

DATE: October 18, 2011

LOCATION: Regents Park III, Room 201

SUBJECT: HSF NSG VHF Status Minutes

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## INTRODUCTION

Mr. Kevin Riley convened the October 18, 2011, Human Spaceflight (HSF) Network Support Group (NSG) Very High Frequency (VHF) Status splinter meeting to provide VHF system and site status and discuss planned system upgrades (refer to the presentation, *ISS/Soyuz VHF Support Team, NSG, VHF Ground Station Status*).

## MEETING

- A. Mr Riley reviewed the network configuration. The diagram shows the station equipment and data movement. The antennas are shown at the different stations. It was noted that the White Sands Complex (WSC) has a single tower with both antennas (single Yagi for VHF-1 and quad Yagi for VHF-2). Dryden Flight Research Center (DFRC) has four antennas (two quad Yagi VHF-1 and two quad Yagi VHF-2).
- B. Mr. Riley reviewed the station support requirements. The stations currently support the International Space Station (ISS) with VHF-1 and the Soyuz with VHF-2. This is per the Program Requirements Document (PRD). WSC will not be scheduled below 20 degrees for VHF-1 test passes. This requirement should change once the new WSC tower is in place (to separate the two antennas). WSC should be able to support VHF-1 test passes scheduled to 5 degrees. Soyuz VHF-2 is voice downlink monitoring with emergency uplink only (NASA is not licensed to transmit on the Soyuz uplink frequency). Station proficiency passes used to be performed monthly, but will now be conducted quarterly. The PRD is being updated. When the proficiency passes were performed quarterly in the past, station proficiency did suffer. How to keep the stations proficient will have to be discussed.
- C. Mr. Riley reviewed the station equipment configurations diagram. He noted that WSC is a single string VHF-2.
- D. Mr. Riley reviewed the station major component equipment list. This list provides a comprehensive equipment list. The systems are very similar, but are tuned to different frequencies. WSC has upgraded its VHF-1 system 2 power amplifier.
- E. Mr. Riley provided a Wallops Ground Station (WGS)/WSC hardware status. The Elevation drive motors are obsolete. The motors are common to WSC and WGS. New motors can be purchased and used with a controller software upgrade. Spares for the old motors are available within the network. Mr. Bangerter stated that he would like to discuss using the new motors in the WSC upgrade. Repair of the VHF system is done locally except for the Modular Receiver/Transmitter (MRT) modules which are shipped back to the Goddard Space Flight Center (GSFC) for repair. Building 25 has a technician to do the repairs. GSFC has spare parts which can be shipped to the station while the repairs are being made. Mr. Riley stated that a complete inventory will be conducted at the stations and testbed. The last complete inventory was conducted in 2003.
- F. Mr. Riley provided a DFRC hardware status. DFRC experienced ISS support problems. The backup VHF-1 Quad PC was replaced to mitigate a flip mode problem during an August support. Mr. Mike Yettaw stated that there was noise on a September support. The problem was isolated to power line noise. Insulator replacement on power poles helped alleviate the problem in some directions. More insulators will be replaced to further reduce the noise. DFRC computer displays were upgraded to visually distinguish the V1 Yagi and V2 Yagi tracking systems. Monitors have also been added so that all tracking systems can be seen in real time.

- G. Mr. Riley reviewed the planned WSC upgrades. A new power amplifier was installed in the VHF-1, system 2. The equipment shelter was recabled. There had been some noise in the ISS audio and this helped clear up that problem. Equipment in the shelter racks was relocated to maximize separation between transmit and receive. This equipment move provided no significant improvement and the equipment was returned to its original configuration. The system grounding was checked and found to be good. A VHF-1 Quad Yagi antenna/tower is being ordered. The VHF-1 and VHF-2 final configuration will be on separate towers. The VHF-1 gain and link margin will be increased. A new power divider/combiner was installed but produced higher insertion loss. It was removed for further testing. An Engineering Change (EC) is in process for the tower upgrades. The EC for the record capability has been cancelled. The new record capability will be implemented as part of the tower upgrade EC . The upgrade EC (01) is scheduled for approval on November 9. EC 02 will document the new configuration of the VHF-2 system. There are plans to remote the transmit power output reading to the operations floor and Mr. Ken Clark is working this.
- H. Mr. Cliff Baxter provided a procurement status. A third party vendor will provide the parts for the tower. Additional data was needed on the pad and soil. Data was located and provided to the vendor. A response from the vendor on the provided data is awaited. Fabrication of the antenna and components is proceeding. The tower is scheduled for delivery at the end of November. It will take approximately a week to assemble the tower. It will take one day to move equipment and install the tower at the new site; this will take place in December. Non-recurring (NRE) work is still on hold until the tower vendor says that the data on the pad and soil is the data needed. If not, a waiver may be required.
- I. Mr. Bangerter asked if the new motors will be installed in the upgrade. These motors are not the same as used on the VHF-2. Would it be possible to use the new rather than the old motors? Mr. Riley responded that the plan was to replace the old motors when they fail; there is a lot of effort involved in replacing the motors. There is a plan to stock some of the new motors should there be a failure. There will be three new motors: one in the VHF-1 system and two spares (one for VHF -1 and one for VHF-2 should there be a failure there). He reiterated that the new motors need new software. The vendor will test the new software with the controllers at WSC. Mr. Bangerter asked how often Preventative Maintenance (PM) is performed on the old motors. He asked that a status be provided; a brief summary. Mr. David Glasscock accepted an action item to verify the frequency of the Element PMs and coordinate providing PM status reports to Mr. Jim Bangerter (action item 101811-VHF Status-01). Mr. Glasscock stated that WSC does do trending on the WSC VHF systems maintenance. Mr. Riley stated that the M2 equipment failure rate was reviewed and found to be low. Mr. Mark Harris noted that the motor units are sealed units and a visual inspection does not reveal much. He stated that he will review WGS policy to determine if WGS is doing anything different.
- J. The question arose again as to what can be done to maintain proficiency at the sites now that the proficiency passes have gone back to being quarterly vice monthly. Mr. Bangerter stated that he would like input from stations as what can be done. System Readiness Tests (SRT) will be continued. SRTs are conducted bi-weekly. Mr. Riley stated that SRTs were conducted in the past and there were still proficiency issues. Mr. Ken Jones suggested that monthly dry runs with the elements be conducted (no

radiation to the ISS). Test passes can be scheduled and all the stations exercised. Passive tracking can be performed. Mr. Joe Whitney stated that it should be possible to get permission to use the voice loops. Mr. Kevin Riley accepted an action item to coordinate getting site inputs on what is required to maintain VHF proficiency and develop a procedure for VHF dry runs to supplement the SRTs (action item 101811-VHF Status-02). Mr. Joe Aquino asked if there is the possibility of introducing negative training since there is no uplink. Mr. Riley stated that there was not at the stations; the stations will go through their whole process except bringing up the carrier. Mr. Whitney stated that as new equipment is installed at WSC, it may be possible to get opportunities to do testing. He stated that he will check on this with the Flight Directors (FD). Mr. Riley stated that once the system is together, time with the crew will be needed for engineering passes. Mr. Bangerter stated that the system definitely needs to be verified. Mr. Riley will be writing the verification plan for the new system checkout.

- K. Mr. Riley stated that WSC would like to have cameras so that the operations personnel can see the antennas/towers. He noted that VHF-1 will be further away than it is now. Mr. Glasscock agreed that the monitors are needed. Mr. Bangerter suggested that the excess equipment lists be checked for cameras. If no cameras can be found, an estimate needs to be provided for the cost of implementing the cameras. Ms. Melissa Blizzard accepted an action item to, in regards to implementing the VHF two-tower monitoring capability at WSC: 1) Review the excess equipment lists to determine what, if any, hardware is available and 2) Working through SCNS, provide an estimate for procuring whatever is needed (e.g., two cameras) (action item 101811-VHF Status-03).
- L. Mr. Riley provided a documentation status. The Tracking and relay Satellite System (TDRSS) Network Operations Support Plan (TNOSP) VHF Annex is undergoing a major rewrite. Support Summaries are being standardized. The system equipment manual is being updated.
- M. Mr. Riley reviewed the VHF support summary evaluation points diagram. He noted that the summaries have been given formal form numbers and are under Configuration Management (CM) control. He asked that the stations provided more data in the comments field.
- N. Mr. Riley provided a summary. The new proficiency pass dry runs procedure will be added to the TNOSP if ready in time for the rewrite. If not, an Interim Support Instruction (ISI) will be issued and the document updated at a later date.
- O. Other
  - 1. Mr. Whitney stated that the software onboard the ISS is being updated. The S-band Multiplexer/Demultiplexers (MDM) are being upgraded and if the MDMs go down, the whole system goes down. SRTs will be performed monthly to simulate operations. He stated that he is not sure at what time of day the SRTs will be performed. Mr. Bangerter stated that WGS and WSC can support 24x7, but DFR is not a 24x7 operation. Mr. Yettaw stated that it may be possible to move shifts to provide the needed support.
  - 2. Mr. Bob Marriott asked where the crew is during the checkouts. Mr. Whitney stated that the crew is in the lab and the procedures have been updated.

**ACTION ITEMS**

The following action items were assigned at the October 18, 2011, HSF NSG VHF status meeting.

101811-VHF Status-01	David Glasscock/ WSC	Verify the frequency of the EI motor PMs and coordinate providing PM status reports to Mr. Jim Bangerter.	<b>Open</b>
101811-VHF Status-02	Kevin Riley/ GSFC/HSF	Coordinate getting site inputs on what is required to maintain VHF proficiency and develop a procedure for VHF dry runs to supplement the SRTs.	<b>Open</b>
101811-VHF Status-03	Melissa Blizzard/ GSFC/HSF	In regards to implementing the VHF two-tower monitoring capability at WSC: <ul style="list-style-type: none"><li>• Review the excess equipment lists to determine what, if any, hardware is available and</li><li>• Working through SCNS, provide an estimate for procuring whatever is needed (e.g., two cameras).</li></ul>	<b>Open</b>

(Original Approved By)  
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