3.2 Medical Requirements Overview

TABLE 3.2: MEDICAL REQUIREMENTS OVERVIEW

MRID# and Title:	MR008L Toxicological Assessment Using Compound Specific Analyzer-Combustion Products (CSA-CP)
Sponsor:	Medical Operations
Discipline:	Environmental Health
Category:	Medical Requirements
References:	ISS Medical Operations Requirements Document SSP 50260
Purpose/Objectives:	To detect and quantify combustion products (CPs) in the air on-board the ISS following a suspected pyrolysis event or during decontamination of the atmosphere following a confirmed pyrolysis event. CSA-CP data is also used to guide donning and doffing of PPE.
Measurement Parameters:	In-flight concentrations of carbon monoxide, hydrogen chloride, and hydrogen cyanide.
Deliverables:	Real-time assessment of crew exposure to specific noxious combustion by-products. In off-nominal or contingency events when extensive monitoring is required, a post-event report evaluating the data collected will be provided.
Flight Duration:	≥30 days
Number of Flights:	Every ISS Increment
Number and Type of Crewmembers Required:	One crewmember (CM) is trained in all EHS activities (US Specialist). All CMs are trained in Environmental Health System (EHS) Toxicology Operations. One CM will perform the in-flight activity.
Other Flight Characteristics:	N/A

3.3 Preflight Training

TABLE 3.3: PREFLIGHT TRAINING

Preflight Training Activity Description:	All CMs are trained in EHS Toxicology Operations			
	Duration:	**Schedule:**	**Flexibility:**	**Personnel Required:**
Schedule:	EHS Assessment: 90 minutes	See MA/ITP Schedule	N/A	Instructors/Crewmembers
Ground Support Requirements Hardware/Software	**Preflight Hardware:**	**Preflight Software:**	**Test Location:**	
	CSA-CP, CSA-CP Sampling Pump CSA-CP Zero Filter, CSA-CP Sampling Pump Filters, CSA-CP Data Cable ,CSA-CP Sample Probe, CSA-CP/CDM Battery Packs, Station Support Computer (SSC)	CSA-CP Software on SSC	U.S	
Training Facilities	**Minimum Room Dimensions:**	**Number of Electrical Outlets:**	**Temperature Requirements:**	**Special Lighting:**
	29' x 14'	1 (One)	Ambient	N/A
	Hot or Cold Running Water:	**Privacy Requirements:**	**Other:**	
	N/A	N/A	1 Table & 6-8 chairs	
Constraints/Special Requirements:	None			
Launch Delay Requirements:	Refresher training will be available upon crewmember request.			
Notes:	EHS Assessment includes training for CSA-CP, Grab Sample Containers (GSCs), Formaldehyde Monitor Kit (FMK), Portable Oxygen Monitor (POM), Carbon Dioxide Monitor Kit (CDMK), Portable Gas Delivery System, and Air Quality Monitor (AQM). USOS and Russian Crewmembers who have completed ASCAN Training or have flown before will complete the EHS Assessment.			

3.4 Preflight Activities

TABLE 3.4: PREFLIGHT ACTIVITIES –Launch Delay Requirements

Preflight Activity	No Preflight Activity
Launch Delay Requirements:	For launch delay of ≥30 days, the hardware owners may choose to refurbish and/or recalibrate the CSA-CPs.
Notes:	None
Data Delivery	N/A

3.5 Inflight Activities

TABLE 3.5.1: In-Flight Activities

Table 3.5.1a IN-FLIGHT ACTIVITIES

<table>
<tr><td>In-Flight Activity Description:</td><td colspan="4">During nominal operations, the four CSA-CP monitors remain powered down: two units are deployed in Node 1 and two units are deployed in the Russian Service Module (SM). Measurement of CP concentrations are taken real-time using the CSA-CPs in response to a suspected pyrolysis event. Measurements are also taken during decontamination of the atmosphere following a confirmed pyrolysis event.

CSA-CP Activation & Checkout is performed in two parts. During Part 1, battery packs are replaced, and date, time and Data Logger are reset via software on any ISS laptop. After Part 1, all four new CSA-CP monitors will be deactivated and deployed for 10-12 days in the open cabin to off-gas. After the 10-12 day off-gassing period, Part 2 is performed where all new units will be zero calibrated if sensor readings are within acceptable range.</td></tr>
<tr><td rowspan="3">Schedule:</td><td>Activity</td><td>Duration</td><td>Schedule</td><td>Personnel Required</td></tr>
<tr><td>CSA-CP Nominal Ops</td><td>Unstow: 5 minutes
Activate: 5 minutes
Sampling: Activity dependent
Restow: 5 minutes</td><td>As Needed</td><td>1 Crewmember
Unattended during unpowered deployment</td></tr>
<tr><td>CSA-CP Activation & Checkout</td><td>Part I: 50 minutes
Part II: 20 minutes
Total: 70 minutes.</td><td>Prior to deployment of new units</td><td>1 Crewmember</td></tr>
<tr><td>Procedures:</td><td colspan="4">Procedures can be found in the Systems Operations Data File (SODF) Med Ops book</td></tr>
<tr><td>Constraints / Special Requirements:</td><td colspan="4">• All crewmembers must know exactly where the units are located in case a pyrolysis event (i.e., fire) is suspected or confirmed.
• CSA-CPs must be readily accessible in the event that a pyrolysis event is suspected or confirmed.
• For CO> 50 ppm, an additional measurement is required using the CO Draeger Tube.
• If elevated CP levels are obtained, photo documentation of sampling locations may be requested by ground or CM.</td></tr>
<tr><td>Photo/TV Requirements:</td><td colspan="4">Photo documentation will be requested on an as needed basis, typically following contingency events or when elevated levels of CPs are detected. Photos should show approximately 1 meter of surrounding area on all sides of the sample locations.</td></tr>
<tr><td>Cold Stowage Requirements:</td><td colspan="4">N/A</td></tr>
<tr><td>Mission Extension Requirements:</td><td colspan="4">The CSA-CP monitors are resupplied based on the calibration or shelf life of the sensors.</td></tr>
<tr><td>Notes:</td><td colspan="4">The four CSA-CP monitors onboard the ISS are replaced and returned to JSC Toxicology for post-flight evaluation and future refurbishment for ISS resupply.</td></tr>
</table>

Data Delivery	CSA-CP data will be verbally communicated to MCC-H and may be recorded in crew notes, IPV, or .xml. For extensive monitoring sessions, data download and downlink to MCC-H may be required depending upon the criticality of the data and the CP levels reported. The JSC Toxicology and Environmental Chemistry (TEC) Laboratory will evaluate all downlinked data and provide an assessment to the Crew Surgeon as soon as possible. Any significant findings resulting from CSA-CP measurements will be included in the final Increment Toxicology Report. The final Increment report will be posted to the JSC Toxicology website no later than 3 months after analysis of all Increment samples is completed.

TABLE 3.5.2: IN-FLIGHT HARDWARE

Hardware/Software Name
CSA-CP Monitor Assembly
CSA-CP Sampling Pump
CSA-CP Sampling Pump Filters
CSA-CP Zero Filter
CSA-CP Sample Probe
CSA-CP/CDM Battery Packs
CSA-CP Data Cable
Station Support Computer (SSC)
CSA-CP Software

3.6 Postflight Activities – No Postflight Activities

3.7 Summary Schedule

TABLE 3.7: SUMMARY SCHEDULE

ACTIVITY	DURATION	SCHEDULE	PERSONNEL REQUIRED	CONSTRAINTS
Preflight Training				
EHS Assessment:	90 minutes	See MA/ITP Schedule	Crewmembers/ Instructors	Requires SSC with CSA-CP Software
Preflight: N/A				
In-Flight				
CSA-CP Nominal Ops	Unstow: 5 minutes Activate: 5 minutes Sampling Varies (Activity dependent Restow: 5 minutes	As Needed - If a pyrolysis event is suspect or confirmed	1 Crewmember	The CSA-CP monitors are deployed (unpowered) as follows: • Two in Node 1 • Two in the Russian SM All crew members must know the deployed locations of the CSA-CPs. CSA-CPs must be readily accessible in the event that a pyrolysis event is suspected or confirmed
CSA-CP Activation & Checkout	Part I: 50 minutes Part II: 20 minutes Total: 70 minutes	Prior to deployment of new units	1 Crewmember	After Part 1, all new CSA-CP monitors will be deactivated and deployed for 10-12 days in the open cabin to off-gas.
Postflight: N/A				
Postflight Debrief:				
Crew Debrief	No extra time	~R+30 days	Crewmembers & Toxicology Team	Included as part of the nominal Med Ops debrief.