Draft
January 1987

EXPOSURE PARAMETERS DECISION DOCUMENT

INDIRECT ADDITIVES STANDARD

SECTION 4. PIPES AND RELATED PRODUCTS

This document has been compiled at the request of the Pipes and Related Products Task Group. The purpose is to document the basis for the decisions reached at the December 10-11 Task Group meeting related to the exposure parameters described in the Appendix to the standard.

Discussions related to the Exposure Appendix began with the protocol used in NSF Standard 14--"Plastics Piping Components and Related Materials":

Water Conditions: pH = 5, 8, & 10

100 ppm hardness

1 mg/L available chlorine (except at pH 8)

Time at Temperature: Cold application samples 24, 24, 72 hours at 37.5° C (100° F).

Hot application samples 1, 1, 1/2 hour at 82° C (180° F) followed by 72 hours at 37.5° C (100° F).

DECISIONS #1 AND 2

SECTION 1. SAMPLES

1.0.X SURFACE AREA TO VOLUME RATIO

DECISION: For pipes, the smallest diameter produced by a manufacture within the product line would be tested, (i.e., 3" for ductile iron, 1/2" for copper, etc.).

BASIS: By testing the smallest diameter product manufactured, the surface area to volume ratio would be the greatest and represent the most extreme condition. The committee felt this could be more readily defined, rather than a series of specific surface area to volume ratios based on application or use (e.g., distribution versus residential).

UNDER CONSIDERATION: How to address the surface area to volume ratio for products other than pipes (e.g. fittings), because of the variations in configuration and exposure.

1.1.2 CONDITIONING

DECISION: Prior to exposure testing, the product shall be conditioned by static exposure to pH=8 water (with 100 ppm hardness and 2 mg/L available chlorine [NSF Standard 14 water]) for fourteen

(14) days, with the water changed ten (10) times during this period, with a minimum of 24 hours for each individual exposure.

BASIS: The concern was centered around testing a new product versus one that had adjusted to its environment ('aging'). Metal products were primarily discussed. General consensus was that, initially, significant concentrations of extractions may be present and that these concentrations would be reduced as the product adjusted to the water conditions and a protective layer was formed. This is indicative of the 'real world', which is the general focus of this standard.

The length of the conditioning process (14 days) is designed to represent a pre-occupancy or use period of two weeks. In the first exposure, the conditioning water will contain 50 ppm available chlorine, to reflect disinfection practices as described in AWWA C651-86, "Disinfecting Water Mains".

DECISION #3

SECTION 2. EXTRACTION WATER

DECISION: It was tentatively, decided to use the Langlier Index as the basis for defining the parameters of the water used in exposure testing.

BASIS: During discussions of various pH's for testing, members of the Task Group were of the strong opinion that products should be tested using the average (median) water conditions as defined by the AWWA 1985 Water Utility Operators Data Report. However, there was concern that there are areas where the conditions deviate substantially from the median, and thus the testing would not necessarily be valid.

In an attempt to resolve this dilemma, the approach of only varying the pH to alter the "aggressiveness" of the water was questioned. It was proposed that the Langlier Index would be a better measure of a water's aggressiveness because it takes into account more variables (e.g., temperature, pH, alkalinity, etc.).

UNDER CONSIDERATION: More information about the Langlier Index was requested. Standard 14 water is to be characterized based on the index to determine its adequacy. The water buffering systems may or may not have to be changed.

DECISIONS #4, 5, AND 6

SECTION 5. EXPOSURE

5.0 VESSEL EXPOSURE

DECISION (tentative): In-the-product exposures, rather than product-in-vessel exposures, are preferred.

BASIS: This approach is primarily applicable to pipes. Fittings may not be of a configuration which accommodates this type of evaluation. This approach is based on the premise that only the inside surfaces are exposed to drinking water, and that the outside surfaces may not be suitable for exposure (e.g., the coating on the inside of ductile iron is intended for potable water applications, whereas the outside coating [if coated] is for protection only, and is not intended to contact drinking water).

UNDER CONSIDERATION: How to expose odd shaped products, such as fittings.

5.1.1 MULTIPLE EXPOSURE

COLD APPLICATION SAMPLES:

DECISION: The products shall be exposed at a temperature of 30° C (86° F).

BASIS: There was strong disagreement with the Standard 14 temperature of 37.5° C (100° F). Many felt this temperature was too high and that room temperature (23° C [73° F]) would be more appropriate.

The discussions that followed indicated that the water in some areas of the country, when distributed was exposed to temperatures higher than room temperature (e.g., in the southwest the distribution piping is not buried very deeply or may be above ground, and during the summer can reach temperatures higher than 70° F; similarly piping in attics can reach higher temperatures). Some believed that the lower temperature was appropriate because the water at the tap is not delivered at the temperature occurring in the distribution system. An observer from Louisiana discounted this reasoning by stating that during the summer, water delivered from the tap may indeed be above room temperature, and requires cooling before drinking.

COLD AND HOT APPLICATION SAMPLES:

DECISION: The final exposure for all products shall be for 16 hours. The extractant water produced from this exposure will be analyzed.

For hot applications, samples shall be exposed as outlined below:

1 hour @ 82° C (180° F)
1 hour @ 82° C (180° F)
1/2 hour @ 82° C (180° F)
followed by
16 hours @ 30° C (86° F)

The preconditioning previously discussed will replace the initial two 24 hour exposures outlined in the Standard 14 protocol.

BASIS: It was indicated that the 72 hour exposure in Standard 14 was to simulate the long weekend scenario as a worst case situation. The

opinion of this Task Group was that the Health Effects Task Group will be incorporating the safety factors needed for the Indirect Additives Standard and therefore, this Task Group did not have to nor would it include any additional safety factors. The consensus was that long weekends occur only two or three times a year, and that by including this type of exposure additional safety factors would be introduced. Therefore, overnight simulation of eight hours should suffice.

It was noted that this short exposure period is not feasible in the laboratory and that the water not only stands still overnight, but also during the day when the home is not occupied. Therefore, 16 hours was decided as feasible and representative of the "worst case."

The original two 24-hour periods were eliminated, the basis being that the products had already been conditioned for two weeks, and that these additional periods were unnecessary -- the product to be tested would be exposed directly after conditioning.