WORKSHOP 2; USER ENVIRONMENTAL EFFECTS

- IEEE Standard 1193–1994 "Guide for Measurement of Environmental Sensitivities of Standard Frequency Generators" is in print and should be available to the general public early 1995.

- Future focus on guidelines for the time and frequency community should be "dynamic (time–dependent) effects/environmental changes." This may include recommendations for studies and research needed.

- User environmental effects are particularly difficult to characterize because of the problems encountered in mapping manufacturers' specifications (sensitivity coefficients for the individual environmental sensitivities) into the overlapping/interacting actual environments. Resolution often requires expensive simulation of an actual environment.

- The following suggestions were made:

  - Users to characterize both (and independently) the systems' environment for the T&F components (e.g. cables, voltages and fluctuations, internal temperatures, etc.) and the environment of the system itself.

  - Manufacturers to ask, in a guiding and systematic way (develop a "questionnaire"), the user about the environment(s): What temperatures? What cables? Use in vacuum? When needed after turn–on? Will there be high humidity? .... Based on returned data, the manufacturer can apply his *total* knowledge about interactive environmental effects and customize environmental prediction (at little cost) and recommend environmental acceptance tests only where no knowledge exists (minimizing costly testing).

- Failure predictions and warranties have more business/risk factor content than technical value; also, failure definitions depend on a convoluted interpretation of actual performance versus "usually observed" performance versus specified performance. E.g. current GPS on–board failure rates for cesium were stated as one per three years but could be much smaller using a different failure criterion.

- In GPS, temperature sensitivity is used to determine clock health: Eclipse triggers the temperature change; clock health relates to frequency–temperature behavior as compared to prior eclipse data from the same clock. This type of environmental; monitoring may be useful, in general, as a predictor for latent T&F hardware failures.