To: Keith Kalinowski, Mal Niedner

From: Ray Kutina, Larry Petro

Subject: Suggestions for further actions NCS/ASCS EMC

The electromagnetic compatibility review of the NICMOS Cooling System and the Aft Shroud Cooling System conducted by Violette Engineering and subsequent EMC testing has shown no reason to believe that the incorporation of NCS and ASCS during SM3b and SM4 will cause any measurable degradation to the HST science instrument performance. This conclusion hinges on the accuracy of the NCS radiator test results, the applicability of those results to the flight configuration and the accuracy of the predicted RF signal strengths that HST will be exposed to over the next ten years. STScI feels further clarification and analysis in the following areas would strengthen the conclusion and reduce the risk that potential sources of instrument degradation have been overlooked. Barring any negative results from further analysis and testing, we look forward to the benefits that the NCS and ASCS will bring to the science program of the HST observatory.

1) The radical difference in the results from the first and second NCS radiator tests puts the validity of the second test in question. We suggest a single test report covering both tests be written which explains the significant differences between the tests. A single plot of the data from both tests over the full frequency range covered with an indication of the limits and margins would be extremely useful. The report should document the similarities and any differences between the flight configuration of the radiators/CPLs and the test setups noting in particular the test RF illumination pattern versus that expected on-orbit.

2) In order to validate the reasonableness of the test results, compute the theoretical performance of the radiator/CPL system as an antenna and conduit of RF signal into the aft shroud. Evaluate any substantial differences between the analysis and test results.

3) Since the validity of ECAC projected RF field strengths are critical to the validity of the conducted emission margin calculations, we recommend documenting the conservatism in the values over the anticipated lifetime of HST. To what range of operating conditions (e.g. transmitter power and distance to target) do the predicted on-orbit field strengths correspond? Why are RF signals below 450 MHz not considered a threat to HST? The probability and duration that HST might be exposed to the signal levels used in the margin calculations should be determined to understand if such levels will be common or extremely rare and short lived. The possibility that HST might be used as a target for testing ground radars should be assessed and compared to the levels used.