 2/11/97	Mon 2/12/97	Tue 2/13/97	Wed 2/14/97	Thu 2/15/97	Fri 2/16/97	Sat 2/17/97	Sun 2/18/97	Mon 2/19/97	Tue 2/20/97
			201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220
HLS:BP:I:10	Mir Crew: Completion of Computer		50							50							50					
HLS:BP:I:11	NASA Crew: Completion of Comp																					
890091	**GASMAP Facility Operations**																					
HLS:FAC:I:1	GASMAP Check-Out																					
HLS:FAC:I:3	GASMAP Rough-Out																					
HLS:FAC:I:4	GASMAP Full Functional Check an																					
650006	**Enhanced Dynamic Load Sensors (EDL**																					
ISS:DYN:I:2	Enhanced Dynamics Load Sensor (E																					
ISS:DYN:I:2	Enhanced Dynamics Load Sensor (E																					
ISS:DYN:I:26	Enhanced Dynamics Load Sensor U																					
ISS:DYN:I:36	Enhanced Dynamics Load Sensor (E																					
650007	**Optical Properties Monitor (OPM)**																					
ISS:ENV:I:19	OPM Data Collection																					
650008	**Water Microbiological Monitoring (W**																					
ISS:CHS:I:13	Microbial Capture Device Processin																					
ISS:CHS:I:15	Microbial Capture Device Colony C																					
650009	**Mir Electric Field Characterization (M**																					
ISS:ENV:I:46	MEFC Experiment Set-up and Data																					
650013	**Mir Structural Dynamics Experiment (**																					
ISS:DYN:I:11	MiSDE 4a - Mir Thruster Firing Dat																					
ISS:DYN:I:12	MiSDE E5 - Shuttle Thruster Firing																					
ISS:DYN:I:13	MiSDE 2a - Ambient Noise Data Co																					
ISS:DYN:I:14	MiSDE 2c - Ambient Noise Data Co																					
ISS:DYN:I:15	MiSDE 2d - Ambient Noise Data Co																					
ISS:DYN:I:16	MiSDE 3a - IVA Data Collection (S																					
ISS:DYN:I:37	MiSDE Equipment Visual Inspectio																					
ISS:DYN:I:38	MiSDE Docking - Shuttle Docking																					
ISS:DYN:I:5	MiSDE 2b - Ambient Noise Data Co																					
ISS:DYN:I:6	MiSDE 2e - Ambient Noise Data Co																					
ISS:DYN:I:7	MiSDE 2f - Ambient Noise Data Col																					
ISS:DYN:I:8	MiSDE 3b - IVA Data Collection (																					
ISS:DYN:I:9	MiSDE 4b - Mir Thruster Firing Dat																					
650015	**Water Quality Monitor (WQM)**																					
LSR:CHS:I:13	Reagent Mixing for TOC Analyzer																					
LSR:CHS:I:21	Mir Potable Water Collection and In																					
LSR:CHS:I:23	Mir Potable Water Collection and In																					
LSR:CHS:I:8	Inflight TOC Analysis of Ground-Pr																					

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		12/1/97	12/2/97	12/3/97	12/4/97	12/5/97	12/6/97	12/7/97	12/8/97	12/9/97	2/10/97	2/11/97	2/12/97	2/13/97	2/14/97	2/15/97	2/16/97	2/17/97	2/18/97	2/19/97	2/20/97
Investigation	**Session** **FD**	**201**	**202**	**203**	**204**	**205**	**206**	**207**	**208**	**209**	**210**	**211**	**212**	**213**	**214**	**215**	**216**	**217**	**218**	**219**	**220**
750029	**Microgravity Isolation Mount (MIM) F**																				
MG:FAC:I:36	MIM Health and Status Check																				
750030	**Microgravity Glovebox (MGBX) Facilit**																				
MG:FAC:I:9	MGBX Facility Checkout and Condi																				
750031	**Biotechnology System (BTS) Facility O**																				
MG:FAC:I:38	BTS Facility Functional Tests-EEC1																				
890043	**QUELD Furnace Experiment - MIM**																				
MG:MTS:I:2	QUELD Experiment Mounting																				
MG:MTS:I:37	QUELD Furnace Activation																				
MG:MTS:I:38	QUELD Furnace Experiment Operat																				
MG:MTS:I:6	QUELD Furnace Experiment Dismo																				
890079	**Space Acceleration Measurement Syste**																				
MG:ENV:I:6	SAMS Data Collection for Docking																				
MG:ENV:I:7	SAMS Data Collection for Undocki																				
MG:FAC:I:29	SAMS Maintenance - TSH Bias Me																				
890093	**Biochemistry of 3-D Tissue Engineering**																				
MG:BT:I:16	Cell Sample Transfer, Fixation and																				
MG:BT:I:18	Science Experiment Termination																				
MG:BT:I:59	Media Sample and Testing																				
MG:BT:I:60	Culture Microscopy and Photograph																				
MG:BT:I:61	BEM/BSTC-M Engineering Evaluat																				
MG:BT:I:67	BEM/BSTC-M and BTR Continuou																				
MG:FAC:I:39	BEM/BSTC-M and BTR Facility M																				
890252	**Canadian Protein Crystallization Exper**																				
MG:BT:I:29	CAPE Experiment Initiation																				
MG:BT:I:33	CAPE Experiment Termination, Dis																				
MG:BT:I:34	CAPE/MIM Continuous Operations																				
MG:BT:I:62	CAPE/MIM Daily Status Checks																				
MG:BT:I:63	MIM Data Sampling Rate Change																				
MG:BT:I:64	CAPE Video Tape Changeout																				
MG:BT:I:65	MIM Data Archiving																				
MG:BT:I:66	CAPE Mounting to MIM and CAPE																				
890255	**Ambient Diffusion Controlled Protein C**																				
MG:BT:I:28	DCAM Photography Operations																				
890265	**Colloidal Gelation**																				
MG:FP:I:72	Unstow Equipment and Setup in M																				
MG:FP:I:73	Binary Colloidal Alloy Samples - IA																				
MG:FP:I:74	Binary Colloidal Alloy Samples - IB																				
MG:FP:I:75	GEL Properties for Colloid Polymer																				
MG:FP:I:76	Gel Properties for Colloid Polymer																				

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		12/1/97	12/2/97	12/3/97	12/4/97	12/5/97	12/6/97	12/7/97	12/8/97	12/9/97	2/10/97	2/11/97	2/12/97	2/13/97	2/14/97	2/15/97	2/16/97	2/17/97	2/18/97	2/19/97	2/20/97
Investigation	**Session FD**	**201**	**202**	**203**	**204**	**205**	**206**	**207**	**208**	**209**	**210**	**211**	**212**	**213**	**214**	**215**	**216**	**217**	**218**	**219**	**220**
MG:FP:I:77	Three Phase Colloid Polymer Initiati																				
MG:FP:I:78	Three Phase Colloid Polymer Growt																				
MG:FP:I:79	Three Phase Colloidal Growth Vide																				
MG:FP:I:80	Long Term Colloid Polymers - IIF																				
MG:FP:I:81	Fractal Aggregation Combination Sa																				
MG:FP:I:82	Fractal Aggregation Gelation Proces																				
MG:FP:I:83	Fractal Aggregation Gel Properties -																				
MG:FP:I:84	Fractal Aggregation Gelation Proces																				
MG:FP:I:85	Deactivate and Stow Equipment																				
OPS																					
890437	**Mir Inventory**																				
OPS:SHR:I:1	Mir Inventory Session																				
MIR																					
890096	**Space Medicine Program - US Medical**																				
SMP:MO:I:13	MO-11 Radiation Data Download E																				
SMP:MO:I:2	MO-1 Private Medical Conference																				
SMP:MO:I:27	MO-6 Crew Status and Support Trac																				
SMP:MO:I:28	MO-12 Radiation Monitoring																				
SMP:MO:I:29	MO-9 Physical Exam																				
SMP:MO:I:31	MO:2 Install Updated BDL software																				
SMP:MO:I:32	MO-2 Barcode Data Logger Downlo																				
SMP:MO:I:35	MO-10 Analysis of Urine Samples																				
SMP:MO:I:36	MO-11 TEPC Display Call Down																				
SMP:MO:I:37	MO-14 Environmental Health Anom																				
SMP:MO:I:38	MO-2 Barcode Data Logger Downli																				
890607	**Analysis of Mir Archival Water Sample**																				
SMP:ENV:I:1	Humidity Condensate Set-up																				
SMP:ENV:I:16	Docked Phase Water Collection and																				
SMP:ENV:I:19	Pre-Adsorption Bed Change-out Wa																				
SMP:ENV:I:2	Humidity Condensate Dismantle																				
SMP:ENV:I:22	Post-Adsorption Bed Change-out W																				
890608	**Crew Microbiological Assessment**																				
SMP:MIC:I:1	Crew Microbial Sample Collection -																				
SMP:MIC:I:2	Crew Microbial Sample Collection -																				
890609	**Mir Microbiological Assessment**																				
SMP:ENV:I:15	Air & Surface Sample Collections o																				
SMP:ENV:I:7	MAS Recharge with UBC on Mir																				
SMP:ENV:I:8	Surface and Air Sample Collection																				
SMP:ENV:I:9	Colony Count and Photo of Samples																				
890610	**Toxicological Assessment of Airborne V**																				

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		12/1/97	12/2/97	12/3/97	12/4/97	12/5/97	12/6/97	12/7/97	12/8/97	12/9/97	2/10/97	2/11/97	2/12/97	2/13/97	2/14/97	2/15/97	2/16/97	2/17/97	2/18/97	2/19/97	2/20/97
Investigation	**Session** **FD**	**201**	**202**	**203**	**204**	**205**	**206**	**207**	**208**	**209**	**210**	**211**	**212**	**213**	**214**	**215**	**216**	**217**	**218**	**219**	**220**
SMP:ENV:I:12	Activate SSAS																				
SMP:ENV:I:13	Grab Air Sampling																				
SMP:ENV:I:14	Deactivate SSAS																				
890613	**Mir Defibrillator and Crew Medical Re**																				
SMP:CH:I:1	Mir Defibrillator Checkout																				
SMP:CH:I:2	Mir CMRS Operational Checkout																				
Crewtime Daily Totals (in minutes)		50	0	0	0	0	0	0	50	0	0	0	0	0	0	50	0	0	0	0	0
Crewtime Daily Totals (in hours)		0.83	0.00	0.00	0.00	0.00	0.00	0.00	0.83	0.00	0.00	0.00	0.00	0.00	0.00	0.83	0.00	0.00	0.00	0.00	0.00
Daily Cum Totals (in hours)		817.35	817.35	817.35	817.35	817.35	817.35	817.35	818.18	818.18	818.18	818.18	818.18	818.18	818.18	819.02	819.02	819.02	819.02	819.02	819.02

In-flight Crewtime Scenario (by Flight Days) - Mir 24 NASA 5

PIPS

Payload Category / Investigation	Session	FD	Thu 2/21/97	Fri 2/22/97	Sat 2/23/97	Sun 2/24/97	Mon 2/25/97	Tue 2/26/97	Wed 2/27/97	Thu 2/28/97	Fri 2/29/97	Sat 2/30/97	Sun 2/31/97	Mon 1/1/98	Tue 1/2/98	Wed 1/3/98	Thu 1/4/98	Fri 1/5/98	Sat 1/6/98	Sun 1/7/98	Mon 1/8/98	Tue 1/9/98
			221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240
ADV																						
600006	**Commercial Generic Bioprocessing Ap**																					
ADV:OPS:I:1	Locker Preparation for CGBA-ICM-																					
ADV:OPS:I:2	Locker Preparation for CGBA-ICM-																					
ES																						
700004	**Regional & Temporal Variability of Pri**																					
ES:OB:I:1	EO3 - Regional & Temporal Variabi																					
700005	**Calibration & Validation of Priroda Mi**																					
ES:HYD:I:1	EO7-Calibration & Validation of Pri																					
700006	**Watershed Hydrologic Studies**																					
ES:HYD:I:2	EO4 - Watershed Hydrologic Studie																					
700007	**Validation of Biosphere-Atmosphere In**																					
ES:LAI:I:1	EO2-Validation of Biosphere-Atmos																					
700008	**Comparison of Atmospheric Chemistry**																					
ES:AC:I:1	EO8 - Comparison of Atmospheric																					
700010	**Validation of Priroda Rain Observation**																					
ES:MT:I:1	EO6 - Validation of Priroda Rain Ob																					
700011	**Test Site Monitoring**																					
ES:EO:I:10	Global Test Site Monitoring																					
ES:EO:I:12	NASA - Global Test Site Monitoring																					
810525	**Visual Earth Observations**																					
ES:EO:I:37	Earth Observations for Visual Earth																					
ES:EO:I:38	Data Transfer for Visual Observatio																					
890615	**Visual Observations**																					
ES:EO:I:40	Investigation of the Optical Quality																					
ES:EO:I:40	Investigation of the Optical Quality																					
FB																						
110047	**Effects of Gravity on Insect Circadian**																					
FB:DEV:I:73	Preparation of Priroda Lockers																					
FB:DEV:I:75	Beetle Kit Stowage and Experiment																					
FB:DEV:I:76	Verify Beetle Kit Power Status																					
FB:DEV:I:77	Beetle Kit Ventilation																					
FB:DEV:I:78	Experiment Deactivation																					
890268	**Developmental Analysis of Seeds Grow**																					
FB:DEV:I:33	GEMS Assembly																					
FB:DEV:I:34	Seed Planting																					
FB:DEV:I:35	Video Observations and Photograph																					

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		2/21/97	2/22/97	2/23/97	2/24/97	2/25/97	2/26/97	2/27/97	2/28/97	2/29/97	2/30/97	2/31/97	1/1/98	1/2/98	1/3/98	1/4/98	1/5/98	1/6/98	1/7/98	1/8/98	1/9/98
Investigation	**Session FD**	**221**	**222**	**223**	**224**	**225**	**226**	**227**	**228**	**229**	**230**	**231**	**232**	**233**	**234**	**235**	**236**	**237**	**238**	**239**	**240**
FB:DEV:I:36	Daily Operations & Data Downlink																				
FB:DEV:I:37	Final Harvest of Plant Samples - Firs																				
FB:DEV:I:39	Svet and GEMS Functional Check,																				
FB:DEV:I:40	Svet Assembly and Program 1																				
FB:DEV:I:41	Svet Root Module and Soil Moistur																				
FB:DEV:I:42	De-Install Root Module from Svet																				
FB:DEV:I:43	Final Harvest of Plant Samples - Thi																				
FB:DEV:I:80	GEMS hardware Collection and Pre																				
FB:DEV:I:81	Svet and GEMS Inventory Check																				
FB:DEV:I:82	Program 2																				
FB:DEV:I:83	Program 3																				
FB:DEV:I:84	Zeroing Differential Pressures																				
FB:DEV:I:85	Leaf Bag Assembly Removal																				
FB:DEV:I:86	1st Fixation																				
FB:DEV:I:87	Pollination																				
FB:DEV:I:88	Terminalization and Second Fixatio																				
FB:DEV:I:89	Hard Drive (Winchester) Replaceme																				
FB:DEV:I:90	Leaf Bag Assembly Installation, Exp																				
FB:DEV:I:91	Seed Strip Preparation																				
FB:DEV:I:92	Processing of Mir Core Svet Teleme																				
FB:DEV:I:93	Refill Water Container																				
FB:DEV:I:94	Svet and GEMS disassembly																				
	HLS																				
110019	**Sleep Investigations (639/663/710)**																				
HLS:MET:I:36	Night Headband - Presleep																				
HLS:MET:I:40	MIPS Data Download																				
HLS:MET:I:43	Blood Collection and Processing																				
HLS:MET:I:46	MSRR Recording																				
HLS:MET:I:48	Night Headband Postsleep																				
HLS:MET:I:49	Doff MSRR Hardware and Stow Ass																				
HLS:MET:I:52	MIPS Data Download																				
HLS:MET:I:77	Night Headband - Presleep																				
110028	**Frames of Reference for Sensori-motor**																				
HLS:NEU:I:23	COGNILAB Test A																				
HLS:NEU:I:24	COGNILAB Test B																				
HLS:NEU:I:40	Locate COGNILAB Equipment																				
110034	**Magnetic Resonance Imaging (MRI) Af**																				
HLS:MS:I:2	Back Pain Questionnaire - Mir Crew																				
HLS:MS:I:8	Back Pain Questionnaire - NASA Cr																				
110037	**Crewmember and Crew-Ground Intera**																				

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		2/21/97	2/22/97	2/23/97	2/24/97	2/25/97	2/26/97	2/27/97	2/28/97	2/29/97	2/30/97	2/31/97	1/1/98	1/2/98	1/3/98	1/4/98	1/5/98	1/6/98	1/7/98	1/8/98	1/9/98
Investigation	**Session FD**	**221**	**222**	**223**	**224**	**225**	**226**	**227**	**228**	**229**	**230**	**231**	**232**	**233**	**234**	**235**	**236**	**237**	**238**	**239**	**240**
HLS:BP:I:10	Mir Crew: Completion of Computer																				
HLS:BP:I:11	NASA Crew: Completion of Comp																				
890091	**GASMAP Facility Operations**																				
HLS:FAC:I:1	GASMAP Check-Out																				
HLS:FAC:I:3	GASMAP Rough-Out																				
HLS:FAC:I:4	GASMAP Full Functional Check an																				
ISS																					
650006	**Enhanced Dynamic Load Sensors (EDL**																				
ISS:DYN:I:2	Enhanced Dynamics Load Sensor (E																				
ISS:DYN:I:2	Enhanced Dynamics Load Sensor (E																				
ISS:DYN:I:26	Enhanced Dynamics Load Sensor U																				
ISS:DYN:I:36	Enhanced Dynamics Load Sensor (E																				
650007	**Optical Properties Monitor (OPM)**																				
ISS:ENV:I:19	OPM Data Collection																				
650008	**Water Microbiological Monitoring (W**																				
ISS:CHS:I:13	Microbial Capture Device Processin																				
ISS:CHS:I:15	Microbial Capture Device Colony C																				
650009	**Mir Electric Field Characterization (M**																				
ISS:ENV:I:46	MEFC Experiment Set-up and Data																				
650013	**Mir Structural Dynamics Experiment (**																				
ISS:DYN:I:11	MiSDE 4a - Mir Thruster Firing Dat																				
ISS:DYN:I:12	MiSDE E5 - Shuttle Thruster Firing																				
ISS:DYN:I:13	MiSDE 2a - Ambient Noise Data Co																				
ISS:DYN:I:14	MiSDE 2c - Ambient Noise Data Co																				
ISS:DYN:I:15	MiSDE 2d - Ambient Noise Data Co																				
ISS:DYN:I:16	MiSDE 3a - IVA Data Collection (S																				
ISS:DYN:I:37	MiSDE Equipment Visual Inspectio																				
ISS:DYN:I:38	MiSDE Docking - Shuttle Docking																				
ISS:DYN:I:5	MiSDE 2b - Ambient Noise Data Co																				
ISS:DYN:I:6	MiSDE 2e - Ambient Noise Data Co																				
ISS:DYN:I:7	MiSDE 2f - Ambient Noise Data Col																				
ISS:DYN:I:8	MiSDE 3b - IVA Data Collection (																				
ISS:DYN:I:9	MiSDE 4b - Mir Thruster Firing Dat																				
LSR																					
650015	**Water Quality Monitor (WQM)**																				
LSR:CHS:I:13	Reagent Mixing for TOC Analyzer																				
LSR:CHS:I:21	Mir Potable Water Collection and In																				
LSR:CHS:I:23	Mir Potable Water Collection and In																				
LSR:CHS:I:8	Inflight TOC Analysis of Ground-Pr																				
MC																					

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		2/21/97	2/22/97	2/23/97	2/24/97	2/25/97	2/26/97	2/27/97	2/28/97	2/29/97	2/30/97	2/31/97	1/1/98	1/2/98	1/3/98	1/4/98	1/5/98	1/6/98	1/7/98	1/8/98	1/9/98
Investigation	**Session** **FD**	**221**	**222**	**223**	**224**	**225**	**226**	**227**	**228**	**229**	**230**	**231**	**232**	**233**	**234**	**235**	**236**	**237**	**238**	**239**	**240**
750029	**Microgravity Isolation Mount (MIM) F**																				
MG:FAC:I:36	MIM Health and Status Check																				
750030	**Microgravity Glovebox (MGBX) Facilit**																				
MG:FAC:I:9	MGBX Facility Checkout and Condi																				
750031	**Biotechnology System (BTS) Facility O**																				
MG:FAC:I:38	BTS Facility Functional Tests-EEC1																				
890043	**QUELD Furnace Experiment - MIM**																				
MG:MTS:I:2	QUELD Experiment Mounting																				
MG:MTS:I:37	QUELD Furnace Activation																				
MG:MTS:I:38	QUELD Furnace Experiment Operat																				
MG:MTS:I:6	QUELD Furnace Experiment Dismo																				
890079	**Space Acceleration Measurement Syste**																				
MG:ENV:I:6	SAMS Data Collection for Docking																				
MG:ENV:I:7	SAMS Data Collection for Undocki																				
MG:FAC:I:29	SAMS Maintenance - TSH Bias Me																				
890093	**Biochemistry of 3-D Tissue Engineering**																				
MG:BT:I:16	Cell Sample Transfer, Fixation and																				
MG:BT:I:18	Science Experiment Termination																				
MG:BT:I:59	Media Sample and Testing																				
MG:BT:I:60	Culture Microscopy and Photograph																				
MG:BT:I:61	BEM/BSTC-M Engineering Evaluat																				
MG:BT:I:67	BEM/BSTC-M and BTR Continuou																				
MG:FAC:I:39	BEM/BSTC-M and BTR Facility M																				
890252	**Canadian Protein Crystallization Exper**																				
MG:BT:I:29	CAPE Experiment Initiation																				
MG:BT:I:33	CAPE Experiment Termination, Dis																				
MG:BT:I:34	CAPE/MIM Continuous Operations																				
MG:BT:I:62	CAPE/MIM Daily Status Checks																				
MG:BT:I:63	MIM Data Sampling Rate Change																				
MG:BT:I:64	CAPE Video Tape Changeout																				
MG:BT:I:65	MIM Data Archiving																				
MG:BT:I:66	CAPE Mounting to MIM and CAPE																				
890255	**Ambient Diffusion Controlled Protein C**																				
MG:BT:I:28	DCAM Photography Operations																				
890265	**Colloidal Gelation**																				
MG:FP:I:72	Unstow Equipment and Setup in M																				
MG:FP:I:73	Binary Colloidal Alloy Samples - IA																				
MG:FP:I:74	Binary Colloidal Alloy Samples - IB																				
MG:FP:I:75	GEL Properties for Colloid Polymer																				
MG:FP:I:76	Gel Properties for Colloid Polymer																				

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		2/21/97	2/22/97	2/23/97	2/24/97	2/25/97	2/26/97	2/27/97	2/28/97	2/29/97	2/30/97	2/31/97	1/1/98	1/2/98	1/3/98	1/4/98	1/5/98	1/6/98	1/7/98	1/8/98	1/9/98
Investigation	**Session FD**	**221**	**222**	**223**	**224**	**225**	**226**	**227**	**228**	**229**	**230**	**231**	**232**	**233**	**234**	**235**	**236**	**237**	**238**	**239**	**240**
MG:FP:I:77	Three Phase Colloid Polymer Initiati																				
MG:FP:I:78	Three Phase Colloid Polymer Growt																				
MG:FP:I:79	Three Phase Colloidal Growth Vide																				
MG:FP:I:80	Long Term Colloid Polymers - IIF																				
MG:FP:I:81	Fractal Aggregation Combination Sa																				
MG:FP:I:82	Fractal Aggregation Gelation Proces																				
MG:FP:I:83	Fractal Aggregation Gel Properties -																				
MG:FP:I:84	Fractal Aggregation Gelation Proces																				
MG:FP:I:85	Deactivate and Stow Equipment																				
OPS																					
890437	**Mir Inventory**																				
OPS:SHR:I:1	Mir Inventory Session																				
SMP																					
890096	**Space Medicine Program - US Medical**																				
SMP:MO:I:13	MO-11 Radiation Data Download E																				
SMP:MO:I:2	MO-1 Private Medical Conference																				
SMP:MO:I:27	MO-6 Crew Status and Support Trac																				
SMP:MO:I:28	MO-12 Radiation Monitoring																				
SMP:MO:I:29	MO-9 Physical Exam																				
SMP:MO:I:31	MO:2 Install Updated BDL software																				
SMP:MO:I:32	MO-2 Barcode Data Logger Downlo																				
SMP:MO:I:35	MO-10 Analysis of Urine Samples																				
SMP:MO:I:36	MO-11 TEPC Display Call Down																				
SMP:MO:I:37	MO-14 Environmental Health Anom																				
SMP:MO:I:38	MO-2 Barcode Data Logger Downli																				
890607	**Analysis of Mir Archival Water Sample**																				
SMP:ENV:I:1	Humidity Condensate Set-up																				
SMP:ENV:I:16	Docked Phase Water Collection and																				
SMP:ENV:I:19	Pre-Adsorption Bed Change-out Wa																				
SMP:ENV:I:2	Humidity Condensate Dismantle																				
SMP:ENV:I:22	Post-Adsorption Bed Change-out W																				
890608	**Crew Microbiological Assessment**																				
SMP:MIC:I:1	Crew Microbial Sample Collection -																				
SMP:MIC:I:2	Crew Microbial Sample Collection -																				
890609	**Mir Microbiological Assessment**																				
SMP:ENV:I:15	Air & Surface Sample Collections o																				
SMP:ENV:I:7	MAS Recharge with UBC on Mir																				
SMP:ENV:I:8	Surface and Air Sample Collection																				
SMP:ENV:I:9	Colony Count and Photo of Samples																				
890610	**Toxicological Assessment of Airborne V**																				

Payload Category		Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue
		2/21/97	2/22/97	2/23/97	2/24/97	2/25/97	2/26/97	2/27/97	2/28/97	2/29/97	2/30/97	2/31/97	1/1/98	1/2/98	1/3/98	1/4/98	1/5/98	1/6/98	1/7/98	1/8/98	1/9/98
Investigation	**Session** **FD**	**221**	**222**	**223**	**224**	**225**	**226**	**227**	**228**	**229**	**230**	**231**	**232**	**233**	**234**	**235**	**236**	**237**	**238**	**239**	**240**
SMP:ENV:I:12	Activate SSAS																				
SMP:ENV:I:13	Grab Air Sampling																				
SMP:ENV:I:14	Deactivate SSAS																				
890613	**Mir Defibrillator and Crew Medical Re**																				
SMP:CH:I:1	Mir Defibrillator Checkout																				
SMP:CH:I:2	Mir CMRS Operational Checkout																				
Crewtime Daily Totals (in minutes)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crewtime Daily Totals (in hours)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily Cum Totals (in hours)		819.02	819.02	819.02	819.02	819.02	819.02	819.02	819.02	819.02	819.02	819.02	819.02	819.02	819.02	819.02	819.02	819.02	819.02	819.02	819.02

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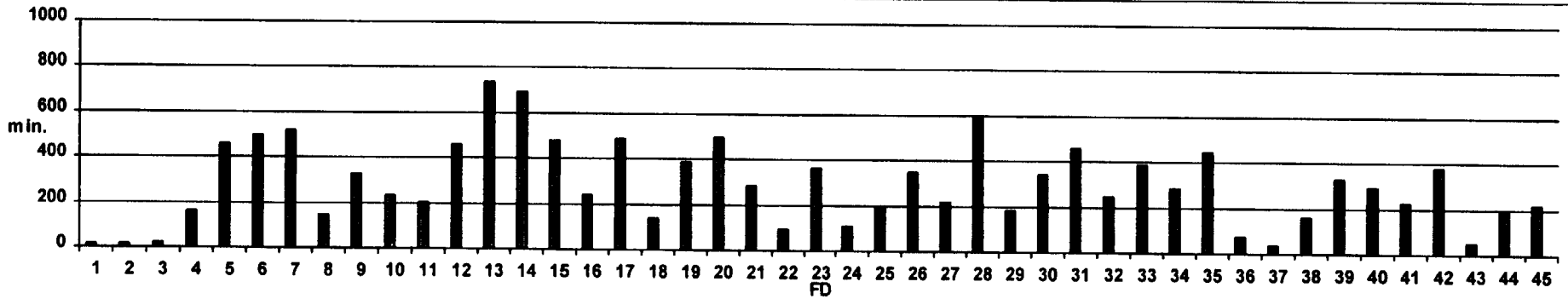
Appendix B

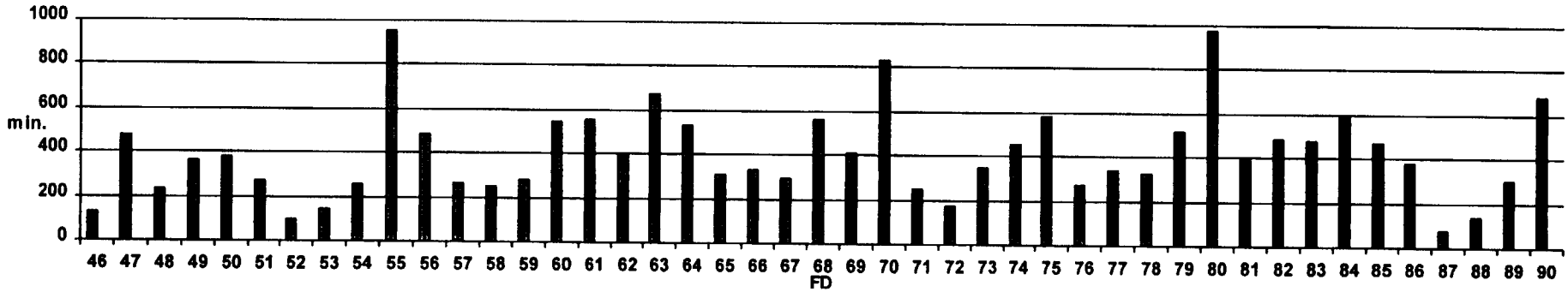
In-flight Crewtime Profile

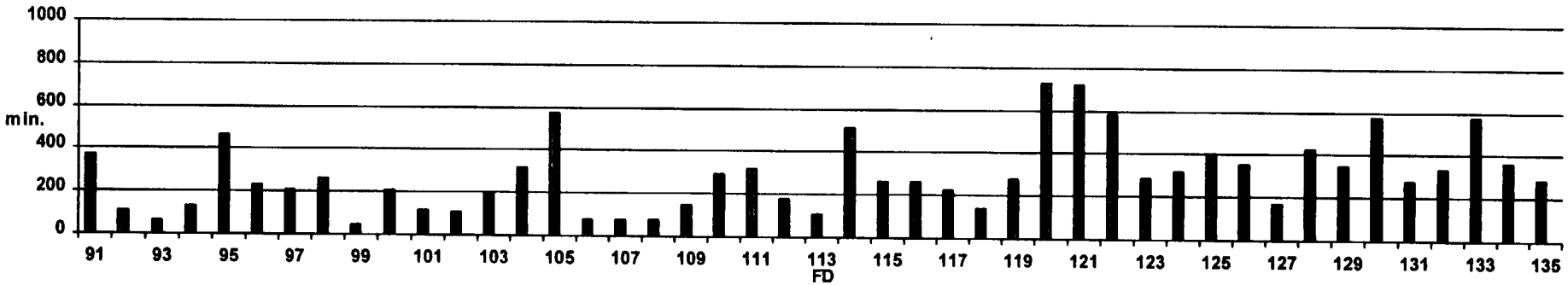
Crewtime Profile - Inflight for Missions: NASA 5 Mir 24

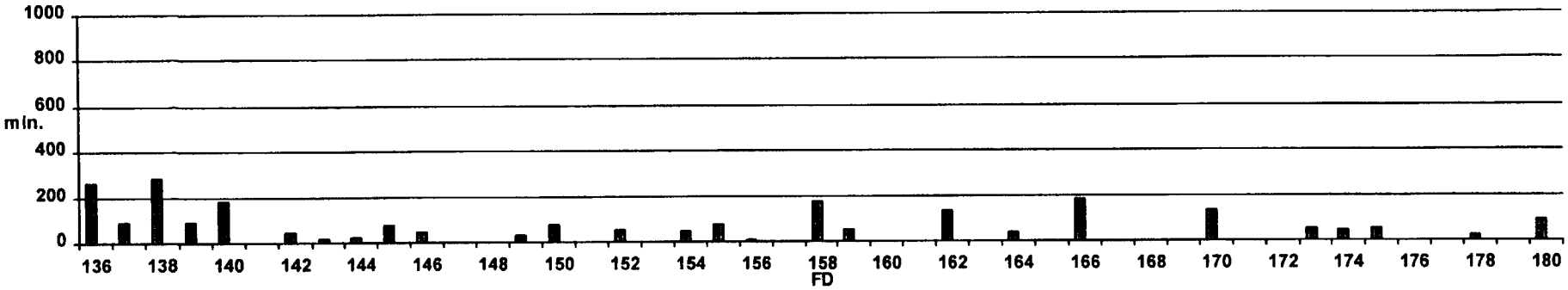
First Mission:	NASA 5	Increment:	5	Launch Date:	5/15/97	Duration:	127
Second Mission:	Mir 24	Increment:	5	Launch Date:	6/24/97	Duration:	180

Overlap Phase-In: 40





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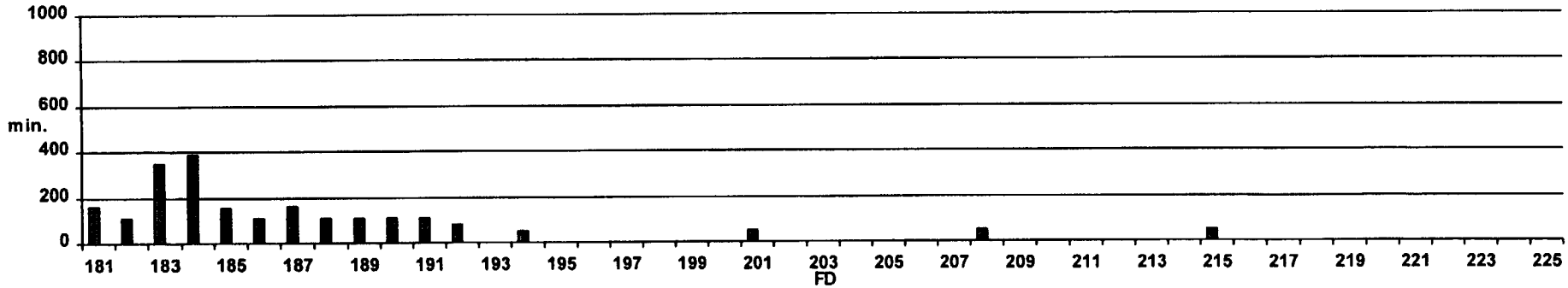
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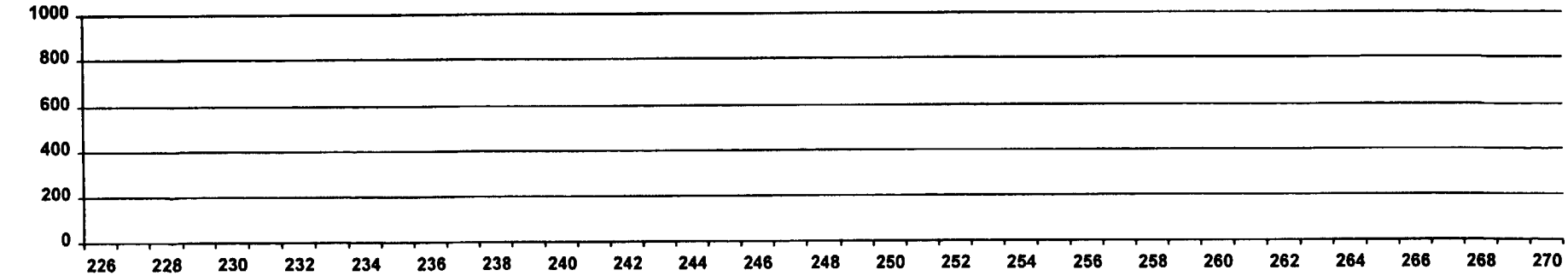
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Appendix C

Preflight Crewtime by 30 Days

Preflight Crewtime (by 30 days) - Mir 24

PIPS

Format: Repetitions/Total Crewtime (min.)

Investigation	Payload Category / Session	L-	6/29/96 360	7/29/96 330	8/28/96 300	9/27/96 270	0/27/96 240	1/26/96 210	2/26/96 180	1/25/97 150	2/24/97 120	3/26/97 90	4/25/97 60	5/25/97 30	Totals	Session Constraints
700011	**Test Site Monitoring**															
ES:EO:P:21	Test Sites Familiarization											1/ 360			360	1. Access to projecting equipment. 2. Scheduling should occur as close to Earth Observation Sites - 1 and Earth Observation Sites - 2 as possible (L-8 to L-3 months). 3. Session training for 1 cosmonaut and 1 astronaut.
700011	**Test Site Monitoring**	**Total**	0	0	0	0	0	0	0	0	0	360	0	0	360	
810525	**Visual Earth Observations**															
ES:EO:P:14	70mm EQ (Hasselblad Training)								1/ 360						360	1. Classroom with projection equipment. 2. Training session is not specific to Earth observation. 3. Scheduled day can be anytime from L- 10 to L-4 months. 4. Training for cosmonaut (receives all camera hardware training) + US
ES:EO:P:18	Earth Observations Photo Technique											1/ 240			240	1. Classroom with projection facilities. 2. Training for cosmonaut on all camera hardware and US astronaut.
ES:EO:P:19	Earth Observation 1											1/ 240			240	1. Access to projecting equipment. 2. Session can be scheduled anytime from L- 8 to L-3 months. 3. Training for cosmonaut and astronaut receiving camera training.
ES:EO:P:20	Earth Observation Sites - 2											1/ 240			240	1. Access to projecting equipment. 2. Scheduling should occur as close to Earth Observation Sites - 1 as possible (L-8 to L-3 months). 3. Training for cosmonaut & astronaut receiving camera hardware training.
ES:EO:P:22	Photo Skills-2											1/ 360			360	1. Session to be scheduled mid-day for outdoor photography. 2 Training session is not specific to Earth observations. 3. Session should occur between L-4 and L-2 months. 4. Training for cosmonaut receiving training and US astronaut.
ES:EO:P:23	Earth Science Software					1/ 60									60	1. Session is not time dependent, but should occur with set of Earth Science training sessions. 2. Training for astronaut.
ES:EO:P:24	35 mm EQ review											1/ 240			240	1. Mir station mock-up to demonstrate interfaces. 2 Training session is not specific to Earth observations. 3. Session should occur between L-4 and L-2 months. 4. Training for astronaut and cosmonaut.
ES:EO:P:25	70 mm EQ review											1/ 240			240	1. Session should occur between L-4 and L-2 months. 2. Training for astronaut and cosmonaut.

Format: Repetitions/Total Crewtime (min.)

Investigation	Payload Category / Session	L-	6/29/96 360	7/29/96 330	8/28/96 300	9/27/96 270	0/27/96 240	1/26/96 210	2/26/96 180	1/25/97 150	2/24/97 120	3/26/97 90	4/25/97 60	5/25/97 30	Totals	Session Constraints
ES:EO:P:26	Camcorder Review											1/ 240			240	1 Training session is not specific to Earth observations. 2. Session should occur between L-4 and L-2 months. 3. Training for astronaut and cosmonaut.
810525	**Visual Earth Observations**	**Total**	0	0	0	60	0	0	360	0	0	1800	0	0	2220	
890615	**Visual Observations**															
ES:EO:P:31	Training for the Investigation of the										1/ 60				60	none
890615	**Visual Observations**	**Total**	0	0	0	0	0	0	0	0	60	0	0	0	60	
	FB															**FB**
110047	**Effects of Gravity on Insect Circadian**															
FB:DEV:P:54	Orientation: Effects of Gravity on In								1/ 120						120	1. Session can be performed in conjunction with "Hardware Familiarization"
FB:DEV:P:56	Hardware Familiarization: Effects o								1/ 120						120	1. Session can be performed in conjunction with "Orientation".
FB:DEV:P:60	Beetle Experiment FO: Activiation										1/ 120		1/ 120		240	1. None.
FB:DEV:P:66	Beetle Experiment FO: Deactivation										1/ 60		1/ 60		120	1. None.
FB:DEV:P:68	Malfunction (Mir Crew)										1/ 60		1/ 60		120	1. None.
110047	**Effects of Gravity on Insect Cir**	**Total**	0	0	0	0	0	0	240	0	240	0	240	0	720	
890268	**Developmental Analysis of Seeds Grow**															
FB:DEV:P:78	Greenhouse FO: Svet Functional Ch											1/ 480	1/ 480		960	1. None
FB:DEV:P:81	Greenhouse FO: Mir Daily Plant &											1/ 480	1/ 480		960	1. None
FB:DEV:P:82	Orientation: Greenhouse Experiment							1/ 120							120	1. Session can be performed in conjunction with "Hardware Familiarization: Greenhouse Experiments".
FB:DEV:P:83	Greenhouse FO: Greenhouse Observ											1/ 360	1/ 360		720	1. None
FB:DEV:P:84	Install Root Module (Mir Crew)											1/ 120	1/ 120		240	1. Requires participation of prime Mir Crew.
FB:DEV:P:85	Malfunction (Mir Crew)										1/ 240	1/ 240			480	none
FB:DEV:P:93	Hardware Familiarization : Greenho							1/ 480							480	1. Session can be performed in conjunction with "Orientation: Greenhouse Experiments."
890268	**Developmental Analysis of Seed**	**Total**	0	0	0	0	0	600	0	0	240	1680	1440	0	3960	
	HLS															**HLS**
9	**Bone Mineral Loss and Recovery after**															
HLS:MS:P:33	Blood and Urine Markers - Mir Cre													2/ 100	100	1. Crewmembers must fast for 10 hrs prior to blood collection. 2. Return urine samples to lab at least once every 24 hours. 3. Urine samples must be kept chilled. 4. One session is required between 3 and 7 days prior to launch. 5. Exact performanc
HLS:MS:P:35	Familiarization Session - Bone and								1/ 120						120	1. None.

Format: Repetitions/Total Crewtime (min.)

Payload Category / Investigation	Session	L-	6/29/96 360	7/29/96 330	8/28/96 300	9/27/96 270	0/27/96 240	1/26/96 210	2/26/96 180	1/25/97 150	2/24/97 120	3/26/97 90	4/25/97 60	5/25/97 30	Totals	Session Constraints
HLS:MS:P:4	BDC - Bone and Mineral Loss and R												1/ 320	1/ 320	640	1. Subject must remove all metal (i.e. jewelry) or clothes containing metal prior to scans. Clothing will be provided. 2. Session for Mir cosmonauts. 3. No radioisotopes or radio-opaques contrast agents for one week prior to study. 4. First densitome
9	**Bone Mineral Loss and Recove**	**Total**	0	0	0	0	0	0	120	0	0	0	320	420	860	
110019	**Sleep Investigations (639/663/710)**															
HLS:MET:P:11	Phlebotomy Training - Sleep/Immun				2/ 480	2/ 480			1/ 240	1/ 240	1/ 240	1/ 240	1/ 240	1/ 240	2400	1. None at this time
HLS:MET:P:50	Familiarization - Sleep and Circadia								1/ 240						240	1. Session must take place no earlier than L-180 days.
HLS:MET:P:61	Task Training								1/ 340				1/ 340		680	1. Session may take place no earlier than L-180 days. 2. Electrode placement training could be done in conjunction with the crew's preflight assessment, less than 6 months but more than 1 month prior to the mission. 3. Exact performance days have bee
HLS:MET:P:70	Ground Based Night Headband Trai												2/ 360		360	1. Session #1 must take place before L-59 days. 2. Session #2 must take place before L-35 days. 3. Thinkpad has data collection software and questionnaires installed. 4. Exact performance days have been estimated.
HLS:MET:P:72	Mir Night Headband Training												1/ 120		120	1. Training should occur after the first preflight sleep monitoring period (L-59 to L-55 days). 2. Training must take place at a NASA/RSA facility which can provide simulated Mir environment. 3. Exact performance days have been estimated.
HLS:MET:P:73	Night Headband Recording & Presl										1/ 16	11/ 176	12/ 192	12/ 192	576	1. If a shift of more than 2 days is necessary, 12 day recording periods should be shifted so that there are at least 20 days between the end of the first block and the start of the second block. 2. The timing of the first recording period should be co
HLS:MET:P:74	Sleep/Wake Immune Functions												2/ 3240		3240	1. The session may occur at any point less than 10 months prior to launch following as soon as possible after the Night Headband sleep recording session. 2. Minimize use of alcohol or caffeine beverages, or nicotine on the day prior to the circadian sl
HLS:MET:P:91	Doff Night Headband & Postsleep											12/ 528	12/ 528	12/ 528	1584	1. If a shift of more than 2 days is necessary, 12 day recording periods should be shifted so that there are at least 20 days between the end of the first block and the start of the second block. 2. The timing of the first recording period should be co
110019	**Sleep Investigations (639/663/7**	**Total**	0	0	480	480	0	0	820	240	256	944	5020	960	9200	
110034	**Magnetic Resonance Imaging (MRI) Af**															

Format: Repetitions/Total Crewtime (min.)

Investigation	Payload Category / Session	L-	6/29/96 360	7/29/96 330	8/28/96 300	9/27/96 270	0/27/96 240	1/26/96 210	2/26/96 180	1/25/97 150	2/24/97 120	3/26/97 90	4/25/97 60	5/25/97 30	Totals	Session Constraints
HLS:MS:P:1	Magnetic Resonance Imaging - BDC												1/ 720	1/ 720	1440	1. Subjects will be screened for metallic implants. 2. Session must be performed prior to any exercise. 3. Session for Mir cosmonauts. 4. Transportation time is included in crewtime (MRI session is 135 minutes).
HLS:MS:P:31	Familiarization Session - MRI Mir C								1/ 120						120	1. N/A
110034	Magnetic Resonance Imaging (	Total	0	0	0	0	0	0	120	0	0	0	720	720	1560	
110037	Crewmember and Crew-Ground Intera															
HLS:BP:P:1	Mir Crew: Training- Completion of												1/ 240		240	1. Ground participation: Ground crew subjects should be those who are in the best position to evaluate the interpersonal climate of the mission control group. The subjects should consist of both Russian and American personnel. There should be a mini
HLS:BP:P:3	Mir Crew: Completion of Computeri												3/ 120	1/ 40	160	1. Subjects should complete the computerized questionnaire packet on the same day, near the end of the day. 2. Completion should take 15-20 minutes depending on whether critical incidents occurred that need to be recorded. 3. Last session should be as
HLS:BP:P:5	Fam Session Crew Interactions (Mir)								1/ 240						240	None at this time.
110037	Crewmember and Crew-Groun	Total	0	0	0	0	0	0	240	0	0	0	360	40	640	
ISS																ISS
650006	Enhanced Dynamic Load Sensors (EDL															
ISS:DYN:P:15	Dynamic Load Sensor Experiment T										1/ 30	1/ 30			60	1. N/A
ISS:DYN:P:16	Dynamic Load Sensor Experiment T										1/ 30				30	N/A
ISS:DYN:P:17	Dyanmic Load Sensor Experiment T										1/ 40				40	N/A
650006	Enhanced Dynamic Load Senso	Total	0	0	0	0	0	0	0	0	100	30	0	0	130	
650007	Optical Properties Monitor (OPM)															
ISS:ENV:P:5	OPM Operations (Checkout, Data C											1/ 120	1/ 120		240	1. None
650007	Optical Properties Monitor (O	Total	0	0	0	0	0	0	0	0	0	120	120	0	240	
LSR																LSR
650015	Water Quality Monitor (WQM)															
LSR:CHS:P:2	Training for Inflight Total Organic					1/ 240						1/ 240			480	1. Preflight performance days have been estimated. 2. Train primary and alternate crewmembers 3. All sessions to be performed in U.S.
650015	Water Quality Monitor (WQM	Total	0	0	0	240	0	0	0	0	0	240	0	0	480	
MG																MG
750029	Microgravity Isolation Mount (MIM) F															
MG:FAC:P:1	MIM Science Background, Operatin										1/ 180				180	1. Session will take place in the classroom. 2. Session used to train the prime crew.

Format: Repetitions/Total Crewtime (min.)

Payload Category		6/29/96	7/29/96	8/28/96	9/27/96	0/27/96	1/26/96	2/26/96	1/25/97	2/24/97	3/26/97	4/25/97	5/25/97		
Investigation	Session L-	360	330	300	270	240	210	180	150	120	90	60	30	Totals	Session Constraints
MG:FAC:P:3	MIM Nominal Operations										2/ 780			780	1. Session to be conducted with the training hardware. 2. Session used to train the prime crew.
MG:FAC:P:4	MIM Contingency Operations										1/ 285	1/ 285		570	1. Session to be conducted using the training hardware. 2. Session used to train the prime crew.
MG:FAC:P:6	MIM Malfunction Procedures											1/ 300		300	1. Session to be conducted using the training hardware. 2. Session used to train the prime crew.
MG:FAC:P:7	MIM Proficiency Training												1/ 180	180	1. Session to be conducted using the training hardware. 2. Session used to train the prime crew.
750029	**Microgravity Isolation Mount (Total**	0	0	0	0	0	0	0	0	1245	585	180	0	2010	
750030	**Microgravity Glovebox (MGBX) Facilit**														
MG:FAC:P:44	MGBX Overview and Operations Fa						1/ 60							60	1. Session will take place in the classroom. 2. Session used to train the prime crew.
MG:FAC:P:45	MGBX Proficiency								1/ 120					120	1. Crewmember may request additional proficiency training. 2. Session used to train the prime crew.
MG:FAC:P:48	MGBX Equipment Nominal and Ma						1/ 180							180	1. Session to be conducted with the training hardware. 2. Session used to train the prime crew.
750030	**Microgravity Glovebox (MGB Total**	0	0	0	0	240	0	0	120	0	0	0	0	360	
750031	**Biotechnology System (BTS) Facility O**														
MG:FAC:P:19	BTS Overview and Operations Fami									1/ 60				60	1. Session takes place in the classroom. 2. Session used to train the prime crew.
MG:FAC:P:20	BTS Equipment Nominal Operations									1/ 180				180	1. Session used to train the prime crew.
MG:FAC:P:21	BTS Proficiency/Off-Nominal Proce									1/ 240				240	1. Crewmember may request additional proficiency training. 2. Session used to train the prime crew.
750031	**Biotechnology System (BTS) Fa Total**	0	0	0	0	0	0	0	0	480	0	0	0	480	
890043	**QUELD Furnace Experiment - MIM**														
MG:MTS:P:10	QUELD Proficiency Training-Mir C											1/ 360		360	1. Session used to train the prime crew. 2. Crew can request additional proficiency training.
MG:MTS:P:12	QUELD Malfunction Operations-Mi						1/ 180				1/ 180			360	1. Session used to train the prime crew.
MG:MTS:P:5	QUELD Nominal and Malfunction											1/ 300		300	1. Session used to train the Mir crew.
MG:MTS:P:6	QUELD Overview and Operations-										1/ 120			120	1. Session to be conducted in the classroom 2. Session used to train the prime crew
MG:MTS:P:7	QUELD Nominal Operations Proced						1/ 180				1/ 180			360	1. Session used to train the prime crew.
890043	**QUELD Furnace Experiment - Total**	0	0	0	0	360	0	0	0	480	300	360	0	1500	
890079	**Space Acceleration Measurement Syste**														
MG:FAC:P:10	SAMS Proficiency												1/ 90	90	1. Crewmember may request additional proficiency training. 2. Session to be used to train prime crew.
MG:FAC:P:8	SAMS Overview and Operations Fa								1/ 60					60	1. Session used to train prime crew.
MG:FAC:P:9	SAMS Equipment Nominal and Mal								1/ 240					240	1. Session to be used to train prime crew.

Format: Repetitions/Total Crewtime (min.)

Investigation	Payload Category / Session	L-	6/29/96 360	7/29/96 330	8/28/96 300	9/27/96 270	0/27/96 240	1/26/96 210	2/26/96 180	1/25/97 150	2/24/97 120	3/26/97 90	4/25/97 60	5/25/97 30	Totals	Session Constraints
890079	Space Acceleration Measureme	Total	0	0	0	0	0	0	0	300	0	0	90	0	390	
	OPS															**OPS**
890271	**Photo/TV Operations**															
OPS:SHR:P:1	Basic Photo (Mir Crew)					1/ 240									240	1. Classroom with projection equipment. 2. Training session is not specific to Earth observation. 3. Scheduled day can be anytime from L-10 to L-6 months. 4. Training is for 1 cosmonaut 5. This is a multi-media presentation and requires NASA P-TV
OPS:SHR:P:2	35 mm EQ (Nikon Camera)					1/ 180									180	1. Classroom with projection equipment. 2. Training session is not specific to Earth observation. 3. Scheduled day can be anytime from L-10 to L-4 months. 4. Training is for 1 cosmonaut + U.S. astronaut (receives all camera hardware training).
OPS:SHR:P:3	Camcorder EQ								1/ 180						180	1. Classroom with projection equipment. 2. Training session is not specific to Earth observation. 3. Scheduled day can be anytime from L-10 to L-4 months. 4. Training is for 1 cosmonaut + U.S. astronaut (receives all camera hardware training).
OPS:SHR:P:4	General Photo Skills/Hands-on Pract								1/ 180						180	1. Classroom with projection equipment. 2. Training session is not specific to Earth observation. 3. Scheduled day can be anytime from L-10 to L-4 months. 4. This session should be scheduled after Basic Photo Training, including training on all cam
OPS:SHR:P:5	Earth Observation Photo Techniques											1/ 180			180	1. Mir station mock-up is required to demonstrate interfaces. 2. Training session is not specific to Earth observations. 3. Session should occur between L-4 and L-2 months. 4. Training for cosmonaut and U.S. astronaut (trained on all camera hardwar
OPS:SHR:P:7	Experiment Photo Techniques											1/ 180			180	1. Mir station mock-up is required to demonstrate interfaces. 2. Mockups, photographs, or actual experiment training hardware is required. 3. JSC Building 8 photo processing is required. 4. Session should occur between L-4 and L-2 months. 5. Trai
890271	**Photo/TV Operations**	Total	0	0	0	420	0	0	360	0	0	360	0	0	1140	
	SMP															**SMP**
890096	**Space Medicine Program - US Medical**															
SMP:MO:P:42	MO-2 MSMK Refresher Training													1/ 240	240	1. Session dates are estimated. 2. Should be scheduled as close to launch as possible.
SMP:MO:P:44	MO-2 MSMK Familiarization and					1/ 840									840	None
SMP:MO:P:47	MO-2 MSMK Medical Therapeutics					1/ 840									840	1. None at this time.
SMP:MO:P:49	MO-2 MSMK Medical Therapeutics									1/ 480					480	1. Training days are estimated

Format: Repetitions/Total Crewtime (min.)

Payload Category			6/29/96	7/29/96	8/28/96	9/27/96	0/27/96	1/26/96	2/26/96	1/25/97	2/24/97	3/26/97	4/25/97	5/25/97		
Investigation	Session	L-	360	330	300	270	240	210	180	150	120	90	60	30	Totals	Session Constraints
SMP:MO:P:51	MO-2 MSMK Diagnostic/Analysis													1/ 240	240	1. Session dates are estimated.
890096	**Space Medicine Program - US**	**Total**	0	0	0	1680	0	0	0	480	0	0	240	240	2640	
890607	**Analysis of Mir Archival Water Sample**															
SMP:ENV:P:1	Humidity Condensate Sampling Trai								1/ 30						30	1. Training for cosmonauts and astronauts will be provided in Russia by the Russians. No U.S. time will be scheduled. 2. Hardware is provided by the Russians
SMP:ENV:P:11	Combined Training for Water Sampl				1/ 240				1/ 240			1/ 240			720	1. Training for Water (MSD053), Micro (MSD022), and WMM have been combined for this session. 2. Exact preflight performance days have been estimated.
890607	**Analysis of Mir Archival Water**	**Total**	0	0	240	0	0	0	270	0	0	240	0	0	750	
890608	**Crew Microbiological Assessment**															
SMP:MIC:P:1	Crew Sample Collection Training (							1/ 60				1/ 60			120	1. Exact performance days have been estimated.
SMP:MIC:P:3	Crew Microbiology (Mir Crew)												1/ 60	2/ 120	180	1. The first BDC session at approximately L-2 months must be performed in Russia.
890608	**Crew Microbiological Assessme**	**Total**	0	0	0	0	0	60	0	0	0	60	60	120	300	
890609	**Mir Microbiological Assessment**															
SMP:ENV:P:4	Crew, Air, Surface, and Water Colle				1/ 120										120	1. Exact performance days have been estimated. 2. Combined session for Crew (MSD021), Micro (MSD022), Water (MSD053), and WMM.
SMP:ENV:P:6	Air Sample Collection Training (Mir							1/ 120				1/ 120			240	1. Exact performance days have been estimated.
SMP:ENV:P:8	Surface Sample Collection Training							1/ 120				1/ 120			240	1. None at this time.
890609	**Mir Microbiological Assessmen**	**Total**	0	0	120	0	0	240	0	0	0	240	0	0	600	
890613	**Mir Defibrillator and Crew Medical Re**															
SMP:CH:P:10	Advanced Cardiac Life Support Prot											1/ 360			360	1. Training sessions should be conducted in Star City or at JSC, dependent on crew schedules.
SMP:CH:P:12	Advanced Cardiac Life Support Meg											1/ 360			360	1. Training sessions should be conducted in Star City or at JSC, dependent on crew schedules.
SMP:CH:P:2	Mir Defibrillator and CMRS Familia										1/ 240				240	1. Training sessions should be conducted in Star City or at JSC, dependent on crew schedules.
SMP:CH:P:4	Mir Defibrillator Maintenance										1/ 240				240	1. Training sessions should be conducted in Star City or at JSC, dependent on crew schedules.
SMP:CH:P:6	Advanced Cardiac Life Support Phar											1/ 360			360	1. Training sessions should be conducted in Star City or at JSC, dependent on crew schedules.
SMP:CH:P:8	Advanced Cardiac Life Support Prot											1/ 360			360	1. Training sessions should be conducted in Star City or at JSC, dependent on crew schedules.
890613	**Mir Defibrillator and Crew Me**	**Total**	0	0	0	0	0	0	0	0	480	1440	0	0	1920	

Format: Repetitions/Total Crewtime (min.)

Payload Category	6/29/96	7/29/96	8/28/96	9/27/96	0/27/96	1/26/96	2/26/96	1/25/97	2/24/97	3/26/97	4/25/97	5/25/97		
Investigation Session L-	360	330	300	270	240	210	180	150	120	90	60	30	Totals	Session Constraints
Crewtime Monthly Totals (in minutes)	0	0	840	2880	600	900	2530	1140	3581	8399	9150	2500	32520	
Crewtime Monthly Totals (in hours)	0.00	0.00	14.00	48.00	10.00	15.00	42.17	19.00	59.68	139.98	152.50	41.67	542.00	
Monthly Cum Totals (in hours)	0.00	0.00	14.00	62.00	72.00	87.00	129.17	148.17	207.85	347.83	500.33	542.00		

Preflight Crewtime (by 30 days) - NASA 5

PIPS

Format: Repetitions/Total Crewtime (min.)

Investigation	Session	Payload Category L-	5/20/96 360	6/19/96 330	7/19/96 300	8/18/96 270	9/17/96 240	0/17/96 210	1/16/96 180	2/16/96 150	1/15/97 120	2/14/97 90	3/16/97 60	4/15/97 30	Totals	Session Constraints
ADV																**ADV**
600006	**Commercial Generic Bioprocessing Ap**															
ADV:BT:P:11	CGBA ICM Locker Preparation											1/ 60			60	1. None at this time.
600006	**Commercial Generic Bioproces**	**Total**	0	0	0	0	0	0	0	0	0	60	0	0	60	
ES																**ES**
700011	**Test Site Monitoring**															
ES:EO:P:21	Test Sites Familiarization										1/ 360				360	1. Access to projecting equipment. 2. Scheduling should occur as close to Earth Observation Sites - 1 and Earth Observation Sites - 2 as possible (L-8 to L-3 months). 3. Session training for 1 cosmonaut and 1 astronaut.
700011	**Test Site Monitoring**	**Total**	0	0	0	0	0	0	0	0	360	0	0	0	360	
810525	**Visual Earth Observations**															
ES:EO:P:14	70mm EQ (Hasselblad Training)							1/ 360							360	1. Classroom with projection equipment. 2. Training session is not specific to Earth observation. 3. Scheduled day can be anytime from L- 10 to L-4 months. 4. Training for cosmonaut (receives all camera hardware training) + US
ES:EO:P:18	Earth Observations Photo Technique										1/ 240				240	1. Classroom with projection facilities. 2. Training for cosmonaut on all camera hardware and US astronaut.
ES:EO:P:19	Earth Observation Sites - 1										1/ 240				240	1. Access to projecting equipment. 2. Session can be scheduled anytime from L- 8 to L-3 months. 3. Training for cosmonaut and astronaut receiving camera training.
ES:EO:P:20	Earth Observation Sites - 2										1/ 240				240	1. Access to projecting equipment. 2. Scheduling should occur as close to Earth Observation Sites - 1 as possible (L-8 to L-3 months). 3. Training for cosmonaut & astronaut receiving camera hardware training.
ES:EO:P:22	Photo Skills-2										1/ 360				360	1. Session to be scheduled mid-day for outdoor photography. 2 Training session is not specific to Earth observations. 3. Session should occur between L-4 and L-2 months. 4. Training for cosmonaut receiving training and US astronaut.
ES:EO:P:23	Earth Science Software				1/ 60										60	1. Session is not time dependent, but should occur with set of Earth Science training sessions. 2. Training for astronaut.

Format: Repetitions/Total Crewtime (min.)

Investigation	Payload Category / Session	L-	5/20/96 360	6/19/96 330	7/19/96 300	8/18/96 270	9/17/96 240	0/17/96 210	1/16/96 180	2/16/96 150	1/15/97 120	2/14/97 90	3/16/97 60	4/15/97 30	Totals	Session Constraints
ES:EO:P:24	35 mm EQ review											1/ 240			240	1. Mir station mock-up to demonstrate interfaces. 2 Training session is not specific to Earth observations. 3. Session should occur between L-4 and L-2 months. 4. Training for astronaut and cosmonaut.
ES:EO:P:25	70 mm EQ review											1/ 240			240	1. Session should occur between L-4 and L-2 months. 2. Training for astronaut and cosmonaut.
ES:EO:P:26	Camcorder Review											1/ 240			240	1 Training session is not specific to Earth observations. 2. Session should occur between L-4 and L-2 months. 3. Training for astronaut and cosmonaut.
810525	**Visual Earth Observations**	**Total**	0	0	60	0	0	360	0	0	1800	0	0	0	2220	
890615	**Visual Observations**															
ES:EO:P:31	Training for the Investigation of the										1/ 60				60	none
890615	**Visual Observations**	**Total**	0	0	0	0	0	0	0	0	60	0	0	0	60	
FB																**FB**
110047	**Effects of Gravity on Insect Circadian**															
FB:DEV:P:55	Orientation: Effects of Gravity on In						1/ 60								60	1. Session can be performed in conjunction with "Hardware Familiarization"
FB:DEV:P:57	Hardware Familiarization: Effects o						1/ 60								60	1. Session can be performed in conjunction with "Orientation".
FB:DEV:P:61	Beetle Experiment FO: Activiation								1/ 60		1/ 60		1/ 60		180	1. None.
FB:DEV:P:67	Beetle Experiment FO: Deactivatio								1/ 30		1/ 30		1/ 30		90	1. None.
FB:DEV:P:69	Malfunction (NASA Crew)								1/ 30		1/ 30		1/ 30		90	1. None.
110047	**Effects of Gravity on Insect Cir**	**Total**	0	0	0	0	120	0	120	0	120	0	120	0	480	
890268	**Developmental Analysis of Seeds Grow**															
FB:DEV:P:101	Greenhouse FO: Final Harvest of Pl								1/ 120		1/ 120	1/ 120			360	1. None
FB:DEV:P:79	Greenhouse FO: Mir Daily Plant &								1/ 120		1/ 120	1/ 120			360	None
FB:DEV:P:80	Greenhouse FO: Greenhouse Obser								1/ 180		1/ 180	1/ 180			540	None
FB:DEV:P:86	Greenhouse FO: Harvest, Dry, & Fi								1/ 180		1/ 180	1/ 180			540	None
FB:DEV:P:87	Greenhouse FO: Seed Planting (NA								1/ 60		1/ 60	1/ 60			180	None
FB:DEV:P:88	Hardware Familiarization: Greenho						1/ 240								240	1. Session can be performed in conjunction with "Orientation: Greenhouse Experiments."
FB:DEV:P:89	Orientation: Greenhouse Experiment						1/ 60								60	1. Session can be performed in conjunction with "Hardware Familiarization: Greenhouse Experiments".
FB:DEV:P:90	Greenhouse FO: Svet Functional Ch								1/ 240		1/ 240	1/ 240			720	1. None
FB:DEV:P:91	Install Root Module (NASA Crew)								1/ 60		1/ 60	1/ 60			180	1. None
FB:DEV:P:92	Malfunction (NASA Crew)								1/ 120		1/ 120	1/ 120			360	none
890268	**Developmental Analysis of Seed**	**Total**	0	0	0	0	300	0	1080	0	1080	1080	0	0	3540	
HLS																**HLS**
9	**Bone Mineral Loss and Recovery after**															

Format: Repetitions/Total Crewtime (min.)

Payload Category			5/20/96	6/19/96	7/19/96	8/18/96	9/17/96	0/17/96	1/16/96	2/16/96	1/15/97	2/14/97	3/16/97	4/15/97		
Investigation	Session	L-	360	330	300	270	240	210	180	150	120	90	60	30	Totals	Session Constraints
HLS:MS:P:11	BDC - Bone and Mineral Loss and R												1/ 160	1/ 160	320	1. Subject must remove all metal (i.e. jewelry) or clothes containing metal prior to scans. Clothing will be provided. 2. Session for NASA astronaut. 3. Densitometry testing must be done in the U.S.on the same machine. 4. First densitometry session
HLS:MS:P:30	Familiarization Session - Bone and								1/ 60						60	1. None.
HLS:MS:P:34	Blood and Urine Markers - NASA C													2/ 50	50	1. Crewmembers must fast for 10 hrs prior to blood collection. 2. Return urine samples to lab at least once every 24 hours. 3. Urine samples must be kept chilled. 4. One session is required between 3 and 7 days prior to launch. 5. Exact performan
9	Bone Mineral Loss and Recove	Total	0	0	0	0	0	0	60	0	0	0	160	210	430	
110019	Sleep Investigations (639/663/710)															
HLS:MET:P:10	Familiarization - Sleep and Circadia							1/ 120							120	1. Session must take place no earlier than L-180 days.
HLS:MET:P:11	Phlebotomy Training - Sleep/Immun				2/ 240	2/ 240			1/ 120	1/ 120	1/ 120	1/ 120	1/ 120	1/ 120	1200	1. None at this time
HLS:MET:P:93	Task Training								1/ 170				1/ 170		340	1. Session may take place no earlier than L-180 days. 2. Electrode placement training could be done in conjunction with the crew's preflight assessment, less than 6 months but more than 1 month prior to the mission. 3. Exact performance days have bee
HLS:MET:P:94	Ground Based Night Headband Trai												2/ 180		180	1. Session #1 must take place before L-59 days. 2. Session #2 must take place before L-35 days. 3. Thinkpad will also have questionnaire and data collection software installed. 4. Exact performance days have been estimated.
HLS:MET:P:96	Mir Night Headband Training												1/ 60		60	1. Training should occur after the first preflight sleep monitoring period (L-59 to L-55 days). 2. Training must take place at a NASA/RSA facility which can provide simulated Mir environment. 3. Exact performance days have been estimated.
110019	Sleep Investigations (639/663/7	Total	0	0	240	240	0	120	290	120	120	120	530	120	1900	
110028	Frames of Reference for Sensori-motor															
HLS:NEU:P:23	COGNILAB Familiarization						1/ 60								60	1. All crewmembers, both primary and backup should participate.
HLS:NEU:P:24	COGNILAB Familiarization II							1/ 120							120	1. All crewmembers, both primary and backup, should participate.
HLS:NEU:P:25	COGNILAB Task Training								2/ 180	2/ 180					360	1. Session should be scheduled prior to Baseline Data Collection. 2. Training is to be conducted on all crew members, both primary, and backup. 3. Subject data will be collected to evaluate training.

Format: Repetitions/Total Crewtime (min.)

Payload Category			5/20/96	6/19/96	7/19/96	8/18/96	9/17/96	0/17/96	1/16/96	2/16/96	1/15/97	2/14/97	3/16/97	4/15/97		
Investigation	Session	L-	360	330	300	270	240	210	180	150	120	90	60	30	Totals	Session Constraints
HLS:NEU:P:26	COGNILAB Test A											1/ 90	1/ 90	1/ 90	270	1. Each test should be performed at approximately the same time of day (morning or evening) throughout pre-, post-, and inflight testing. 2. Each of these sessions should be performed within 3 days of the corresponding session COGNILAB Test B, preferab
HLS:NEU:P:27	COGNILAB Test B											1/ 60	1/ 60	1/ 60	180	1. Each test should be performed at approximately same time of day (morning or evening) throughout pre-, post- and in-flight testing. 2. Each of these sessions should be performed within 3 days of the corresponding session of COGNILAB Test A, preferabl
110028	**Frames of Reference for Sensor**	**Total**	0	0	0	0	60	120	180	180	150	150	150	0	990	
110034	**Magnetic Resonance Imaging (MRI) Af**															
HLS:MS:P:2	Magnetic Resonance Imaging - BDC												1/ 255	1/ 255	510	1. Subjects will be screened for metallic implants. 2. Session must be performed prior to any exercise. 3. Session for NASA astronaut. 4. Transportation time is included in crew time (90 min).
HLS:MS:P:32	Familiarization Session - MRI NAS								1/ 60						60	1. None at this time.
110034	**Magnetic Resonance Imaging (**	**Total**	0	0	0	0	0	0	60	0	0	0	255	255	570	
110037	**Crewmember and Crew-Ground Intera**															
HLS:BP:P:2	NASA Crew: Training-Completion												1/ 120		120	1. Ground participation: Ground crew subjects should be those who are in the best position to evaluate the interpersonal climate of the mission control group. The subjects should consist of both Russian and American personnel. There should be a minimum
HLS:BP:P:4	NASA Crew: Completion of Compu												3/ 60	1/ 20	80	1. Subjects should complete the computerized questionnaire packet on the same day, near the end of the day. 2. Completion should take 15-20 minutes depending on whether critical incidents occurred that need to be recorded. 3. Last session should be as
HLS:BP:P:6	Fam Session Crew Interactions (NA								1/ 60						60	None at this time.
110037	**Crewmember and Crew-Groun**	**Total**	0	0	0	0	0	0	60	0	0	0	180	20	260	
890091	**GASMAP Facility Operations**															
HLS:FAC:P:1	GASMAP - Hardware Familiarizatio								1/ 90						90	1. None at this time.
HLS:FAC:P:2	GASMAP - Hardware Familiarizatio								1/ 120						120	1. None at this time.
HLS:FAC:P:3	GASMAP - Hardware Operations Re													1/ 120	120	1. None at this time.
890091	**GASMAP Facility Operations**	**Total**	0	0	0	0	0	0	210	0	0	0	0	120	330	
	ISS															**ISS**
650006	**Enhanced Dynamic Load Sensors (EDL**															
ISS:DYN:P:18	Dynamic Load Sensor Experiment T					1/ 15			1/ 15						30	N/A
ISS:DYN:P:19	Dynamic Load Sensor Experiment T					1/ 20			1/ 20						40	N/A

Format: Repetitions/Total Crewtime (min.)

Payload Category		5/20/96	6/19/96	7/19/96	8/18/96	9/17/96	0/17/96	1/16/96	2/16/96	1/15/97	2/14/97	3/16/97	4/15/97		
Investigation	Session L-	360	330	300	270	240	210	180	150	120	90	60	30	Totals	Session Constraints
ISS:DYN:P:20	Dynamic Load Sensor Experiment T					1/ 15			1/ 15					30	N/A
ISS:DYN:P:9	Dynamic Load Sensor Experiment T					1/ 15			1/ 15					30	N/A
650006	Enhanced Dynamic Load Senso Total	0	0	0		65	0	0	65	0	0	0	0	0	130	
650007	Optical Properties Monitor (OPM)														
ISS:ENV:P:5	OPM Operations (Checkout, Data C											1/ 120	1/ 120		240	1. None
650007	Optical Properties Monitor (O Total	0	0	0		0	0	0	0	0	0	120	120	0	240	
650009	Mir Electric Field Characterization (M														
ISS:ENV:P:21	MEFC Experiment Training											1/ 120			120	1. Training should be performed in the U.S.
650009	Mir Electric Field Characteriza Total	0	0	0		0	0	0	0	0	0	120	0	0	120	
650013	Mir Structural Dynamics Experiment (														
ISS:DYN:P:13	MiSDE Familiarization										1/ 120				120	None
ISS:DYN:P:14	MiSDE Operations and Video Ops												1/ 240		240	None
650013	Mir Structural Dynamics Expe Total	0	0	0		0	0	0	0	0	120	0	240	0	360	
890601	Radiation Monitoring Equipment - III														
ISS:ENV:P:10	Radiation Monitoring Equipment Re												1/ 30		30	1. None
ISS:ENV:P:11	Radiation Monitoring Equipment Op										1/ 90				90	1. None
890601	Radiation Monitoring Equipme Total	0	0	0		0	0	0	0	0	90	0	30	0	120	
LSR																LSR
650015	Water Quality Monitor (WQM)															
LSR:CHS:P:1	Training for Inflight Total Organic					1/ 120						1/ 120			240	1. Preflight performance days have been estimated. 2. Train primary and back-up crewmembers 3. At least one session to be performed in U.S.
650015	Water Quality Monitor (WQM Total	0	0	0		120	0	0	0	0	0	120	0	0	240	
MG																MG
750029	Microgravity Isolation Mount (MIM) F															
MG:FAC:P:1	MIM Science Background, Operatin										1/ 180				180	1. Session will take place in the classroom. 2. Session used to train the prime crew.
MG:FAC:P:3	MIM Nominal Operations										2/ 780				780	1. Session to be conducted with the training hardware. 2. Session used to train the prime crew.
MG:FAC:P:4	MIM Contingency Operations										1/ 285	1/ 285			570	1. Session to be conducted using the training hardware. 2. Session used to train the prime crew.
MG:FAC:P:6	MIM Malfunction Procedures											1/ 300			300	1. Session to be conducted using the training hardware. 2. Session used to train the prime crew.
MG:FAC:P:7	MIM Proficiency Training												1/ 180		180	1. Session to be conducted using the training hardware. 2. Session used to train the prime crew.
750029	Microgravity Isolation Mount (Total	0	0	0		0	0	0	0	0	1245	585	180	0	2010	
750030	Microgravity Glovebox (MGBX) Facilit															

Format: Repetitions/Total Crewtime (min.)

Investigation	Payload Category / Session	L-	5/20/96 360	6/19/96 330	7/19/96 300	8/18/96 270	9/17/96 240	0/17/96 210	1/16/96 180	2/16/96 150	1/15/97 120	2/14/97 90	3/16/97 60	4/15/97 30	Totals	Session Constraints
MG:FAC:P:44	MGBX Overview and Operations Fa							1/ 60							60	1. Session will take place in the classroom. 2. Session used to train the prime crew.
MG:FAC:P:46	MGBX Proficiency										1/ 180				180	1. Crewmember may request additional proficiency training. 2. Session used to train the prime crew.
MG:FAC:P:49	MGBX Equipment Nominal and Ma							1/ 300							300	1. Session to be conducted with the training hardware. 2. Session used to train the prime crew.
750030	Microgravity Glovebox (MGB	Total	0	0	0	0		360	0	0	180	0	0	0	540	
750031	Biotechnology System (BTS) Facility O															
MG:FAC:P:19	BTS Overview and Operations Fami											1/ 60			60	1. Session takes place in the classroom. 2. Session used to train the prime crew.
MG:FAC:P:20	BTS Equipment Nominal Operations											1/ 180			180	1. Session used to train the prime crew.
MG:FAC:P:21	BTS Proficiency/Off-Nominal Proce											1/ 240			240	1. Crewmember may request additional proficiency training. 2. Session used to train the prime crew.
750031	Biotechnology System (BTS) Fa	Total	0	0	0	0	0	0	0	0	480	0	0	0	480	
890043	QUELD Furnace Experiment - MIM															
MG:MTS:P:11	QUELD Proficiency Training-NAS												1/ 180		180	1. Session used to train the prime crew. 2. Crew can request additional proficiency training.
MG:MTS:P:13	QUELD Malfunction Operations-N							1/ 90				1/ 90			180	1. Session used to train the prime crew.
MG:MTS:P:8	QUELD Nominal Operations Proced							1/ 90				1/ 90			180	1. Session used to train the prime crew.
MG:MTS:P:9	QUELD Overview and Operations-											1/ 60			60	1. Session to be conducted in the classroom 2. Session used to train the prime crew
890043	QUELD Furnace Experiment -	Total	0	0	0	0		180	0	0	0	240	0	180	0	600
890079	Space Acceleration Measurement Syste															
MG:FAC:P:8	SAMS Overview and Operations Fa										1/ 60				60	1. Session used to train prime crew.
MG:FAC:P:9	SAMS Equipment Nominal and Mal										1/ 240				240	1. Session to be used to train prime crew.
890079	Space Acceleration Measureme	Total	0	0	0	0		0	0	0	300	0	0	0	300	
890093	Biochemistry of 3-D Tissue Engineering															
MG:BT:P:11	Biochemistry of 3-D Tissue Enginee					1/ 480									480	1. Session used to train the prime crew.
MG:BT:P:12	Biochemistry of 3-D Tissue Enginee					1/ 90									90	1. Session takes place in the classroom. 2. Session used to train the prime crew.
MG:BT:P:13	Biochemistry of 3-D Tissue Enginee										1/ 270				270	1. Session used to train the prime crew.
MG:BT:P:14	Biochemistry of 3-D Tissue Enginee										1/ 420				420	1. Session used to train the prime crew. 2. Crew may request additional proficiency training.
890093	Biochemistry of 3-D Tissue Eng	Total	0	0	0	570		0	0	0	690	0	0	0	1260	
890252	Canadian Protein Crystallization Exper															
MG:BT:P:22	CAPE Equipment Overview and Op							1/ 60							60	1. Session to be conducted in the classroom. 2. Session used to train the prime crew.
MG:BT:P:23	CAPE Equipment Nominal and Malf							1/ 240							240	1. Session used to train the prime crew.

Format: Repetitions/Total Crewtime (min.)

Payload Category / Investigation	Session	L-	5/20/96 360	6/19/96 330	7/19/96 300	8/18/96 270	9/17/96 240	0/17/96 210	1/16/96 180	2/16/96 150	1/15/97 120	2/14/97 90	3/16/97 60	4/15/97 30	Totals	Session Constraints
MG:BT:P:24	CAPE Proficiency											1/ 240			240	1. Crew may request additional proficiency training.
890252	**Canadian Protein Crystallizati**	**Total**	0	0	0	0	300	0	0	0	240	0	0	0	540	
890255	**Ambient Diffusion Controlled Protein C**															
MG:BT:P:19	DCAM Overview and Operations Fa									1/ 30					30	1. Session to be conducted in the classroom. 2. Session used to train the prime crew.
MG:BT:P:20	DCAM Equipment Operations									1/ 30					30	1. Session used to train the prime crew.
MG:BT:P:21	DCAM Proficiency											1/ 60			60	1. Crew may request additional proficiency training.
890255	**Ambient Diffusion Controlled P**	**Total**	0	0	0	0	0	0	0	60	0	60	0	0	120	
890265	**Colloidal Gelation**															
MG:FP:P:68	CGEL Overview and Operations Fa				1/ 60										60	1. Session takes place in the classroom. 2. Session used to train the prime crew.
MG:FP:P:69	CGEL Equipment Nominal and Mal				1/ 300					1/ 300					600	1. Session used to train the prime crew.
MG:FP:P:70	CGEL Proficiency									1/ 180					180	1. Crew may request additional proficiency training.
890265	**Colloidal Gelation**	**Total**	0	0	360	0	0	0	0	480	0	0	0	0	840	
OPS																**OPS**
890271	**Photo/TV Operations**															
OPS:SHR:P:2	35 mm EQ (Nikon Camera)					1/ 180									180	1. Classroom with projection equipment. 2. Training session is not specific to Earth observation. 3. Scheduled day can be anytime from L-10 to L-4 months. 4. Training is for 1 cosmonaut + U.S. astronaut (receives all camera hardware training).
OPS:SHR:P:3	Camcorder EQ								1/ 180						180	1. Classroom with projection equipment. 2. Training session is not specific to Earth observation. 3. Scheduled day can be anytime from L-10 to L-4 months. 4. Training is for 1 cosmonaut + U.S. astronaut (receives all camera hardware training).
OPS:SHR:P:4	General Photo Skills/Hands-on Pract								1/ 180						180	1. Classroom with projection equipment. 2. Training session is not specific to Earth observation. 3. Scheduled day can be anytime from L-10 to L-4 months. 4. This session should be scheduled after Basic Photo Training, including training on all cam
OPS:SHR:P:5	Earth Observation Photo Techniques											1/ 180			180	1. Mir station mock-up is required to demonstrate interfaces. 2. Training session is not specific to Earth observations. 3. Session should occur between L-4 and L-2 months. 4. Training for cosmonaut and U.S. astronaut (trained on all camera hardwar
OPS:SHR:P:6	Basic Photo (NASA Crew)					1/ 120									120	1. Classroom with projection equipment. 2. Training session is not specific to Earth observation. 3. Scheduled day can be anytime from L-10 to L-6 months. 4. Training is for U.S. astronaut. 5. This is a multi-media presentation and requires NASA

Format: Repetitions/Total Crewtime (min.)

Investigation	Payload Category / Session	L-	5/20/96 360	6/19/96 330	7/19/96 300	8/18/96 270	9/17/96 240	0/17/96 210	1/16/96 180	2/16/96 150	1/15/97 120	2/14/97 90	3/16/97 60	4/15/97 30	Totals	Session Constraints
OPS:SHR:P:7	Experiment Photo Techniques											1/ 180			180	1. Mir station mock-up is required to demonstrate interfaces. 2. Mockups, photographs, or actual experiment training hardware is required. 3. JSC Building 8 photo processing is required. 4. Session should occur between L-4 and L-2 months. 5. Trai
890271	Photo/TV Operations	Total	0	0	0	300	0	0	360	0	0	360	0	0	1020	
	SMP															SMP
890096	Space Medicine Program - US Medical															
SMP:MO:P:15	MO-11 Training Session - Radiation										1/ 120		1/ 120		240	1. Training dates are estimated.
SMP:MO:P:22	MO-12 Training Session - Radiation							1/ 30							30	1. Exact days have been estimated.
SMP:MO:P:25	MO-6 Psychological Factors for Lon								1/ 120					1/ 120	240	1. Private room, free from distractions, needed for briefing. 2. Both prime and back-up crewmembers will be trained.
SMP:MO:P:41	MO-6 Crew Status & Support Track											1/ 90			90	1. N/A
SMP:MO:P:43	MO-2 MSMK Refresher Training													1/ 120	120	1. Session dates are estimated. 2. Should be scheduled as close to launch as possible.
SMP:MO:P:45	MO-2 MSMK Familiarization and			1/ 420											420	1. None at this time.
SMP:MO:P:46	MO-2 MSMK Medical Therapeutics			1/ 420											420	1. N/A
SMP:MO:P:48	MO-2 MSMK Medical Therapeutics								1/ 240						240	1. None at this time.
SMP:MO:P:50	MO-2 MSMK Diagnostic/Analysis											1/ 120			120	1. Dates are estimated.
SMP:MO:P:52	MO-12 Training Session - Passive D												1/ 15		15	1. None
SMP:MO:P:53	MO-14 Training Environmental Hea								1/ 30			1/ 30			60	1. None at this time
890096	Space Medicine Program - US	Total	0	0	840	0	0	30	390	0	120	240	135	240	1995	
890597	Return to Duty Sensorimotor Neurologi															
SMP:NEU:P:1	Preflight Sensorimotor Test Battery												1/ 40	1/ 40	80	1. Crewmember should limit participation in provocative training exercises (e.g., flight motion simulators, centrifuge simulations, training aircraft) within 24 hours prior to testing. 2. Crewmember should limit alcohol consumption within 24 hours prio
890597	Return to Duty Sensorimotor N	Total	0	0	0	0	0	0	0	0	0	0	40	40	80	
890605	Monitoring Orthostatic Function Durin															
SMP:MON:P:2	Preflight HR & BP Measurements												1/ 120		120	1. This session should occur within the L-60 to L-30 day timeframe. 2. A Shuttle crewmember operator will be required to participate in this session.
SMP:MON:P:3	Hardware Familiarization Session		1/ 60												60	1. This session should occur prior to other crew training or data collection.
890605	Monitoring Orthostatic Functio	Total	60	0	0	0	0	0	0	0	0	0	120	0	180	
890607	Analysis of Mir Archival Water Sample															

Format: Repetitions/Total Crewtime (min.)

Payload Category / Investigation	Session	L-	5/20/96 360	6/19/96 330	7/19/96 300	8/18/96 270	9/17/96 240	0/17/96 210	1/16/96 180	2/16/96 150	1/15/97 120	2/14/97 90	3/16/97 60	4/15/97 30	Totals	Session Constraints
SMP:ENV:P:2	Combined Training for Water Sampl					1/ 120				1/ 120			1/ 120		360	1. Training for Water (MSD053), Micro (MSD022), and WMM have been combined for this session. 2. Exact preflight performance days have been estimated.
890607	**Analysis of Mir Archival Water**	**Total**	60	0	120	0	0	0	120	0	0	120	0	0	360	
890608	**Crew Microbiological Assessment**															
SMP:MIC:P:2	Crew Sample Collection Training (N							1/ 30				1/ 30			60	1. Exact performance days have been estimated.
SMP:MIC:P:4	Crew Microbiology (NASA Crew)												1/ 30	2/ 60	90	1. The first BDC session at approximately L-2 months must be performed in Russia.
890608	**Crew Microbiological Assessme**	**Total**	60	0	0	0	0	30	0	0	0	30	30	60	150	
890609	**Mir Microbiological Assessment**															
SMP:ENV:P:5	Crew, Air, Surface, and Water Colle					1/ 60									60	1. Exact performance days have been estimated. 2. Combined session for Crew (MSD021), Micro (MSD022), Water (MSD053), and WMM.
SMP:ENV:P:7	Air Sample Collection Training (NA							1/ 60				1/ 60			120	1. Exact performance days have been estimated.
SMP:ENV:P:9	Surface Sample Collection Training							1/ 60				1/ 60			120	1. None at this time.
890609	**Mir Microbiological Assessmen**	**Total**	60	0	60	0	0	120	0	0	0	120	0	0	300	
890610	**Toxicological Assessment of Airborne V**															
SMP:ENV:P:10	Training - Atmosphere Sample Colle					1/ 30						1/ 30			60	1. None at this time.
890610	**Toxicological Assessment of Ai**	**Total**	60	0	30	0	0	0	0	0	0	30	0	0	60	
890613	**Mir Defibrillator and Crew Medical Re**															
SMP:CH:P:1	Mir Defibrillator and CMRS Familia										1/ 120				120	1. Training sessions should be conducted in Star City or at JSC, dependent on crew schedules.
SMP:CH:P:11	Advanced Cardiac Life Support Meg											1/ 180			180	1. Training sessions should be conducted in Star City or at JSC, dependent on crew schedules.
SMP:CH:P:3	Mir Defibrillator Maintenance										1/ 120				120	1. Training sessions should be conducted in Star City or at JSC, dependent on crew schedules.
SMP:CH:P:5	Advanced Cardiac Life Support Phar											1/ 180			180	1. Training sessions should be conducted in Star City or at JSC, dependent on crew schedules.
SMP:CH:P:7	Advanced Cardiac Life Support Prot											1/ 180			180	1. Training sessions should be conducted in Star City or at JSC, dependent on crew schedules.
SMP:CH:P:9	Advanced Cardiac Life Support Prot											1/ 180			180	1. Training sessions should be conducted in Star City or at JSC, dependent on crew schedules.
890613	**Mir Defibrillator and Crew Me**	**Total**	60	0	0	0	0	0	0	0	240	720	0	0	960	
Crewtime Monthly Totals (in minutes)			60	0	1710	1295	1320	780	2995	2010	6465	4035	2470	1065	24205	
Crewtime Monthly Totals (in hours)			1.00	0.00	28.50	21.58	22.00	13.00	49.92	33.50	107.75	67.25	41.17	17.75	403.42	
Monthly Cum Totals (in hours)			1.00	1.00	29.50	51.08	73.08	86.08	136.00	169.50	277.25	344.50	385.67	403.42		