

Approved per signature page

INTEGRATED RUSSIAN SEGMENT

EMERGENCY OPERATIONS
ДАС ЭО

IRS.1

2000

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INTRODUCTION

These crew procedures are intended for trained crew members who have completed the full training course and simulations

RSC-E developed procedures 1, 2 steps.2.1 - 2.7.11, procedure 3 steps.3.2, 3.3.1 – 3.3.4, procedure 4 step 4.1

NASA developed procedure 2 steps..2.7.12 - 2.7.19, procedure 3 step 3.3.5, procedure 4 step 4.2

NASA and RSC-E developed procedure 3 step 3.1, 3.3, procedure 5

These crew procedures determine initial order of crew actions in case of depress and fire at the 2R flight phase

These crew procedures may be updated ISS assembly, pending systems modification and procedure validation at simulators and training facilities















ACRONYMS AND ABBREVIATIONS

АС	-	USOS
б/и	-	crew procedures
БИ	-	flight engineer
БМП	-	micropurification unit
БО	-	orbital module on Soyuz
БОА	-	atmosphere purification unit
БРУБ	-	БО switch panel
БРУС	-	СА switch panel
ВВ	-	air duct fan
ВД	-	air duct
ВКЛ	-	activate
ВН	-	air heater
ВП	-	parachute altimeter
ГА	-	pressurized adapter
ГЖА	-	gas-liquid unit
ДпоУЗ	-	√ MCC
ДнаЗ	-	Report to MCC
загл	-	cap
ЗвП ВЧ	-	high-pitch warble
ЗвП НЧ	-	low-pitch warble
ИП	-	parameter measurement
ИП-1	-	directional air flow sensor
ИПД	-	Draeger tube air sampler
ИПК-1	-	gas mask
ИРС	-	Integrated Russian segment
КК	-	Soyuz commander
Кл	-	valve
клав	-	pushbutton
КСД	-	depress valve
КЭ	-	CDR
КЭИ	-	multifunction parameters display
МОК	-	condensate line
МВ	-	pressure gauge
ОСП4	-	backpack fire extinguisher
ОТКЛ	-	off, turn off, deactivate
ОТКР	-	open, opened
п.	-	procedure step

ПБК	-	[CA] depress command inhibit
ПГО	-	instrumentation cargo compartment
ПрК	-	transfer tunnel
П.О.	-	TBD
ПСС	-	caution and warning panel
поУЗ	-	On MCC GO
ПхО	-	transfer compartment
Р	-	pressure
Р(МВ)	-	pressure gauge pressure
РБС - У	-	universal power outlet
РРЖ	-	liquid flow control valve
РС	-	Russian segment
СА	-	Soyuz descent module
СвД	-	LED
СМ	-	Service Module
см	-	ref.
СПГС	-	gas mixture supply system
СРВ-К	-	condensate water processor
СРО	-	work lights
ССВП	-	docking and internal transfer system
СТ	-	station: SM and FGB
СтА	-	docking assembly
СУ	-	docking device
ТК	-	Soyuz
ТКГ	-	Progress
тмб	-	sw, switch
ТСЭ	-	electroluminescent indicator panel
Т.рез	-	time remaining until P=490 mmHg in the overall station volume
Т.рк	-	time remaining until P=490 mmHg in Soyuz compartment volume
t.1мм	-	pressure drop time in total station volume per 1 mm Hg
ФВП	-	harmful contaminants filter
ФГБ	-	Functional Cargo Block
ХСА	-	cooler/dryer
ЦО	-	master alarm
ЦП	-	SM central post
ЭО	-	expedition crew
ЭП	-	visiting crew

SYMBOLS

□	-	illuminated
■	-	not illuminated
◻	-	blinking
▣	-	indicator status changes when command is issued
↓	-	press pushbutton
⌵	-	press pushbutton to lock
⌴	-	press pushbutton to release
⊕	-	sw →Off (i.e. down relative to label on panel)

	-	sw →On (i.e. down relative to label on panel)
	-	verify
	-	continuously monitor
	-	verify aurally
	-	adjust by rotating
	-	verify. The checkmark sign is used to tell the crewmember to verify that the observed state (or condition) corresponds to the one specified in the procedure
	-	place physical device in designated position
	-	disconnect
	-	connect
	-	clockwise
	-	counterclockwise
	-	clockwise up to stop
	-	counterclockwise up to stop
15:46:28	-	15 h 46 min 28 sec
Deg	-	degree
min	-	minutes
mL	-	milliliters
mm Hg.	-	millimeters of mercury
	-	repeat steps

1. GENERAL INSTRUCTIONS

In case of emergency situation the crew is responsible to record GMT and **report to MCC** at earliest available comm pass

The crew bears all responsibility for any actions performed in departure from the crew procedures

ISS CDR is responsible for crew and station safety, ISS CDR directs and coordinates all crew activities
Crew member in charge of a station segment is responsible for performance of all the segment-related actions

Double failures, simultaneous leaks in two compartments are considered very low probability abnormalities and are not described in the crew procedures

RS Emergency Ops crew procedure book is located:

CDR's and flight engineer's copies – at SM central post

Pilot's copy – in orbital module

Radiogram Form 14 should be placed daily into cover pocket of Emergency Ops in orbital module

After audio signal АВАРИЯ (*Emergency*) (high-pitch warble) deactivate hardware being operated, go to central post, determine АВАРИЯ on caution and warning panel

After signal АВАРИЯ $\Delta P / \Delta t$, complete transfer inside station for 2 minutes (for operation of directional air flow sensors)

During hatch closure:

Ensure there are no foreign objects in the hatchway

If time permits, clean hatch rubber seals

Expedition crew is responsible for fire on ISS, visiting crew may be involved in fire extinguishing

Fire extinguishing is performed by command (not less than 2 crew members)

In case of fire on spacecraft, the crew member responsible for the spacecraft (with the seat liners) will extinguish fire

2. DEPRESSURIZATION

2.1. SCHEMATIC OF RESPONSE TO DEPRESS (TBD)

2.2. RESPONSE TO ΔP/ ΔT AND ATM PRESS ALARM SIGNALS

<input type="checkbox"/> ΔP/ Δt, ЗВУК (high-pitch warble)\ (T.res < 06:11:00)	<input type="checkbox"/> ATM PRESS, ЗВУК (high and low-pitch warble) (T.res > 06:11:00)
--	--

RS Laptop

P.MB _____ GMT _____

P.MB drops (if not, <<< ■ ΔP/ Δt ■ ATM PRESS Report to MCC)

Разгерметизация

T.res _____ (if available)	pressure drop temperature _____ (if available)
----------------------------	--

ИнПУ
ПА 3(228)

SM:SM COMM CONTROL ↓ CHANNEL 1,2	√ <input type="checkbox"/> VHF 1 <input type="checkbox"/> CHANNEL 1,2
-------------------------------------	--

Disconnect ВД Soyuz – ПрК (ГА)
Ingress Soyuz, taking pressure gauge

P.MB _____ GMT _____

Δ GMT / Δ P.MB = t.1mm _____ T.res _____ (nomograph)

Shut (but do not seal) БО – СУ hatch
<<< P.MB

P.MB drops– Soyuz is leaking		P.MB is stable – Soyuz is sealed	
Open БО-СУ hatch		Open БО-СУ hatch urgently	
Leak rate < 0.4 mm/min (T res>13:17:00) (SoyuzT reserve>00:25:00)	Leak rate ≥ 0.4 mm/min (T.res<13:17:00)	Perform 2.3, p. 2—2 СУ TUNNEL LEAK CHECK	
Perform 2.5, p. 2—2 [CA] LEAK CHECK	Perform 2.4, p. 2—2 SOYUZ PREPARATION FOR UNDOCKING		

2.3. CY TUNNEL LEAK CHECK

КСД cap ↔ fitting labeled МЕСТО ЗАГЛУШКИ КСД

Close ПрК – СУ (ГА – СУ) hatch

Close БО-СУ hatch

БО

√ККС → ЗАКР (*Close*), √КВД → ЗАКР (*Close*)

ККТ → ОТКР (*Open*)

◀◀ P.MB (БО), when leak check is complete ККТ → ЗАКР (*Close*)

T.res ≤ 00:30:00	T.res > 00:30:00	
Do not open БО – СУ hatch Begin preparation for descent, see SOYUZ: ASCENT AND DESCENT Report to MCC	Open БО – СУ hatch Open ПрК – СУ (ГА – СУ) hatch	
	ΔP ≥ 2 mm - СУ is leaking Perform 2.6.1, p. 2—4 ISS DEACTIVATION	ΔP = 0 - СУ is sealed Return to central post at least 5 min elapsed from АВАРИЯ signal - Perform 2.6, p. 2—3 LEAK PINPOINT

2.4. SOYUZ PREPARATION FOR UNDOCKING

Transfer space suits and seat liners into SM

If necessary, use portable repress tank

ПК 7

↓ ПУЛЬТ ВКЛ (*Panel On*)

БРУС

⊕ РАЗРЕШ РРСТ (*Undocking Inhibit Override*) □ РАЗРЕШ РРСТ, **ЗВУК**

ФЗ

АВТОМАТ КСС (*Rescue Aids Automatic Equipment*)

ПК 8

↓ ПУЛЬТ ОТКЛ (*Panel Off*)

БРУС

⊕ СРО СА ([CA] Lights)

КВД СА – БО → ОТКР (*Open*)

Close СА – БО hatch

КВД БО – СУ → ОТКР (*Open*)

√ КСД БО → ЭЛЕКТ УПР (*Electric*)

БРУБ

⊕ СРО БО ([BO] Lights)

КСД cap ↔ fitting labeled МЕСТО ЗАГЛУШКИ КСД

Close БО – СУ hatch from the ISS side

Close ПрК - СУ (ГА - СУ) hatch

Report to MCC

2.5. [CA] LEAK CHECK

ISS CDR and Soyuz commander in БО, flight engineer ingresses [CA] taking pressure gauge [MB] along

Shut (but do not seal) СА-БО hatch

◀◀ P.MB

ΔP ≥ 2 mm ([CA] is leaking)	ΔP = 0 (БО is leaking)
Open СА – БО hatch Perform 2.4, p. 2—2 SOYUZ PREPARATION FOR UNDOCKING	КВД СА – БО → ОТКР (<i>Open</i>) Open СА – БО hatch КВД СА – БО → ЗАКР (<i>Close</i>) Perform 2.6.1, p. 2—4 ISS DEACTIVATION

2.6. LEAK PINPOINT

ЦП

Reconfigure Pressure Alarm Sensor (ДСД):

sw → 510

WARNING

After signal ATM PRESS, **ЗВУК** (high and low-pitch warble) (from ДСД):

Stop work

КСД cap ←→ fitting labeled МЕСТО ЗАГЛУШКИ КСД

Close ПрК-СУ (ГА-СУ) hatch

Close БО-СУ hatch

Begin preparation for descent – Perform SOYUZ: ASCENT AND DESCENT

ПУ СОА

◀ VAC V OP

If VAC V OP

↓ VAC VLVS

CLOSED

VAC V1 CL

VAC V2 CL

VAC V3 CL

VAC V OP

◀ valve closure per label in indicator

ПСС

SM (FGB)(USOS)

RS Laptop

Разгерметизация

Determine the leaking compartment (~in 5 min after АВАРИЯ signal)

If the leaking compartment is not determined on RS Laptop

Determine the leaking compartment using pressure gauge - perform.2.7, p. 2—10

Isolate the leaking compartment per Table

Compartment	T.isolate		Reference
	Soyuz on SM ПрК	Soyuz on FGB ГА	
Progress	11.5	11.5	2.6.2, p.
ПрК	11 + 11.5	9.5 + 11.5	2.6.3, p. 2—5
[РО]	12.5 + 11.5	12.5 + 11.5	2.6.4, p. 2—6
ПхО	12.5 + 11.5	15 + 11.5	2.6.5, p. 2—7
ПГО	12.5 + 11.5	15 + 11.5	2.6.6, p..2—8
ГА	11.5 + 11.5	14 + 11.5	2.6.7, p. 2—8
USOS	6.5	6.5	2.6.12, p.

2.6.1. ISS DEACTIVATION

ISOLATE PROGRESS (if present) see 2.6.2, p. 2—4

Soyuz on SM ПpК	Soyuz on FGB ГA
<u>FGB DEACTIVATION</u> ПСС ☞ POWER ☞ PБC (all) <u>DEACTIVATE LIGHTING</u> (prior to egress from FGB) <u>SM DEACTIVATION</u> ☞ PБC (all) ПСС ☞ POWER ИHПУ ↓ POWER OFF ПУPВ-К ↓ PANEL POWER OFF ПУ COA ↓ PANEL POWER OFF ПУBH ↓ PANEL PWR OFF (two) ПУ ACY ☞ PANEL PWR <u>DEACTIVATE LIGHTING</u> (prior to egress from SM)	<u>SM DEACTIVATION</u> ПУBH ↓ PANEL PWR OFF (two) ПУ ACY ☞ PANEL PWR ПУPВ-К ↓ PANEL POWER OFF ПУ COA ↓ PANEL POWER ИHПУ ↓ POWER OFF ПСС ☞ POWER ☞ PБC (all) <u>DEACTIVATE LIGHTING</u> (prior to egress from SM) <u>FGB DEACTIVATION</u> ПСС ☞ POWER ☞ PБC (all) <u>DEACTIVATE LIGHTING</u> (prior to egress from FGB)

СУ is leaking	БO is leaking
Ingress Soyuz Close ПpК – СУ (ГA – СУ) hatch Close БO – СУ hatch Perform SOYUZ: ASCENT AND DESCENT (Soyuz preparation for undocking) Report to MCC	Ingress Soyuz Perform SOYUZ: OFF-NOMINAL OPERATION (Preparation for descent in leaking БO) Report to MCC

2.6.2. PROGRESS ISOLATION

Progress T.isolate = 11.5 min

PREPARATION FOR UNDOCKING

Deactivation and removal of YC-21 container (5 min) – perform **on MCC GO**

If time allows

ПБК Deactivation and removal of ВД and ВЭН (3 min)) – perform if time allows

Disconnect ВД ТКГ – ПpК (ГA)

☞ БЛ PРСТ (0.5 min) (*Undocking Inhibit*)

Manual valve ГЖA ТКГ → ОТКРЫТО (*Open*) (0.5 min)

ЩO ↓ Off (two)

КСД cap ↔ fitting labeled МЕСТO ЗАГЛУШКИ КСД

Remove ИП-1 (directional air flow sensor) on ГA – СУ (ПpК – СУ)

Remove docking interface clamps, if Progress is on ПpК

Close ТКГ- СУ hatch

Close ГA – СУ (ПpК – СУ) hatch

◀◀ P(MB), ΔP = 0

Report to MCC

2.6.3. SM ПрК ISOLATIONISOLATE PROGRESS (if present) see 2.6.2, p. 2—4

<u>ISOLATION (SOYUZ on SM ПрК)</u> ПрК T.isolate = 11 min	<u>ISOLATION (SOYUZ on FGB ГА)</u> ПрК T.isolate = 9.5 min
<p><u>FGB DEACTIVATION</u></p> <p>ПСС ⊕ POWER ⊕ РБС (all)</p> <p><u>DEACTIVATE LIGHTING</u> (prior to egress from FGB)</p> <p><u>SM DEACTIVATION</u></p> <p> ⊕ РБС (all)</p> <p>ПСС ⊕ POWER ИнПУ ↓ POWER OFF ПурВ-К ↓ PANEL POWER OFF ПУ СОА ↓ PANEL POWER OFF ПУВН ↓ PANEL PWR OFF (two) ПУ АСУ ⊕ PANEL PWR ППС-24 ⊕ ВВПрК</p> <p>Disconnect ВД [РО] – ПрК (1 min) Remove ИП-1 on [РО] – ПрК (0.5 min) Remove safety ring Close [РО] – ПрК hatch (1 min)</p> <p>КСД cap ↔ fitting labeled МЕСТО ЗАГЛУШКИ КСД (0.5 мин)</p> <p><u>DEACTIVATE LIGHTING</u> Shut (but do not seal) ПрК – СУ hatch (1 min) Close БО – СУ hatch (1 min)</p> <p>⚡⚡ Р.МВ (БО), ΔP = 0 Report to MCC</p>	<p>⊕ РБС</p> <p>Disconnect ВД [РО] – ПрК (1 min) Remove ИП-1 on [РО] – ПрК (0.5 min) Remove safety ring (1 min)</p> <p><u>DEACTIVATE LIGHTING</u> Close [РО] – ПрК hatch (1 min)</p> <p>⚡⚡ Р.МВ, ΔP = 0 Report to MCC</p>

2.6.4. SM ISOLATION ([PO] IS LEAKING)PROGRESS ISOLATION (if present) see 2.6.2, p. 2—4

<u>ISOLATION (SOYUZ on SM ПpK)</u> SM T.isolate = 12.5 min	<u>ISOLATION (SOYUZ on FGB ГA)</u> SM T.isolate = 12.5 min
<u>FGB DEACTIVATION</u> ПСС Ⓢ POWER Ⓢ PБC (all) <u>DEACTIVATE LIGHTING</u> (prior to egress from FGB) <u>SM DEACTIVATION</u> Ⓢ PБC (all) ПСС Ⓢ POWER ИнПУ ↓ POWER OFF ПУРВ-К ↓ PANEL POWER OFF ПУ СОА ↓ PANEL POWER OFF ПУВН ↓ PANEL PWR OFF (two) ПхО Disconnect ВД FGB – SM (1 min) Close ПГО – СУ hatch (3 min) КСД cap ←+→ fitting labeled МЕСТО ЗАГЛУШКИ КСД (0.5 мин) <u>DEACTIVATE LIGHTING</u> Close ПpK – СУ hatch (1 min) Close БО – СУ hatch (1 min) ⚡⚡ P.МВ, ΔP = 0 Report to MCC	<u>SM DEACTIVATION</u> ПУВН ↓ PANEL PWR OFF (два) ПУ АСУ Ⓢ PANEL PWR ПУРВ-К ↓ PANEL PWR OFF ПУ СОА ↓ PANEL PWR OFF ИнПУ ↓ POWER OFF ПСС Ⓢ POWER Ⓢ PБC (all) <u>DEACTIVATE LIGHTING</u> (prior to egress from S M) <u>FGB DEACTIVATION</u> ПСС Ⓢ POWER Ⓢ PБC (all) ПхО Disconnect ВД FGB – SM (1 min) ПГО Close ПГО – СУ hatch (3 min) КСД cap ←+→ fitting labeled МЕСТО ЗАГЛУШКИ КСД (0.5 мин) <u>DEACTIVATE LIGHTING</u> Close ГA – СУ hatch (1 min) Close БО – СУ hatch (1 min) ⚡⚡ P.МВ, ΔP = 0 Report to MCC

2.6.5. SM ПхО ISOLATION

ISOLATE PROGRESS (if present) see 2.6.2, p. 2—4

ISOLATION (SOYUZ on SM ПpK) ПхО T.isolate = 12.5 min	ISOLATION (SOYUZ on FGB ГА) ПхО T.isolate = 15 min
<p><u>FGB DEACTIVATION</u></p> <p>ПСС Ⓢ POWER Ⓢ PБC (all) <u>DEACTIVATE LIGHTING</u> (prior to egress from FGB)</p> <p>ПхО Disconnect ВД FGB – SM (1 min) Disconnect ВД [PO] – ПхО (1 min) Close ПГО – СУ hatch (3 min) <u>DEACTIVATE LIGHTING</u> Remove ИП-1 on [PO] – ПхО (0.5 min) Close [PO] – ПхО hatch (1 min)</p> <p>⏪⏪ P.MB, ΔP = 0 Report to MCC</p>	<p><u>SM DEACTIVATION</u></p> <p>ПУВН ↓ PANEL PWR OFF (two) ПУ АСУ Ⓢ PANEL PWR ПУРВ-К ↓ PANEL POWER OFF ПУ СОА ↓ PANEL POWER OFF ИНПУ ↓ POWER OFF ПСС Ⓢ POWER Ⓢ PБC (all) ППС-22 Ⓢ ВВ ПхО → Off <u>DEACTIVATE LIGHTING</u> (prior to egress from SM)</p> <p><u>FGB DEACTIVATION</u></p> <p>ПСС Ⓢ POWER Ⓢ PБC (all)</p> <p>ПхО Disconnect ВД [PO] – ПхО (1 min) Remove ИП-1 on [PO] – ПхО (0.5 min) <u>DEACTIVATE LIGHTING</u> (ПpK, PO) Close [PO] – ПхО hatch (1 min)</p> <p> Disconnect ВД FGB – SM (1 min) <u>DEACTIVATE LIGHTING</u> (ПхО) Close ПГО – СУ hatch (3 min)</p> <p> Remove ИП-1 on ГА – СУ (0.5 min) КСД cap ←+→ fitting labeled МЕСТО ЗАГЛУШКИ (0.5 min) <u>DEACTIVATE LIGHTING</u> (FGB) Close ГА – СУ hatch (1 min) Close БО – СУ hatch (1 min)</p> <p>⏪⏪ P.MB, ΔP = 0 Report to MCC</p>

2.6.7. FGB GA ISOLATION

ISOLATE PROGRESS (if present) see 2.6.2, p. 2—4

ISOLATION (SOYUZ on SM ПpK) ГA T.isolate = 11.5 min	ISOLATION (SOYUZ on FGB ГA) ГA T.isolate = 14 min
ГA Close NODE 1 Fwd hatch (0.5 min) Disconnect ВД ПГО – ГA (1 min) Remove ИП-1 on ПГО – ГA (0.5 min) Remove safety ring (1 min) Close ПГО – ГA hatch [noa 10] (1 min)	<u>SM DEACTIVATION</u> ПУВH ↓ PANEL PWR OFF (two) ПУ АСУ Ⓢ PANEL PWR ПУРВ-К ↓ PANEL POWER OFF ПУ СОА ↓ PANEL POWER OFF ИHПУ ↓ POWER OFF ПСС Ⓢ POWER Ⓢ PBC (all) <u>DEACTIVATE LIGHTING</u> (prior to egress from SM) <u>FGB DEACTIVATION</u> ПСС Ⓢ POWER Ⓢ PBC (all) ПГО Disconnect ВД ПГО – ГA (1 min) Remove ИП-1 on ПГО – ГA (0.5 min) Remove safety ring (1 min) КСД cap ←→ fitting labeled МЕСТО ЗАГЛУШКИ (0.5 min) Close NODE 1 Fwd hatch (0.5 min) ГA Close ПГО – ГA hatch (1 min) <u>DEACTIVATE LIGHTING</u> Close ГA – СУ hatch (1 min) Close БО – СУ hatch (1 min)
⚡⚡ P.MB , ΔP = 0 Report to MCC	⚡⚡ P.MB , ΔP = 0 Report to MCC

2.7. LEAK PINPOINT USING PRESSURE GAUGE [MB]

GENERAL INSTRUCTIONS ON LEAK PINPOINT

Crew member task assignments:

SC2:

Monitor compartments pressure integrity using pressure gauge until ΔP becomes > 2 mm Hg or until the monitoring time interval elapse (see Table)

1 mm Hg pressure drop (P(MB)) (t.1mm)	< 30 sec	31-60 sec	> 60 sec
Monitoring time interval P(MB)	1 min	2 min	2t.1mm

Compartment is leaking when $\Delta P > 2$ mm Hg

Compartment is sealed when $\Delta P < 2$ mm Hg within monitoring time interval P(MB)

Report monitoring results and info on leaking compartment to ISS CDR

SC3:

Execute SC2 commands: Close and open hatches and КВД valves, perform other tasks on ISS

2.7.1. RS LEAK CHECK

Close Node 1 Fwd hatch

◀◀ P.MB

$\Delta P \geq 2$ mm Hg. (RS and PMA 1 are leaking)		$\Delta P = 0$ (USOS is leaking)	
ГА Disconnect ВД FGB – NODE 1 Remove ИП-1 on ГА – PMA 1 Close ГА – PMA 1 hatch ◀◀ P.MB		◀ T.res > 00:10:00 Open Node 1 Fwd hatch Perform 2.7.12, p. 2—15 US SEGMENT LEAK CHECK	
$\Delta P \geq 2$ mm - RS is leaking	$\Delta P = 0$ - PMA 1 is leaking		
Open ГА – PMA 1 hatch ◀ T.res > 00:10:00 Perform 2.7.2, p. 2—11 PROGRESS LEAK CHECK	Do not open ГА – PMA 1 hatch Report to MCC		

2.7.2. PROGRESS LEAK CHECK

PREPARATION FOR UNDOCKING

	Deactivation and removal of УС-21 (5 min)) – perform on MCC GO if time allows
	Deactivation and removal of ВД and ВЭН (3 min)) – perform if time allows
ПБК	Disconnect ВД Progress – ПрК (ГА) ⊕ БЛ РРСТ (0.5 min) Manual valve ГЖА ГрО → ОТКРЫТО (<i>Open</i>) (0.5 min)
ЩО	↓ Off (two) КСД cap ←→ fitting labeled МЕСТО ЗАГЛУШКИ КСД (0.5 min) Remove ИП-1 on ГА – СУ (ПрК – СУ) (0.5 min) Remove docking interface clamps if Progress is on ПрК (1 min) Close ТКГ- СУ hatch Close ГА – СУ (ПрК – СУ) hatch ⚡⚡ P.MB

$\Delta P \geq 2$ mm Hg (Progress and СУ are sealed)	$\Delta P = 0$ (Progress or СУ is leaking)
Do not open ГА – СУ (ПрК – СУ) hatch ⚡ T.res > 00:10:00, proceed to FGB LEAK CHECK, 2.7.4, p. 2—12	Do not open ГА – СУ (ПрК – СУ) hatch Proceed to СУ LEAK CHECK, 2.7.3, p. 2—11

2.7.3. СУ LEAK CHECK

Obtain FGB pressure gauge
√ ККТ ГА (ПрК) – Soyuz → CLOSE
cap ←→ ККТ
FGB pressure gauge →← ККТ
ККТ → OPEN
⚡⚡ P.MB

$\Delta P \geq 2$ mm Hg (СУ is leaking)	$\Delta P = 0$ (Progress is leaking)
Do not open ГА – СУ (ПрК – СУ) hatch ККТ → CLOSE FGB pressure gauge ←→ ККТ cap →← ККТ Report to MCC	

2.7.4. FGB LEAK CHECK (SOYUZ ON SM ПpK)

ПСС Ⓢ POWER
 Ⓢ РБС (all)
DEACTIVATE LIGHTING
 ПхО Disconnect ВД FGB – SM (1 min)
 Remove ИП-1 ПхО - X (0.5 min)
 Close ПхО - СУ – X hatch (3 min)
 << P.MB

$\Delta P \geq 2$ mm Hg (FGB is leaking) Open ПхО - СУ – X hatch Perform SM DEACTIVATION, 2.6.1, p. 2—4 Close ПГО – СУ hatch < T.res > 00:10:00, proceed to SM ПхО LEAK CHECK, 2.7.5, p. 2—12	$\Delta P = 0$ (FGB and СУ are leaking) < T.res > 00:10:00 КВД ПхО - СУ – X → OPEN Open ПхО - СУ – X hatch КВД ПхО - СУ – X → ЭЛЕКТ УПР (<i>Electric</i>) <u>ACTIVATE LIGHTING</u> Proceed to 2.7.7, p. 2—13, perform ГА LEAK CHECK
---	---

2.7.5. SM ПхО LEAK CHECK (SOYUZ ON SM ПpK)

Disconnect ВД [PO] – ПхО
 Remove ИП-1 [PO] – ПхО
DEACTIVATE LIGHTING
 Close [PO] – ПхО hatch
 << P.MB

$\Delta P \geq 2$ mm Hg ([PO] and ПpK are leaking) Open [PO] – ПхО hatch < T.res > 00:10:00, proceed to ПpK LEAK CHECK, 2.7.6, p. 2—12	$\Delta P = 0$ (ПхО is leaking) Report to MCC
--	---

2.7.6. [PO] LEAK CHECK (SOYUZ ON SM ПpK)

ППС-24 Ⓢ ВВ ПpK
 Disconnect ВД [PO] - ПpK
 Remove ИП-1 [PO] – ПpK
 СУ Remove safety ring
 КСД cap ↔ fitting labeled МЕСТО ЗАГЛУШКИ КСД
 Close [PO] – ПpK hatch

[PO] – ПpK hatch would not close	[PO] - ПpK hatch is closed (ПpK is leaking) Do not open [PO] - ПpK hatch
----------------------------------	---

ПpK DEACTIVATE LIGHTING
 Shut (but do not seal) ПpK – СУ hatch
 Close БО – СУ hatch
 Report to MCC

2.7.7. ГA LEAK CHECK (SOYUZ ON SM ПpК)

ПГО Disconnect ВД ПГО - ГA
Remove ИП-1 on ПГО – ГA
Remove safety ring

ГA DEACTIVATE LIGHTING

ПГО Close ПГО – ГA hatch
◀◀ P(MB)

$\Delta P \geq 2 \text{ mm Hg}$ (ПГО and CY are leaking)		$\Delta P = 0$ (ГA is leaking)
Open ПГО – ГA hatch <u>DEACTIVATE LIGHTING</u> Close ПГО – CY hatch ◀◀ P(MB)		Do not open ПГО – ГA hatch Report to MCC
$\Delta P \geq 2 \text{ mm Hg}$ (CY is leaking)	$\Delta P = 0$ (ПГО is leaking)	
Close ПxO - CY – X hatch Report to MCC	Open ПГО – CY hatch Close ПxO - CY – X hatch Report to MCC	

2.7.8. SM LEAK CHECK (SOYUZ ON FGB ГA)

ПГО Perform SM DEACTIVATION, 2.6.1, p. 2—4
Disconnect ВД FGB – SM
Close ПГО – CY hatch
◀◀ P(MB)

$\Delta P \geq 2 \text{ mm Hg}$ (FGB is leaking)	$\Delta P = 0$ (SM and CY are leaking)
Open ПГО – CY hatch Close ПxO – CY – X hatch Perform FGB deactivation, 2.6.1, p. 2—4 ◀ T.res > 00:17:00, proceed to 2.7.9, p. 2—13, perform ПГО LEAK CHECK	◀ T.res > 00:17:00 КВД ПГО – SM → OPEN Open ПГО – CY hatch КВД ПГО – SM → ЭЛЕКТ УПР (<i>Electric</i>) Proceed to 2.7.10, p. 2—13, perform ПpК LEAK CHECK

2.7.9. ПГО LEAK CHECK (SOYUZ ON FGB ГA)

Disconnect ВД ПГО - ГA
Remove ИП-1 on ПГО – ГA
Remove safety ring
КСД cap ◀+ fitting labeled МЕСТО ЗАГЛУШКИ
DEACTIVATE LIGHTING
Close ПГО – ГA hatch

ПГО – ГA hatch would not close (ПГО is leaking)	ПГО – ГA hatch is closed (ГA is leaking)
Close ГA – CY hatch Close БО – CY hatch Report to MCC	Do not open ПГО – ГA hatch Close ГA – CY hatch Close БО – CY hatch Report to MCC

2.7.10. ПpK LEAK CHECK (SOYUZ ON FGB ΓA)

ППC-24 Disconnect ВД [PO] - ПpK
 Ⓢ ВВПpK → Off
 Remove ИП-1 on [PO] - ПpK
 Remove safety ring
DEACTIVATE LIGHTING
 Close [PO] – ПpK hatch
 ◀◀ P.MB

$\Delta P \geq 2$ mm Hg ([PO] and ПxO are leaking) Open [PO] – ПpK hatch ◀ T.res > 00:17:00, proceed to 2.7.11, p.2—14 perform [PO] LEAK CHECK	$\Delta P = 0$ (ПpK is leaking) Do not open [PO] - ПpK hatch Report to MCC
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2.7.11. [PO] LEAK CHECK (SOYUZ ON FGB ΓA)

ППC-22 Ⓢ ВВПxO → Off
 Disconnect ВД [PO] - ПxO
 Remove ИП-1 on [PO] - ПxO
DEACTIVATE LIGHTING
 Close [PO] – ПxO hatch
 ◀◀ P.MB

$\Delta P \geq 2$ mm Hg (ПxO and CY are leaking) Do not open [PO] - ПxO hatch Close ПxO – CY – X hatch ◀◀ P.MB	$\Delta P = 0$ ([PO] is leaking) Open [PO] – ПxO hatch Close ПГО – CY hatch Close ΓA – CY hatch Close БO – CY hatch Report to MCC
$\Delta P \geq 2$ mm Hg (CY is leaking) Close ПГО – CY hatch ◀◀ P.MB $\Delta P = 0$, Report to MCC	$\Delta P = 0$ (ПxO is leaking) Open ПxO – CY – X hatch Close ПГО – CY hatch Report to MCC

2.7.12. US SEGMENT LEAK CHECK**WARNING**

After each hatch closure, if T.res < 10 minutes,
evacuate US Segment and close FGB ΓA-PMA 1 hatch

Perform MPLM LEAK CHECK(if MPLM available) (see 2.7.13)

Close Lab Aft hatch (if available)

◀◀ P[MB]

Hatch closes or $\Delta P \geq 2$ (N1 or N1/Lab Vest Leak)	Hatch opens (Lab Leak)
Close Node 1 Fwd hatch √Node 1 Fwd Port(Fwd Stbd) IMV vlvs (two) – CL	√Node 1 Fwd MPEV → CL
	Perform ECLSS SSR-3: LAB LOSS OF TOTAL PRESSURE EQUIPMENT SAFING, (SODF: ECLSS: CORRECTIVE: ACS)
Hatch opens or $\Delta P \geq 2$ (N1 Leak)	Hatch closes(Vest leak)

Node 1 Fwd MPEV→ OP (if PMA 2 pressurized or Lab present)	√Node 1 Fwd MPEV → CL
Cap Node1 Stbd&Port PPRVs(two)	Report to MCC
Node 1 Deck MPEV→OP (if PMA 3 pressurized)	
Close FGB GA-PMA 1 hatch	
Perform ECLSS SSR-2: Node 1 LOSS OF TOTAL PRESSURE EQUIPMENT SAFING, (SODF: ECLSS, CORRECTIVE, ACS)	
Report to MCC	

2.7.13. MPLM LEAK CHECKISOLATE MPLM

Close MPLM hatch

◀◀ P[MB]

Hatch closes or $\Delta P \geq 2$ (N1 or N1/MPLM Vest Leak)	Hatch opens (MPLM Leak)
Close Node 1 Deck hatch √Node 1 Deck Aft (Deck Fwd) IMV vlv – CL ◀◀ P[MB]	MPLM MPEV→OP Close Node 1 Deck hatch √Node 1 Deck Aft (Deck Fwd) IMV vlv – CL Report to MCC
Hatch closes(Vest Leak)	Hatch opens or $\Delta P \geq 2$ (Node 1 or Lab Leak)
√Node 1 Deck MPEV → CL Report to MCC	Perform 2.7.12 US SEGMENT LEAK CHECK

2.7.14. PMA 1 ISOLATION

PMA 1	Close Node 1 Aft hatch √Node 1 Aft MPEV – OP
FGB	Remove ИП-1 Air Sensors on ΓA-PMA 1 hatch Close FGB ΓA-PMA 1 hatch

2.7.15. NODE 1 ISOLATION**NOTE**

Expect PCS messages for IMV vlv failure is configuring valves to open/closed position.

Node 1 Stbd, Port Hatches	Cap Node 1 Stbd, Port PPRVs (two)
Lab Aft	If Lab is present √Lab Aft Port(Aft Stbd) IMV vlvs (two) – CL Close Lab Aft hatch √Lab Aft MPEV – CL
MPLM	If MPLM is present Close MPLM hatch √MPLM MPEV – CL
Node 1	If PMA 3 is pressurized Node 1 Deck MPEV → OP(if PMA 3 pressurized)
FGB	Close FGB ΓA-PMA 1 hatch
PCS	Perform ECLSS SSR-2: NODE 1 LOSS OF TOTAL PRESSURE EQUIPMENT SAFING (SODF: ECLSS: CORRECTIVE: ACS).

2.7.16. LAB ISOLATION

Node 1	√Node 1 Fwd Port(Fwd Stbd) IMV vlvs (two) – CL Close Node 1 Fwd hatch √Node 1 Fwd MPEV – CL
PCS	Perform ECLSS SSR-3: LAB LOSS OF TOTAL PRESSURE EQUIPMENT SAFING, (SODF: ECLSS, CORRECTIVE, ACS)

2.7.17. MPLM ISOLATION

MPLM Close MPLM hatch
 MPLM MPEV → OP
 If time available, disconnect vestibule jumpers.

Node 1 Close Node 1 Deck hatch
 √Node 1 Deck MPEV → CL

2.7.18. NODE 1/LAB VESTIBULE ISOLATION

Lab √Lab Aft Port(Aft Stbd) IMV vlvs (two) – CL
 Close Lab Aft hatch
 √Lab Aft MPEV → CL

Node 1 √Node 1 Fwd Port(Fwd Stbd) IMV vlvs (two) – CL
 Close Node 1 Fwd hatch
 √Node 1 Fwd MPEV → CL

2.7.19. NODE 1/MPLM VESTIBULE ISOLATION

MPLM Close MPLM hatch
 √MPLM MPEV → CL
 If time available, disconnect vestibule jumpers.

Node 1 Close Node 1 Deck hatch
 √Node 1 Deck MPEV → CL

3. FIRE

3.1. BURNING ODOR/FIRE

ПСС ↓ MANUAL ALARM FIRE

- MANUAL, **ЗВУК** (low-pitched warble)
- FIRE
- SM (FGB)

GMT _____

Deactivate SM ventilation

WARNING
SM ventilation must be re-activated within 30 minutes after deactivation

<p>RS Laptop SM: TBM: Процедуры</p> <p>proc: F21_APS_0 (CO Gas-Analyzer (ГЛ2106) Fans Deactivation)</p> <p>Execute</p>	<p>ИНПУ SM: COTP CONTROL</p> <p>FAN MASTER POWER OFF <input type="checkbox"/> FANS PWR OFF</p> <p>БК-2 ↓ FAN OFF (for both БКЮ in crew quarters 1,2)</p> <p>ПУВН ↓ ZONE HEATERS / OFF ↓ FAN / OFF</p>
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Obtain emergency equipment: US PBA or ИПК-1, flashlights and CSA-CP
 Locate fire source and remove local electrical power, if possible

CAUTION
Do not use fire extinguishers from Orbiter
<u>NOTE</u>
Fire extinguisher will be obtained from affected module: US PFE on the USOS, or ОСП-4 on the RS

Perform atmosphere test using CSA-CP, record CSA-CP readings as time allows

GMT: _____

Location _____

CO _____

HCl _____

HCN _____

Don US PBA or ИПК-1 if visible smoke or flames present, or if CSA-CP readings exceed CO - TBD, HCN - TBD, HCl - TBD

Configure Condensate Collector valves on SM

201 7Кл4 → В СБОРНИК КОНДЕНСАТА (*To Condensate Collector*)

401 7Кл3 → ЗАКРЫТ (*Closed*)

Report to MCC (MCC-M deactivates FGB ventilation)

If fire continues, perform fire procedure for affected module per Table

SM	see 3.3.1, p. 3—5
FGB	see 3.3.2, p. 3—5
Soyuz	see 3.3.3, p. 3—6
Progress	see 3.3.4, p. 3—6
NODE 1	see 3.3.5, p. 3—7

If indications, confirming fire, are not defined, perform ECLSS SSR-1 FALSE FIRE RECOVERY (SODF:ECLSS:CORRECTIVE:FDS)>>

Perform RODF: ISS ATMOSPHERE RECOVERY, 4, p. 4—1

3.2. SMOKE ALARM ON RS

ПСС SMOKE, **ЗВУК** (high and low-pitch warble) GMT _____

Locate source of fire and remove local electrical power, if possible

ПУС <input checked="" type="checkbox"/> LED DETECTOR SIGNAL Determine location of activated smoke sensor according to the Table in ПУС area	ПУС <input checked="" type="checkbox"/> LED DETECTOR SIGNAL US ISS Homepage:Fire Summ PSC Fire Display Determine location of activated smoke sensor in FGB
--	---

If there is no smoke – false activation

Locate source of dust

- ПУС LED DETECTOR SIGNAL
- ПСС FIRE, SMOKE
- RS СМ:СОЖ:Сигнал-ВМ
- Laptop **proc:** F26_APS_1 (*Fire detection mode Deactivation*)
Execute
proc: F26_APS_0 (*Fire detection mode Activation*)
Execute
Report to MCC

Expect activation of the other sensors, proceed to procedure FIRE ALARM, see 3.3, p. 3—3

3.3. FIRE ALARM

Go to SM Central Post GMT _____

Locate source of fire and remove local electrical power, if possible

ПСС FIRE, **ЗВУК** (high-pitch warble) SM (FGB)(USOS)

RS Laptop (<input type="checkbox"/> SM)	ПУС (<input type="checkbox"/> SM)	PCS (<input type="checkbox"/> USOS)(FGB)
СМ:СЖО:Сигнал-ВМ Determine location of activated smoke sensor in SM ДС 1 and 2,3 (↓)	<input checked="" type="checkbox"/> LED DETECTOR SIGNAL (1 st activated ДС) <input type="checkbox"/> LED DETECTOR SIGNAL (2 nd and next activated ДС) Determine location of activated smoke sensor (ДС) according to the Table in ПУС area	ISS Homepage:Fire Summ Fire Display Determine location of activated smoke sensors in FGB or USOS

Obtain emergency equipment: US PBA or ИПК-1, flashlights and CSA-CP

CAUTION

Do not use Halon fire extinguishers from Orbiter

NOTE

Fire extinguisher will be obtained from affected module: US PFE on the USOS, or OCP-4 on the RS

Perform atmosphere test using CSA-CP, record CSA-CP readings as time allows

GMT:

Location _____

CO _____

HCl _____

HCN _____

Don US PBA or ИПК-1, if visible smoke or flames present, or if CSA-CP readings exceed: CO - TBD, HCN - TBD, HCl - TBD

Perform the procedure for affected module per Table

SM	see 3.3.1, p. 3—5
FGB	see 3.3.2, p. 3—5
Soyuz	see 3.3.3, p. 3—6
Progress	see 3.3.4, p. 3—6
NODE 1	see. 3.3.5, p. 3—7

3.3.1. FIRE IN SM

Use OCP-4 to extinguish the fire

Fire is extinguished	Fire continues	
Identify the damaged hardware, visually estimate the damage Proceed to ISS ATMOSPHERE RECOVERY, 4, p. 4—1	Soyuz on SM ПрК	Soyuz on FGB ГА
	Ingress Soyuz Disconnect ВД ТК – ПрК КСД cap ↔ fitting labeled МЕСТО ЗАГЛУШКИ КСД Close ПрК – СУ hatch Close БО – СУ hatch Report to MCC	Disconnect ВД FGB - SM Remove ИП-1 ПхО - X Close hatch ПхО - СУ - X (if possible) Close ПГО – СУ hatch Ingress Soyuz Disconnect ВД ТК – ГА КСД cap ↔ fitting labeled МЕСТО ЗАГЛУШКИ КСД Close ГА – СУ hatch Close БО – СУ hatch Report to MCC

3.3.2. FIRE IN FGB

Disconnect ВД ТК – ГА, if Soyuz is on FGB ГА

ISOLATE USOS:

Close NODE 1 Fwd hatch

Use OCP-4 to extinguish the fire

Fire is extinguished	Fire continues	
Identify the damaged hardware, visually estimate the damage Proceed to ISS ATMOSPHERE RECOVERY, 4, p.4—1	Soyuz on SM ПрК	Soyuz on FGB ГА
	Disconnect ВД FGB - SM Remove ИП-1 on ПхО - X Close ПГО – СУ hatch Close ПхО - СУ – X hatch Ingress Soyuz Disconnect ВД ТК – ПрК КСД cap ↔ fitting labeled МЕСТО ЗАГЛУШКИ КСД Close ПрК - СУ hatch Close БО – СУ hatch Report to MCC	Ingress Soyuz КСД cap ↔ fitting labeled МЕСТО ЗАГЛУШКИ КСД Close ГА – СУ hatch Close БО – СУ hatch Report to MCC

3.3.5. FIRE IN NODE 1

4. ISS ATMOSPHERE RECOVERY

4.1. ISS ATMOSPHERE RECOVERY AFTER FIRE ON RS

NOTE

Crew location during atmosphere scrubbing process is to be determined by CDR

ACTIVATE VOZDUKH – Perform RODF: SM COFC, 6.21 and 6.6, **mode**
 < Activate БМП (activates automatically in 30 min after FIRE)

ППС-22 Ⓢ ВВПхО
 ППС-24 Ⓢ ВВПрК

RS Laptop	ИНПУ	Automatically
SM: TBM: Процедуры proc: F21_APS_1 (CO Gaz-Analyzer (ГЛ2106) Fans Activation) Execute	SM: COTP CONTROL FAN MASTER POWER ON ■ FANS PWR OFF	Ⓢ FGB ventilation activation (in 20 min after FIRE) Ⓢ SM ventilation activation (30 min after FIRE)

TEST ATMOSPHERE FOR TOXIC CONTENT (in area of fire)
 Perform atmosphere test using CSA-CP, record readings into Table
 Perform atmosphere test Draeger tube air samplers (see 4.4, p. 4—9), record readings into Table
 GMT _____ Location _____

	CSA-CP	Draeger tube air samplers		
		1	2	3
CO				
HCl				
HCN				

1. Pump counter indication, showing that color is changing
2. Maximum indication of Draeger tube scale
3. Pump counter indication with maximum scale indication

Perform air sample collection using adsorbers AK-1 (AK-1M) (see 4.3, p. 4—9) and GSC

Go to safe place (CDR determines crew location during atmosphere scrubbing)
 Obtain from SM a store of breathing masks (don them during atmosphere scrubbing) and a store of Draeger tube air samplers

Shut (but do not seal) hatches:

ПрК(ГА) Remove ИП-1 on ПрК – СУ (ГА– СУ)

ПхО Shut (but do not seal) ПpК – СУ (ГA– СУ) hatch
 Disconnect ВД FGB – SM
 Remove ИП-1 on ПхО – X
 Shut (but do not seal) ПхО - СУ – X hatch

Isolate USOS:
 Close NODE 1 Fwd hatch

When scrubbing is complete (after 2 hours) ingress affected module
TEST ATMOSPHERE FOR TOXIC CONTENT:
 Perform atmosphere test using CSA-CP, record readings into Table
 Perform atmosphere test using Draeger tube air samplers (see 4.4, p. 4—9),
 record readings into Table
 GMT _____ Location _____

	CSA-CP	Draeber tube air samplers		
		1	2	3
CO				
HCl				
HCN				

1. Pump counter indication, showing that color is changing
2. Maximum indication of Draeger tube air sampler scale
3. Pump counter indication with maximum scale indication

Perform air sample collection using samplers AK-1 (AK-1M) (see 4.3, p. 4—9) and GSC

SYSTEM RETURN TO NOMINAL OPERATION MODE

ПСС
 RS Laptop

◀ ■ FIRE, SMOKE (after there is no more alarm input on sensor)

CM:COЖ: Сигнал-ВМ

proc: F26_APS_1 (Fire detection mode Deactivation)

Execute

proc: F26_APS_0 (Fire detection mode Activation)

Execute

On MCC GO:

201 7Кл4 → В СБОРНИК КОНДЕНСАТА (To Condensate Collector)

401 7Кл3 → ЗАКРЫТ (Closed)

201 7Кл4 → ЗАКРЫТ (Closed)

401 7Кл3 → В СРВК (To Condensate Water Processor)

ПСС-22 Rebuild airduct nominal configuration ВД

ПСС-24 ☞ ВВПхО

☞ ВВПpК

Report to MCC

4.2. NODE 1 POST FIRE CLEANUP

TOOLS AND EQUIPMENT REQUIRED

TBD	Portable LiOH Scrubber Assy
TBD	LiOH Canisters (2)
TBD	Charcoal Filters
TBD	CSA-CP
TBD	Carbon Dioxide Monitoring Kit (CDMK)
TBD	AK-1 Russian Air Sampling Kit (2 pipes), including AM-5 Aspirator and GSC
TBD	US Portable Breathing Apparatus and/or Russian Isolating Gas Mask (3)
TBD	Flashlight (2)
TBD	Wet Wipes, Towels

1. ACTIVATE CONTAMINANT SCRUBBING EQUIPMENT

SM	1.1 Activate the Micropurification Unit (БМП) and Vozdukh in the Service Module {ABSORPTION CARTRIDGES (Φ1, Φ 2) PURIFICATION MODE (on MCC GO) (БМП in auto control mode)} step 3.6.2(RODF: TBD)
MCC-M	1.2 Activate the Harmful Contaminants Filter (ΦБП) in the FGB (RODF: TBD)

2. VERIFY BREATHABLE ATMOSPHERE IN SAFE HAVEN

SM/FGB	2.1 Perform COMBUSTION SPECIFIC ANALYZER - COMBUSTION PRODUCTS (CSA-CP) POST FIRE ANALYSIS (SODF:Med Ops: Nom) to obtain contaminant level readings in SM and FGB. Doff PBAs as indicated in procedure.
	2.2 Relay readings to MCC-H at next communication opportunity.

3. RE-ACTIVATE NODE 1 SYSTEMS

If any equipment was manually powered off or if Load Shed was initiated,
3.1 √**MCC-H** for electrical power re-activation steps

4. NODE 1 INGRESS AND DAMAGE ASSESSMENT

	4.1 Obtain flashlights, AK-1 Russian Air Sampling Kit and AM-5 aspirator, CSA-CP, and CDMK.
Node Aft	4.2 Don US PBA, open Node 1 aft hatch per decal, and enter Node 1 with equipment gathered in step 4.1.
Node 1	4.3 Perform damage assessment, noting extent of damage and equipment capabilities lost.
	4.4 Verify HEPA filters installed in return duct air registers.
	4.5 Perform {AIR SAMPLING ON ADSORBER AK-1} (RODF: TBD), to take Node 1 air samples using two pipes.

- 4.6 Perform {COMBUSTION SPECIFIC ANALYZER - COMBUSTION PRODUCTS (CSA-CP) POST FIRE ANALYSIS} (SODF:Med Ops: Nom) to obtain contaminant level readings in Node 1. Record readings in Table 1.
- 4.7 Perform {CDMK MONITORING TBD} (SODF: TBD) to obtain CO2 level in Node 1. Record levels in Table 1.
- 4.8 Egress Node 1 and close hatch per decal. Doff PBAs if save haven readings in step 2.1 allow.
- 4.9 Relay damage assessment readings to **MCC-H** at next communication opportunity.

Table 1. Node 1 Contaminant Level Readings/GMT

Contaminant	1 Hr EGC low/high	Steps 4.6, 4.7 /GMT	Step 6.2, 6.3 /GMT	Step 8.3, 8.4 /GMT	Step 8.3, 8.4 /GMT	Step 8.3, 8.4/GMT
CO	50/500 ppm					
HCN	5/50 ppm					
HCl	5/20 ppm					
CO2	N/A					

5. NODE 1 CABIN FAN ACTIVATION FOR PARTICULATE SCRUBBING

For each Node 1 smoke detector,

PCS

- 5.1 Node 1: ECLSS: Smoke Detector 1 (2)

Node 1 Smoke Detector 1 (2)

√RPC Position – Closed

'Monitoring'

cmd Inhibit

√Status – Inhibited

'Fire Status'

cmd Reset

Verify Status – blank

- 5.2 Perform NODE 1 CABIN FAN ACTIVATION/DEACTIVATION step 2 (SODF:ECLSS:A&C: THC), to activate fan.

- PCS 5.3 Node 1: ECLSS: Smoke Detector 1 (2)
Node 1 Smoke Detector 1 (2)

Note Smoke Detector 1 and 2 initial Scatter readings.

GMT _____ SD1 Scatter _____

GMT _____ SD2 Scatter _____

CAUTION

If Scatter readings increase markedly after fan activation plus 5 minutes, fire has restarted. Perform step 5.5 of this procedure immediately.

- 5.4 Verify SD 1 and 2 Scatter readings decrease as Cabin Fan runs.
- 5.5 When Scatter readings stabilize, indicating that particulate removal is complete, or on MCC go, perform NODE 1 CABIN FAN ACTIVATION/DEACTIVATION step 3 (SODF: ECLSS: A&C: THC), to deactivate fan.

6. NODE 1 INGRESS AND ATMOSPHERIC SCRUBBING SET UP

- 6.1 Obtain flashlights, CSA-CP, CDMK, Portable LiOH Scrubber, LiOH Canister and 2 Charcoal filters, don PBA or Russian Isolating Gas Masks.
- 6.2 Perform COMBUSTION SPECIFIC ANALYZER - COMBUSTION PRODUCTS (CSA-CP) POST FIRE ANALYSIS (SODF:Med Ops: Nom) to obtain contaminant level readings in Node 1. Record readings in Table 1, p. 4 – 4
- 6.3 Perform CDMK MONITORING TBD (SODF: TBD) to obtain CO2 level in Node 1. Record levels in Table 1, p. 4 – 4
- 6.4 Relay CSA-CP and CDMK readings to MCC-H at next communications opportunity.
- If CO2 concentration in Lab from step 6.3 is greater than 1.3% or 13,000 ppm (10 mmHg at 760 mmHg total pressure)

- Node 1 6.5 Perform PORTABLE LiOH SCRUBBER ACTIVATION/DEACTIVATION (SODF: TBD), to set up and activate Portable LiOH Scrubber in Node 1.
- 6.6 Perform NODE 1 BACTERIA/CHARCOAL FILTER R&R (SODF: ISS IFM: Nom), to replace starboard side HEPA filters with Charcoal filters. Skip steps 1 and 10.

6.7 Egress Node 1 and close hatch per decal. Doff PBAs if save haven readings in step 2.1 allow.

7. NODE 1 CABIN FAN RE-ACTIVATION

7.1 Perform NODE 1 CABIN FAN ACTIVATION/DEACTIVATION step 2 (SODF: ECLSS: A&C: THC), to activate fan.

7.2 After a minimum of 5 hours of Cabin Fan run time, or **on MCC go**, perform NODE 1 CABIN FAN ACTIVATION/DEACTIVATION step 3 (SODF: ECLSS: A&C: THC), to deactivate fan.

8. NODE 1 INGRESS AND CONTAMINANT LEVEL ASSESSMENT

8.1 Obtain CSA-CP, CDMK, replacement LiOH cannister, and 2 Charcoal filters, don PBA or Russian Isolating Gas Masks.

8.2 Open Node 1 aft hatch per decal, and enter Node 1.

Node 1

8.3 Perform COMBUSTION SPECIFIC ANALYZER - COMBUSTION PRODUCTS (CSA-CP) POST FIRE ANALYSIS (SODF:Med Ops: Nom) to obtain contaminant level readings in Node 1. Record readings in Table 1, p. 4 – 4

8.4 Perform CDMK MONITORING TBD (SODF: TBD) to obtain CO2 level in Node 1. Record levels in Table 1, p. 4 – 4

8.5 Relay CSA-CP and CDMK readings to MCC-H at next communications opportunity.

8.6 If CO, HCN or HCl levels are above the 1 Hour SMAC levels, or if CO2 level is above 1.3% (13,000 ppm) (10 mmHg at 760 mmHg total pressure),

8.6.1 Perform NODE 1 BACTERIA/CHARCOAL FILTER R&R (SODF: IFM: Nom), to replace starboard side Charcoal filters. Skip steps 1 and 10.

8.6.2 Deactivate LiOH scrubber, replace LiOH canister, and reactivate scrubber.

8.6.3 Egress Node 1 and close aft hatch per decal.

8.6.4 Repeat steps 7 and 8 (all).

8.7 If CO, HCN and HCl are below 1 Hour Emergency Guidance Concentration High Levels and if CO2 level is 1.3% (13,000 ppm) or less,

8.7.1 Egress Node 1 leaving aft hatch open.

8.7.2 Doff Breathing masks.

9. RELEASE IMV ISOLATION

If CCS software controlling,

Fire Summ: Manual Fire Alarm Display: Manual Fire Alarm Response: ISS IMV Isolation

ISS IMV Isolation

- 9.1 'RS IMV Isolation'
'Isolate'

cmd Release

√RS IMV Isolation Status – Released

- 9.2 'Node 1 IMV Isolation'
'Isolate'

cmd Release

√Node 1 IMV Isolation Status – Released

- 9.3 'LAB IMV Isolation'
'Isolate'

cmd Release

√Lab IMV Isolation Status – Released

- 9.4 'MPLM IMV Isolation'
'Isolate'

cmd Release

√MPLM IMV Isolation Status – Released

If NCS R2 software controlling

- 9.5 Node 1: ECLSS: FDIR

Node 1 FDIR

'IMV Isolation'

cmd Release

√Node 1-1 MDM IMV Isolation Status – Not Isolated

√Node 1-2 MDM IMV Isolation Status – Not Isolated

NOTE

MCC-H will provide CCAA, Node 1 Cabin Fan, IMV, and AR equipment configuration for steps 10 – 12.

10. ECLSS HARDWARE RECONFIGURATION

On MCC-H GO,

- 10.1 Perform NODE 1 BACTERIA/CHARCOAL FILTER R&R (SODF: ISS IFM: Nom), to replace starboard side Charcoal filters with HEPA filters. Skip steps 1 and 10.

10.2 Perform CCAA ACTIVATION (SODF: ECLSS: A&C: THC)

10.3 Perform NODE 1 CABIN FAN ACTIVATION/DEACTIVATION step 2 (SODF: ECLSS: A&C: THC), to activate the fan.

10.4 Perform AR RACK ACTIVATION (SODF: ECLSS: A&C: ARS)

11. RE-ESTABLISHING USOS INTERMODULE VENTILATION

On MCC-H GO,

11.1 Perform IMV VALVE RECONFIGURATION step 2 (SODF: SYSTEMS: ECLSS: NOM: THC) to open the Lab Aft Port and Lab Aft Stbd Valves, and to open the Node Fwd Port and Node Fwd Stbd Valves

11.2 Perform IMV FAN ACTIVATION/DEACTIVATION steps 1 – 2 (SODF: ECLSS: A&C: THC) to turn on the Lab Aft Port Fan

11.3

12. RE-ESTABLISHING USOS – RS INTERMODULE VENTILATION

On MCC-H GO,

If CCS software controlling,

12.1 Perform IMV VALVE RECONFIGURATION step2 (SODF: ECLSS: NOM: THC) to open the Node Aft Port and Node Aft Stbd Valves

12.2 Perform IMV FAN ACTIVATION/DEACTIVATION steps 1 – 2 (SODF: SYSTEMS: A&C: THC) to turn on the Node Aft Port Fan

If NCS R2 software controlling:

12.3 Perform NODE 1 IMV VALVE RECONFIGURATION (2R-5A) step 2 (SODF: ECLSS: NOM: THC) to open the Node Aft Port and Node Aft Stbd Valves

12.4 Perform NODE 1 IMV FAN ACTIVATION/DEACTIVATION (2R-5A) steps 1 – 2 (SODF: ECLSS: A&C: THC) to turn on the Node Aft Port Fan

PMA1 12.5 √Grille Cover - Closed

13. MANUAL CLEAN-UP OF NODE 1

Node 1 13.1 Clean fluids, particulates and soot form interior of Node 1 using materials such as wet wipes, towels etc. and discard into Progress.

4.3. AIR SAMPLE COLLECTION USING AK-1M ADSORBER

Unstow:

- Pump for samples (ACCURO)
- AK-1 (AK-1M) adsorbers

◀ Round pump indicator — white

√ Cycle counter — 0 (Counter may be reset by depressing the rod next to the counter window using a felt-tip pen)

Unscrew strap nuts from adsorber tips and remove caps (two)

Adsorber →← pump

- Fully compress pump to the hard stop (indicator color — dark)
- Cycle counter increased by 1
- Release pump
- Wait till pump is fully expanded (indicator color — white)
- Repeat until pump counter reading — 5

Adsorber ←+→ pump

Install caps (two) on adsorber tips and secure them with strap nuts

Record date, time and location of air sample collection

Adsorber → medicine cabinet container #7

Use pump for work with Draeger tube air samplers

4.4. ATMOSPHERE TEST USING DRAEGER TUBE AIR SAMPLERS

Unstow from kits with Draeger tube air samplers (ИПД) :

- Draeger tube air samplers CO #140 and #160 (two),
- HCN # 220,
- HF # 260

◀ Air sampler indicator layer color – white (yellow-orange, light blue)

Do not use air sampler
Replace it with air sampler from kit

Report to MCC

Snap off both tips of air sampler glass tube (snapping sound is heard)

Assemble circuit

Connect air samplers using smaller diameter fittings
Air sampler # 140 (# 220, #260) →← pump ACCURO
using larger diameter fitting

