TCB-1) In order for processing of this application (FCC ID: RY20001) to continue, the following issue(s) will have to be addressed: 1) The applicant is requesting a Limited Modular Approval (LMA) for this radio module so that it can be installed in three enclosures, as part of the Moisture Monitoring System. I reviewed the interpretation obtained from Mr. Joe Dichoso at the FCC, which states that it is possible to obtain an LMA if the applicant specifies which specific products the device will be installed in. However, the module was tested in a stand-alone configuration. Since the module does not have its own RF shielding, in order to obtain an LMA for using the module in different enclosures, it must be tested in each of them. Please refer to the interpretation attached to this e-mail from Joe Dichoso describing the particulars for obtaining such a modular approval. This interpretation was downloaded from the FCC's interpretation database.

Please provide radiated and AC conducted (if applicable) emissions data showing compliance with the module in each of its intended enclosures.

Applicant-1) **The EUT was tested with the Gateway Device and the Installer and the data is in the report Appendix E. The enclosures for these devices will be plastic but are not ready at this time.**
When the enclosures become available photographs will be submitted.

TCB-2) Please indicate how the module complies with the rest of the conditions for modular approval described in Public Notice DA 00-1407 (attached to e-mail), such as having its own power supply regulation, buffered data/modulation inputs, etc.

Applicant-2) **See Exhibit 9**

TCB-3) I found no description of the "installer" in the documentation submitted. Please describe the installer and where it will be placed in the installation.

Applicant-3) **See page 2 of resubmitted block diagram**

TCB-4) In addition to the calculations submitted, the user's manual must contain installation and operating instructions for satisfying RF exposure compliance (>20 cm separation and no co-located transmitters within 20 cm). These instructions must clearly indicate that these conditions are for satisfying RF exposure issues. Please submit a revised user's manual.

Applicant-4) **Submitted revised user manual**

TCB-5) Please indicate how the installation of the sensor provides 20 cm separation between the antenna and any nearby party. Also, please indicate exactly where the installer and gateway will be installed and how they provide 20 cm separation. It would be helpful to have a diagram of a typical installation showing each component of the system and where they are typically placed.

Applicant-5) **See page 2 of block diagram**

TCB-6) According to the test data submitted, the time of occupancy during a 20 second period is 0.685 seconds (five 68.5 ms hops in a ten second period, corresponding to ten 68.5 ms hops in a twenty second period), and the limit for a device with a carrier frequency bandwidth of less than 250 kHz is 0.4 seconds in a 20 second period).

TCB-6a) According to the documentation submitted, the slave device will only transmit for 36 ms per hour, which does not agree with the test data. Please clarify and submit new plots if necessary. [Chris H.] I thought the requirement is to test worst case behavior (constantly transmitting) so that is how we configured the tests. We chose the operating mode (near constant transmission) which creates worst case emissions. See the plot in the report (Time of Occupancy)

TCB-6b) According to the documentation submitted, the master device transmits for 65 ms on each channel, while continuously listening for a slave. Please indicate how this device complies with the requirement of not transmitting more than 0.4 seconds in a 20 second period. Submit plots.

Applicant-6,-6a,-6b) **See the plot in the report (Time of Occupancy)**

TCB-7) The block diagram submitted is not sufficient. It must show the signal path and frequency indicated at each block. It must also list the tuning range(s) and intermediate frequency(ies) at each block.

Applicant-7) **See new block diagram submitted**

TCB-8) The plot showing the number of channels indicate that there are 51 channels used, whereas the documentation states that there are 127 channels. Please clarify the actual number of channels utilized.

Applicant-8) **See report sec. 8.7**

TCB-9) The test setup photos indicate that the device was tested in its "X" axis. The pictures in the user's manual show that the device, at least in its "sensor" installation, is installed in its "Z" axis. Please indicate whether investigations were performed to determine the device's radiated emission characteristics in this position.

Applicant-9) **See Description of test configuration in report Sec. 4.1**

TCB-10) The antenna conducted plots submitted do not include the frequency range of 1-2 GHz for any of the channels. Please indicate whether radiated and/or antenna conducted emissions tests were performed for this range to determine compliance with the applicable limits.

Applicant-10) **Yes. See report Appendix E RF Conducted Antenna Test Data.**

TCB-11) The user's manual and AC conducted emission test setup photos show that the module has a DB-9 connector installed, whereas for the radiated tests, no such connector is present. Please indicate the reason, and provide justifications for not performing radiated tests with a cable attached to this port, and having it connected to another device with data being transferred. Please refer to condition #5 contained in Public Notice DA 00-1407.

Applicant-11) **The radiated S1 data is tested as a modular device as a stand alone unit. When the unit was tested with the Gateway device, the connector was used and there was a cable installed with traffic running on the cable.**

TCB-12) The FCC label on the module is incorrectly formatted. As per the FCC rules, section 2.925(a)(1), the FCC identifier shall be preceded by the term “FCC ID:” in capital letters on a single line.

Applicant-12) **See new FCC Label submitted.**

TCB-13) Was the receive mode verified during radiated and conducted emissions tests? FYI: Regardless of whether the module can be approved under an LMA, this would only apply for the transmitter portion, and the receiver portion must be tested to its applicable requirements (i.e.: testing in each enclosure), as there are no provisions in the FCC rules for modular approval of receivers. The receive mode falls under the verification procedure and does not require certification. (see paragraph (a) of FCC Public Notice DA-00-1407.)

Applicant-13) **Yes. We called it standby mode. See description in report Sec 4.1.**

TCB-14) For AC conducted emissions testing, the test report indicates that the measurements were performed while the device was in its “stand-by” mode. Please indicate whether investigations were performed to determine the AC conducted emissions levels while the device was transmitting.

Applicant-14) **See correct report Sec. 4.1. The EUT was transmitting during the conducted test. (Data in Appendix E labeled S1)**

TCB-15) For those configurations where the device is powered directly or indirectly by the AC line, please indicate whether the device complies with the voltage variation requirements contained in FCC rule section 15.31(a)(6)(e).

Applicant-15) **See report Sec. 1 and Sec. 9.**