**ACTIVITY TITLE:** Start NICMOS Cooling System (NCS)

**Methodology:**

**Execute step 1 of VDT (at least 1 full orbit at +V3 sunpoint prior to NCC operation while moving the ACS Filter Wheel).**

**Execute step 2 of VDT (at least 1 full orbit at +V3 sunpoint prior to NCC operation with no filter wheel motion).**

As early as possible in the BEA period:

1) **Start the NCS CPL:**
   
   Transition the NCS CPL from Hold to Standby  
   CCL> MNCPHDSB

   Transition the NCS CPL from Standby to Pressure Prime  
   CCL> MNCPSBPR 20

   Transition the NCS CPL from Pressure Prime to Startup  
   CCL> MNCPPRSU

   Transition the NCS CPL from Startup to Control  
   CCL> MNCPSUCL 15

2) **Power on the PCE.**
   
   Transition the NCS from NCS Control to NCC Standby  
   CCL> MNCCCLNS

3) **Start the NCC circulator.**

   CCL> MNCCNSCI

4) **Start the NCC compressor at 5000 Hz.**

   CCL> MNCCOP1

5) **Ramp the compressor to 6000 Hz and transition the NCS CPL to Operate.**

   CCL> MNCCOP2

6) **Transition the NCC to PID control.**

   CCL> MNCCOPPD -10 73.75 73.75

4) With the NCC compressor max speed at its default value (7300 rps.), set the NCC PID control set point to 60 K, controlling off of the weighted average of the neon temperatures. This will result in the fastest cool-down.

   CCL> M8NPDCLT ALT 60
5) 24 hours after the NCC cool-down is begun, begin taking NICMOS detector internal temperature monitoring observations (30-minute dark, 0-sec bias exposures, FPA temperature, mounting cup temperature) once per orbit until the conclusion of the test [148 hr after start of cooldown (TBR)].

6) 76 hours (TBR) after the NCC cool-down is begun, slew HST to the sun angle and roll (consistent with the BEA constraints) that produce the warmest mean NCS radiator temperature. Maintain this attitude for 72 hours (TBR).

7) 90 hours after the NCC cool-down is begun, set the NCC compressor max speed to 7250 rps (normal max speed is 7300 rps) and keep the NCC PID control set point at 60 K. This will cause the compressor to run at a fixed speed of 7250 rps and will result in an asymptotic cool-down to the lowest temperature that can be reached at this speed and under these thermal conditions.

   CCL> M8NPDPSPD UPRLIM 7250

No HST attitude requirements pertain to steps 8-15.

8) 148 hours (TBR) after the NCC cool-down is begun, set the NCC PID control set point to 3.0 K warmer than the temperature reached and the NCC compressor max speed to 7300 rps. This will put the NCC under active PID control at a controlled operating temperature. Maintain this set point for 48 hours (TBR). (Note: This configuration is a normal operational configuration and can be maintained indefinitely.)

   CCL> M8NPDPDLT ALT (TBD)
   CCL> M8NPDPSPD UPRLIM 7300

Steps 9-11 verify the repeatability of the NICMOS detector temperature:

9) Increase NCC PID control set point by an amount that corresponds to 0.5 K at the NICMOS detector and maintain this temperature for 48 hours (TBR).

   CCL> M8NPDPDLT ALT (TBD)

10) Decrease NCC PID control set point by an amount that corresponds to 1.0 K at the NICMOS detector and maintain this temperature for 48 hours (TBR).

   CCL> M8NPDPDLT ALT (TBD)

11) Increase NCC PID control set point by an amount that corresponds to 0.5 K at the NICMOS detector and maintain this temperature for 48 hours (TBR).

   CCL> M8NPDPDLT ALT (TBD)

Execute step 4 of VDT (at least 5 full orbits at +V3 sunpoint while NCC is operating at steady state).

Execute step 5 of VDT (at least 5 full orbits at -V1 sunpoint while NCC is operating at steady-state).

Two weeks after the end of the BEA period:

12) Set the NCC PID control set point to the temperature that corresponds to the NICMOS detector optimal science operating temperature as determined from analysis of the data taken in step 7. This temperature will depend on NCS and NICMOS detector performance. Maintain this set point for 48 hours (TBR).

   CCL> M8NPDPDLT ALT (TBD)
13) Concurrent with steps 8-12, take NICMOS detector internal temperature monitoring observations once per orbit.

14) At the end of the 48-hr stabilization interval, take continuous NICMOS detector internal temperature monitoring observations for 1 orbit to demonstrate +/-0.1K stability at the science operating temperature (known as rapid monitor data takes).

15) Continue NICMOS detector internal temperature monitoring observations once every three orbits for 1 month (150 samples) to demonstrate +/-0.5K stability at the science operating temperature.