

SUBJECT: Soyuz-30, Expedition 31 / Increment 31 MORR Minutes

DATE: April 4, 2012

PLACE: Goddard Space Flight Center, B12 / Room N112

TIME CONVENED: 1300

TIME ADJOURNED: 1430

#### ATTENDANCE

<i>Last Name</i>	<i>First Name</i>	<i>Organization</i>	<i>E-mail Address</i>	<i>Telephone #</i>
Bangerter	James	GSFC/NASA/HSF ND	James.A.Bangerter@nasa.gov	301-286-7306
Banks	Turonald	GSFC/HSF	Turonald.Banks.contractor@exelisinc.com	301-823-2563
Beckner	Phil	GSFC/595	phillip.d.beckner@nasa.gov	301-286-1919
Booker	Harrison	GSFC/HSF	Harrison.Booker@exelisinc.com	301-823-2627
Butts	Bradford	GSFC/NASA/761	Bradford.Butts-1@nasa.gov	301-286-3266
Calhoun	Melvin	GSFC/HSF	Melvin.Calhoun@exelisinc.com	301-823-2644
Clark	Elizabeth	GSFC/HSF	Elizabeth.Clark@exelisinc.com	301-823-2625
Daniel	Earl	GSFC/HSF	Earl.Daniel.contractor@exelisinc.com	301-823-2560
Denis	Jean-Marie	GSFC/NASA/301	Jean-Marie.Denis-1@nasa.gov	301-286-2093
Honeycutt	Randy	GSFC/CSO	Randy.B.Honeycutt@nasa.gov	301-286-0771
Hudiburg	John	GSFC/NASA	John.J.Hudiburg@nasa.gov	301-286-9152
Kraesig	Richard	GSFC/HSF	Richard.Kraesig@exelisinc.com	301-823-2569
May	Jennifer	GSFC/HSF	Jennifer.May.contractor@exelisinc.com	301-823-2629
Pifer	Fred	GSFC/HSF	Fred.Pifer.Contractor@exelisinc.com	301-823-2646
Ramirez	Crystal	GSFC/595	Crystal.E.Ramirez@nasa.gov	301-286-2197
Russell	Thomas	GSFC/HSF	Thomas.Russell@exelisinc.com	301-823-2626
Schlichter	Dale	GSFC/SCNS	Dale.Schlichter@exelisinc.com	301-823-2606
Testoff	Steven	GSFC/ASRC/HSF	Steven.B.Testoff@nasa.gov	301-286-6538

<i>Via Teleconference</i>				
Aquino	Joseph	JSC/NASA/SCIO	Joseph.M.Aquino@nasa.gov	281-483-4033
Baum	Earl	JSC/NOIT	Earl.J.Baum@nasa.gov	281-483-2321
Fulford	George	ER	george.fulford@patrick.af.mil	-----

Harris	Mark	WFF	Mark.A.Harris@nasa.gov	757-824-2192
Hervey	Jewel	JSC/NASA/SCIO	Jewel.R.Hervey@nasa.gov	281-483-0359
Hoge	Susan	GSFC/NASA/595	Susan.L.Hoge@nasa.gov	301-286-3661
Marriott	Bob	JSC/NOIT	Robert.R.Marriott@nasa.gov	281-483-6879
Marsh	Mike	JSC/NOIT	Michael.K.Marsh@nasa.gov	281-483-4761
Midon	Marco	GSFC/NASA	marco.m.midon@nasa.gov	301-286-5570
Pavlicek	James	DFRC/NASA	james.r.pavlicek@nasa.gov	661-276-2671
Richards	Erik	WSC	Erik.Richards@nasa.gov	575-527-7120
Shinners	Don	GSFC/WSC/NASA	Donald.W.Shinners@nasa.gov	575-527-7001
Taylor	Shayla	GSFC/SCNS	Shayla.Taylor@exelisinc.com	301-823-2624
Thomas	Justin	DFRC/Arcata	justin.l.thomas@nasa.gov	661-276-5023
Thompson	Craig	JSC/NOIT	Craig.Thompson-1@nasa.gov	281-483-0241
Walker	Jon	NASA HQ	Jon.Z.Walker@nasa.gov	202-358-2145

## INTRODUCTION

Mr. Jim Bangerter convened the April 4, 2012, Soyuz-30, Expedition 31 / Increment 31 Mission Operations Readiness Review (MORR) to review Integrated Network (IN) element mission operations readiness (refer to the presentation, *Soyuz-30, Expedition 31 Increment 31 Mission Operations Readiness Review [MORR]*). This MORR covers changes and updates to the network since the Soyuz-29 MORR.

## MEETING ITEMS

### A. Welcome/Introduction

1. Mr. Bangerter reviewed the agenda for the MORR.
2. Mr. Bangerter reviewed the MORR board membership.
  - Mr. Jean-Marie Denis, Chairperson, GSFC/Code 301, Systems Review Office.
  - Mr. Scott A. Greateorex, GSFC/Code 450.1, Chief, Networks Integration Management Office (NIMO) (not in attendance).
  - Ms. Susan L. Hoge, GSFC/Code 595, Navigation and Mission Design Branch.
  - Mr. Bradford Butts, GSFC/Code 761, Systems Management Branch.
  - Mr. Joseph Aquino, JSC/DD13, Manager, Space Communications Integration Office (SCIO).
  - Mr. Marco Midon, GSFC/Code 453, Ground Network Project.
  - Mr. Don Shinnars, GSFC/Code 452, Space Network Project.
  - Mr. Michael Yettaw, DFRC, Range Technical Monitor, Western Aeronautical Test Range (WATR).
  - Mr. James A. Bangerter, GSFC/Code 450.1, Human Spaceflight Network Director.
3. Mr. Bangerter provided an overview of the review process (Goddard Space Flight Center [GSFC] MORR, Johnson Space Center [JSC] Mission Operations Directorate [MOD] Flight Readiness Review [FRR], and Stage Operations Readiness Review [SORR]). GSFC does not participate directly in the SORR, but is represented by the JSC Ground Controller's (GC) Office. The FRR is scheduled for April 11, 2012. A Date has not been set for the SORR.

### B. Mission Overview

1. Mr. Pifer reviewed the Mission Profile. He stated that the launch is scheduled for May 15, 2012, 0258 GMT. Docking to the International Space Station (ISS) will be May 17, 2012. The Soyuz will remain docked for approximately 6 months at which time it becomes the Russian Crew Return Vehicle. The payload is crew, logistics, and supplies.
2. Mr. Pifer reviewed ISS Supply Sequence. The supply sequence illustrates the activities during the different increments.

### C. Integrated Network (IN) Overview

1. Mr. Pifer reviewed the ISS/Soyuz IN Overview diagram. This is the basic network configuration in support of the ISS and Soyuz. The diagram is color coded for the different network elements. Green denotes the U.S. segment and Blue denotes the Russian segment. Mr. Pifer stated that Tracking and Data Relay Satellite (TDRS) TD-6 is now in place at 46.2 degrees as backup to TD-3. TD-3 is operational as Spare. On April 9, the TD-3 Space-to-Ground dedicate link will be deactivated.

There are no Space-to-Ground link Traveling Wave Tube Amplifier spares remaining (TWTA).

2. Mr. Pifer reviewed the documentation. The table shows what documentation is or will be in place and when including Interim Support Instructions (ISI). All documentation is up to date. Documentation Change Notices (DCN) are in process for TDRS Network Operations Support Plan (TNOSP) and Freeze Exemption Policy. Mr. John Hudiburg asked what types of changes are being made to the documents. Mr. Bangerter stated that no major changes are being made. The changes being made to the documents do not impact the Soyuz-30 mission.
3. Mr. Pifer stated that there have been no Program Requirement Document (PRD) changes.
4. Mr. Pifer reviewed the Operational/Network Changes.
  - (a) The Very High Frequency (VHF)-1 and 2 antenna systems have been configured to two separate towers. A VHF-1 single Yagi will be replaced with a quad Yagi. VHF-1 equipment is being relocated to the Extended TDRSA Ground Terminal (ETGT).
  - (b) The elevation positioner replacement was completed except for radiating when WSC reported damage to the positioner. The positioner was being checked the day of the MORR.
  - (c) Mr. Hudiburg asked why the changes were being made to the original system. Mr. Bangerter explained that there were operational constraints due to noise; passes were limited to over 20 degrees. There was not a full antenna with all elements. Sharing a tower created a single point of failure. Work is ongoing on the implementation. SCNS is the implementer.
  - (d) Mr. Jean-Marie Denis asked if the system will be qualified prior to the Soyuz mission. Mr. Bangerter stated that the services had been extended when there was a problem encountered with the build. There was a limit switch malfunction. WSC is in the process of completing the work and the work should be done by the end of the week. Qual testing will then be done on site. The antenna will be turned Yellow until a pass can be scheduled with the ISS. This upgrade is being done in support of ISS. The VHF support is in support of ISS should ISS lose all TDRSS capability. There is a risk recorded in the system.
  - (e) Mr. Hudiburg asked if the limit switch problem is related to other Space Network (SN) limit switch issues. Mr. Don Shinnars stated that it is not. Mr. Bangerter stated that the switch had been wired incorrectly. Mr. Hudiburg asked if there is a design issue. Mr. Shinnars stated that the S1 antenna mishap was due to the vendor bypassing the hard limit on the switch. This is a quad Yagi and a different configuration.
  - (f) Mr. Hudiburg stated that it was a training issue then. Mr. Bangerter stated that it was a training exercise.
  - (g) Mr. Denis asked if any subsystems are impacted. Mr. Bangerter stated that none were. There was no damage to the antenna.
  - (h) Mr. Bangerter stated that the vendor will be kept on site until all problems have been fixed. The antenna will be exercised in all positions possible. While there are not personnel at the antenna all the time, engineers will be present to watch all activity. The engineers will then work with WSC on interface checks. A pass

will be scheduled with ISS. It is necessary to get on the ISS work schedule and this may not occur until after the Soyuz-30 launch. Once there is a successful pass with the ISS, the system will go Green.

- (i) Mr. Pifer reported that there was a voice configuration problem on March 28. There was an issue with noise in the headsets. This is being worked. Mr. Bangerter stated that this issue will be cleared prior to the system going Green.
  - (j) Mr. Hudiburg asked if this status is reported at the FRR and Mr. Bangerter replied that it is.
  - (k) The WSC Operational Readiness Review (ORR) date has not been set.
5. Mr. Pifer provided a Network Verification Test summary.
- (a) VHF-1 good two-way checks were performed with the ISS and Wallops Ground Station (WGS) on December 26, 2011 and Dryden Flight Research Center (DFRC) on February 23, 2012. Mr. Pifer commented that the passes went well. These are the most recent checks.
  - (b) Mr. Pifer reported that future checks are on hold due to an expired license for the VHF-1 uplink. The JSC Frequency Manager is working the issue. Emergency communications only will be allowed until the license is renewed. Mr. Bangerter stated that all the VHF support is contingency/emergency only. If there is an issue, the VHF will be used. If necessary, an emergency will be declared. JSC has submitted the renewals.
  - (c) In the past, testing was conducted every 3 months. It will not be possible to conduct the testing until the license is renewed and the date is To Be Determined (TBD). Mr. Hudiburg asked if an action is required and Mr. Bangerter replied that it could take months to get the renewal. The license could be renewed at any time. VHF-1 support is ISS and VHF-2 is Soyuz and Russian Extra Vehicular Activity (EVA) suite support. The capability is not needed for any particular mission. This issue is reported up through JSC management and they are very aware of the issue.

#### D. Integrated Network Element Status

- 1. Network Integration Center (NIC). Mr. Pifer provided a NIC status.
  - (a) There have been no software or hardware operational changes since the Soyuz-29 MORR.
  - (b) There are no open Discrepancy Reports (DR).
  - (c) There is one Freeze Exemption Request (FER) in the system for window replacement.
  - (d) There is no open work.
  - (e) There is a projected change to reconfigure the NIC consoles/workstations.
  - (f) Facilities are Green.
  - (g) Staffing is sufficient to meet all requirements.
  - (h) Documentation is up to date.
  - (i) Mr. Pifer stated that the NIC is ready to support Soyuz-30.
- 2. SN/WSC. Mr. Erik Richards provided a SN/WSC and WSC VHF status.
  - (a) Mr. Richards reported that there have been four software and no hardware changes. An Obsolescence Driven Avionics redesign (ODAR) software delivery to the Data Interface System (DIS) There was a firmware delivery to the DIS (Second TDRSS Ground Terminal [STGT] in February and scheduled for the White Sands

Ground Terminal [WSGT] in April). The DIS RS422 replacement has been completed. The FDF modernization work for the NCC Data System (NCCDS) is complete.

- (b) There are no open DRs.
  - (c) There is no open work.
  - (d) There are no projected changes.
  - (e) Staffing is sufficient to meet all requirements.
  - (f) Documentation is up to date.
  - (g) Mr. Richards stated that the SN/WSC is ready to support Soyuz-30.
  - (h) Mr. Richards provided a WSC VHF status.
    - (1) An audio record and camera capability is being implemented. The VHF-1 and -2 systems are being separated.
    - (2) Two DRs are open. DR 260578 is the limit switch DR. System engineers are wrapping up testing. DR 260573 is the High Power Amplifier (HPA) DR and has no mission impact. The prime HPA is fine; the issue is with the backup HPA. The HPA has enough power, but is operating out of spec. Mr. Hudiburg asked if a spare is required for the mission and should the system be considered Green if a spare is needed. Mr. Bangerter stated that the system is Green can support and is Green for use.
    - (3) Mr. Richards reported that open work includes the installation of a camera so that the antenna can be monitored from the operations floor. Mr. Denis asked the completion date. Mr. Richards responded that the date is TBD. An Engineering Change (EC) is being worked. Two ECs have been created. The antenna moves have been completed.
    - (4) Mr. Hudiburg asked if the VHF-1 is part of the scope of the review. Mr. Bangerter stated that it is not in regards to Soyuz and would be for ISS. It is not needed. It does not impact the Soyuz mission and is included for completeness. The system is not used during nominal flight; it is there for contingency/emergency. WSC support is also overlapped by DFRC. There are some mitigations if needed.
    - (5) Staffing is sufficient to meet all requirements.
    - (6) Documentation is up to date.
    - (7) Mr. Richards stated that WSC VHF systems are ready to support Soyuz-30. Mr. Hudiburg stated that it is not accurate to state that the system is ready to support Soyuz-30. Mr. Bangerter agreed that is should stated pending resolution of VHF-1 issues. Mr. Jim Bangerter accepted an action item to report the status and completion of the WSC VHF-1 implementation to the Board (action item Soyuz-30 MORR-01)
3. WGS. Mr. Mark Harris provided a WGS status. There have been no software or hardware operational changes since the Soyuz-29 MORR. There are no open DRs. There is no open work. There are no projected changes. Staffing is sufficient to meet all requirements. Documentation is up to date. Mr. Harris noted that Building 162 is scheduled for roof replacement work from May 2 through June 8. There will be no impact to the VHF-2 system. Operations reserves the right to hold the work during the Soyuz support. The work dates are target dates. Mr. Harris stated that WGS is ready to support Soyuz-30.

4. DFRC. Mr. Justin Thomas reported that there have been no software or hardware operational changes since the Soyuz-29 MORR. There are no open DRs. There is no open work. There are no projected changes. Staffing is sufficient to meet all requirements. Documentation is up to date. Mr. Thomas stated that DFRC is ready to support Soyuz-30. Mr. Hudiburg asked if there were any power supply issues, as he thought there had been some in the past. Mr. James Pavlicek responded that the power supply issues were at the Aeronautical Test Facility (ATF)-1. It was an S-band problem and not a comm issue.
5. NASA/DoD C-bands Eastern Range (ER). Mr. George Fulford provided an ER resources status. ISS Visiting Vehicles (VV) are not routinely supported by the ER and Western Range (WR). If a contingency is declared by the ISS Ground Controller (GC) during a VV mission, the ranges have agreed that C-band radars will provide VV contingency support within agreed upon call-up times for Nominal and Off-duty hours. An ISI for C-band Radar Contingency Call-up Procedures will be published prior to mission. Prior to L-10 days, an update to the Points-of-Contact (POC) for the ISI will be sent. The ER will also send the Spaceflight Mission Managers (SMM) a status of the available radars. This notice will not preclude any radar maintenance, etc. Mr. Hudiburg asked which radars will be used. Mr. Bangerter started that the range will inform the network of which radars are available 10 days in advance. Ms. Crystal Ramirez stated that the Flight Dynamics Facility (FDF) baselines the L-30 day trajectory. Mr. Bangerter stated that the radars will be called up in a contingency if there is non-nominal launch. The first radar is whichever has a view after the declaration of a contingency/emergency. Mr. Hudiburg asked when the last radar pass occurred. Mr. Bangerter stated that it was approximately Soyuz-27. Mr. Hudiburg stated that there most likely have been configuration changes. He asked how the network maintained confidence that the radars could support. Mr. Bangerter replied that the radars are used for other support such as Expendable Launch Vehicle (ELV) launches and SpaceX last year.
6. Flight Dynamics Facility (FDF). Mr. Phil Beckner reported that there have been no software or hardware changes since the Soyuz-29 MORR. FDF has transitioned to the modernized hardware/software system. Soyuz-29 was successfully supported from the modernized system. Ms. Ramirez commented that the new system is supporting the ISS regularly. Ms. Sue Hoge stated that the legacy system has been removed. There are no open DRs. The Soyuz-30 Two Line Elements (TLE) will be transmitted and reception verified by VHF sites. There are no projected changes. Staffing is sufficient to meet all requirements. The Soyuz-30 Mission Support Plan will be delivered by April 24, 2012. Mr. Beckner stated that FDF is ready to support Soyuz-30. Mr. Hudiburg asked if there was a software problem during the last mission. Ms. Hoge responded that there was a dual stream configuration issue during an Atlas mission and that this does not impact Soyuz.
7. Communication Services Office (CSO). Mr. Randy Honeycutt provided the CSO status.
  - (a) There have been no software or hardware operational changes since the Soyuz-29 MORR.
  - (b) There have been no changes to the Marshall Space Flight Center (MSFC) Russian Services activities.

- (c) There are no Problem Management and Dispatch System (PMDS) tickets.
  - (d) Mr. Honeycutt stated that there is no software open work. There is the completion of the Mission Operations Voice Enhancement (MOVE) keyset retrofit. There are 40 keysets left to retrofit. The retrofit will continue through the end of April. The Nortel Router Replacement Project (NRRP) upgrade work continues. The Transition Readiness Review (TRR) is scheduled for April 4. The project is scheduled for completion in April or May 2013. No new routers have been connected to the operational network and will not be until after a successful TRR. Mr. Hudiburg asked how the freeze policy affects the NRRP. Mr. Bangerter stated that the router work is done separate from the current network. The CSO freeze policy says that there will be no work during freeze or critical periods.
  - (e) There are no projected changes.
  - (f) Staffing is sufficient to meet all requirements.
  - (g) Documentation is up to date.
  - (h) NISN will process all FERs during the mission in accordance with NISN SOP-002.
  - (i) Mr. Honeycutt stated that CSO is ready to support Soyuz-30.
- E. Integrated Network Summary. Mr. Pifer provided an IN summary.
1. Mr. Pifer reviewed the requirements/test matrix. Mr Pifer noted that all requirements have been verified other than the WSC VHF-1 and -2 requirements.
  2. Mr. Pifer reviewed the one risk (VHF-2). VHF-2 is not periodically End-to-End (ETE) tested. The Federal Aviation Administration (FAA) has refused to allow the use of the restricted frequency for periodic VHF-2 system validation. The last VHF-2 ETE Comm check was performed in September 2004. Mr. Bangerter reported that this issue with NASA HQ and the FAA. Mr. Brad Butts asked why this is a risk and Mr. Bangerter stated that NASA is not allowed to radiate from the VHF-2 antenna. The system cannot be completely checked out. Mr. Hudiburg stated that the system will now have new equipment that has never radiated; is a new risk on the new equipment needed? Mr. Bangerter stated that he has just input a new risk for VHF-1. The implementation and license risk will be included and carried until radiated. Mr. Pifer stated that there are Station Readiness Tests (SRT) and that it is possible to radiate through a dummy load. Mr. Bangerter stated that these measures have been effective.

## **BOARD COMMENTS**

Mr. Denis polled the Review Board for their comments. Mr. Bangerter stated that his major concern is the VHF-1 system. This issue is being reported to JSC. Mr. Hudiburg asked if a NASA HQ briefing is required. Mr. Bangerter stated that Mr. Gary Morse is aware of the issue. Mr. Joe Aquino stated that he shares Mr. Bangerter's concerns. All the board members stated that the network is ready to support Soyuz-30 pending closure of the action item and any TBDs.

**ACTION ITEM REVIEW**

One action item was assigned at the April 4, 2012, Soyuz-30 MORR.

Soyuz-30 MORR-01	Jim Bangerter/ GSFC/HSF ND	Report the status and completion of the WSC VHF-1 implementation to the Board.	<b>Open</b>
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**RFA REVIEW**

No Requests for Action (RFA) were assigned at the April 4, 2012, Soyuz-30 MORR.

(Original Approved By)

James A. Bangerter

GSFC/NASA/450.1

HSF ND

Fred Pifer

GSFC/HSF